This teacher's guide and student guide are designed to accompany a general mathematics textbook that contains supplemental readings, activities, and methods adapted for secondary students who have disabilities and other students with diverse learning needs. The materials are designed to help these students succeed in regular education content courses and include simplified text and smaller units of study. The curriculum correlates to Florida's Sunshine State Standards and is divided into the following 11 units of study: (1) whole numbers; (2) fractions; (3) decimals; (4) percents; (5) geometry; (6) measurement; (7) perimeter/area; (8) graphs; (9) central tendency; (10) integers; and (11) equations. For each unit, the teacher's guide includes a general description of the unit's content and the unit's focus. Key prerequisite skills for the students are also listed in this guide. A suggested order of nine teaching events for the unit is given in a scope and sequence chart. These nine events include: determining present level; introducing the concept; presenting vocabulary; conducting initial learning activity; presenting concepts and examples; addressing common errors; reinforcing skills; summarizing the lesson; and administering a
posttest. Answer keys for the quizzes and activities sheets are also included. Appendices in the teacher's guide contain a chart describing standards and benchmarks. The student guide contains vocabulary lists, explanation of content, and practice exercises designed to evaluate comprehension. (CR)
Building General Mathematics Skills.
Parallel Alternative Strategies for Students (PASS).

Beverly Owens, Amy Mitchell, and Sylvia Walford
Building General Mathemetic Skills

Teacher's Guide

Parallel Alternative Strategies for Students

Bureau of Instructional Support and Community Services • Division of Public Schools and Community Education • Florida Department of Education • 1993
Building General Mathematic Skills

Teacher's Guide

Bureau of Instructional Support and Community Services
Division of Public Schools and Community Education
Florida Department of Education

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Building General Mathematic Skills
Teacher's Guide

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FOREWORD

Parallel Alternative Strategies for Students (PASS) books are content-centered packages of alternative methods and activities designed to assist secondary teachers to meet the needs of students of various achievement levels in the basic education content courses. Each PASS offers teachers supplementary activities and strategies to assist certain exceptional students and low achieving students in the attainment of the intended outcomes of a specific course.

The alternative methods and activities found in the PASS materials have been adapted to meet the needs of specific learning disabled and emotionally handicapped students mainstreamed in content classes. The PASS materials provide basic education teachers with a modified approach for presenting the course content that may be useful with mainstreamed exceptional students and other students with learning or behavior problems in their classrooms. The PASS materials also provide the exceptional education teacher, teaching subject area courses, with curriculum materials designed for these exceptional education students.

The initial work on PASS materials was done in Florida through Project IMPRESS, an EHA, Part B project funded to Leon County from 1981–1984. Four sets of modified content materials called Parallel Alternate Curriculum (PAC) were disseminated as Parts two–five of Resource Manual, Volume V-F: An Interactive Model Program for Exceptional Secondary Students (IMPRESS). Project IMPRESS patterned the PACS after the curriculum materials developed at the Child Service Demonstration Center at Arizona State University in cooperation with Mesa, Arizona Public Schools.

A series of 19 PASS volumes was developed by teams of regular and special educators from Florida school districts who volunteered to participate in the EHA, Part B Special Project, Improvement of Secondary Curriculum for Exceptional Students. This project was funded by the Florida State Department of Education, Bureau of Education for Exceptional Students to Leon County Schools from 1984–88 school years. Basic education subject area teachers and exceptional education teachers worked cooperatively to write, pilot, review, and validate the curriculum packages developed for the selected courses.

Continuation efforts have been maintained through the Curriculum Improvement Project. Beginning in 1989 the Curriculum Improvement Project contracted with Evaluation Systems Design, Inc., to design a revision process for the 19 PASS volumes. First, a statewide survey was disseminated to teachers and administrators in the 67 school districts to assess the usage of and satisfaction with the PASS volumes. Teams of experts in instructional design and teachers in the content area and in exceptional education then carefully reviewed and revised the PASS volumes according to the instructional design principles recommended in the recent research literature.
Neither the content nor the activities are intended to be a comprehensive presentation of any course. These PASS materials, designed to supplement the textbooks and other instructional materials, should not be used alone. Instead, they should serve as a stimulus for the teacher to design alternative strategies for teaching the student performance standards to the mastery level to the diverse population in a high school class.

Students with learning or behavior problems often require alternative methods of presentation and evaluation of important content. The content in PASS differs from the standard textbooks and workbooks in several ways: simplified text, smaller units of study, reduced vocabulary level, increased frequency of drill and practice, shorter reading assignments, clearer and more concise directions, less cluttered format, and the presentation of skills in small, sequential steps.

As supplementary material to augment the curriculum for exceptional students and other low achieving students, PASS may be utilized in a variety of ways. For example, some infusion strategies for incorporating this text into the existing program are as follows:

- additional resource to the basic text
- pre-teaching tool (advance organizer)
- post-teaching tool (review)
- alternative homework assignment
- alternate to a book report
- extra credit
- make-up work
- outside assignment
- individual contract
- self-help modules
- independent activity for drill and practice
- general resource material for small or large groups
- assessment of student learning

The PASS is an attempt to provide some of the print modifications necessary for students with special needs to have successful classroom experiences. To increase student learning, these materials must be supplemented with additional resources that offer visual and auditory stimuli, including computer software programs, videotapes, audiotapes, and laser videodiscs.
ACKNOWLEDGEMENTS

The Parallel Alternative Strategies for Students (PASS) volume: Building General Mathematical Skills was developed in 1991 and was based on the PASS: General Mathematics I. The individuals listed below, including both general education and exceptional student education teachers, assisted in the extensive revision and redesign.

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USER'S GUIDE

The Parallel Alternative Strategies for Students (PASS): Building General Mathematic Skills is designed as a supplementary text and workbook. Building General Mathematic Skills is divided into two books—one for the student and one for the teacher. Each book is divided into eleven units of study: Whole Numbers, Fractions, Decimals, Percents, Geometry, Measurement, Perimeter/Area, Graphs, Central Tendency, Integers, and Equations.

In the student's book, each unit contains a "Student's Guide" with a suggested plan for the unit. The guide presents each of the mathematic concepts with examples and problem-solving steps. Following the guide are the worksheets—comprised of quizzes, vocabulary (if applicable), study sheets, and activity sheets.

Each unit of the Teacher's Guide has an overview which lists the objectives and skills addressed. Key prerequisite skills for the student are also listed. A suggested order of nine teaching events for the unit or section is given in a scope and sequence chart. These nine events—i.e., determine present level, introduce the concept, present vocabulary, conduct initial learning activity, present concepts and examples, address common errors, reinforce skills, summarize the lesson, and administer posttest—are described more fully within the subsequent section called "Suggestions for Teaching," which is found in each section.

The answer keys for the quizzes and activity sheets are contained in each unit of the Teacher's Guide.

The learning activities were designed to be sufficiently general and adaptable enough to accompany other textbooks. The materials herein should not be viewed as a fixed curriculum. Sections may be selected and presented to coincide with the selected basic textbook or with the course outline. Other sections or activities may be eliminated, if desired.

This modified text presents only a limited sample of learning activities. The practice and application of the skills and concepts will necessarily include other supplemental materials. Teachers using these supplemental materials will want to provide a variety of opportunities to stimulate the students' interest and develop higher levels of cognition. The classroom experiences will be further enriched with the inclusion of multimedia materials—especially the microcomputer—and hands-on demonstrations, when possible.

The objectives and skills covered in this PASS are correlated to the units and listed in a correlation chart found in the Appendix. This group of skills was formerly the intended outcomes and student performance standards for the discontinued General Mathematics 1 course no. 1205340.
UNIT 1: WHOLE NUMBERS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
Overview of Unit 1

What This Unit Covers...

Unit 1 provides instruction to assist students in performing mathematical operations with whole numbers. The objectives and skills for this unit are listed below.

Objective 1

Compute with whole numbers
Skills: Add no more than four numbers up to four digits, regrouping when necessary.

Subtract any two numbers up to four digits, regrouping when necessary.

Multiply a three-digit number by a two- or three-digit number.

Divide a four or five-digit number by a two-digit number including multiples of ten and one hundred.

Objective 2

Solve real-world problems
Skills: Solve real-world problems involving no more than two whole number operations.

Estimate answers to real-world problems involving whole numbers, common fractions, or decimal numbers.
UNIT 1: WHOLE NUMBERS

Unit 1 is comprised of four sections. The chart below displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 1

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
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<td></td>
<td>Working real-world word problems</td>
</tr>
<tr>
<td>Section 2</td>
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<tr>
<td></td>
<td>Working real-world word problems</td>
</tr>
<tr>
<td>Section 3</td>
<td>Multiplying with no regrouping</td>
</tr>
<tr>
<td></td>
<td>Multiplying with regrouping</td>
</tr>
<tr>
<td></td>
<td>Working real-world word problems</td>
</tr>
<tr>
<td>Section 4</td>
<td>Dividing whole numbers</td>
</tr>
<tr>
<td></td>
<td>Working real-world word problems</td>
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</table>

Unit Components...

The Teacher's Guide for each section in Unit 1 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary lists, and Activity Sheets are found in the student section.
UNIT 1: WHOLE NUMBERS

Section 1: Addition of Whole Numbers

What This Section Is About...

In this section students will add as many as four whole numbers, with no more than four digits, regrouping when necessary.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
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<tr>
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<td></td>
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<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
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<tr>
<td>3. Present vocabulary.</td>
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<td>a. Adding whole numbers</td>
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<td>b. Rewriting in vertical form to add</td>
<td>p. 5</td>
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<td>c. Working real-world problems</td>
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<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 10</td>
</tr>
</tbody>
</table>

Teacher's Guide
UNIT 1: WHOLE NUMBERS

Addition

Suggestions for Teaching...

Suggestions are provided below for teaching addition concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 9 and 10).

Prerequisite Skills for Section 1

- State basic facts of addition.
- Identify place values through ten thousands.

2. Introduce.

- Discuss the origin of "counting."

Primitive man first counted using his fingers. However, this system only allowed him to count to ten. This system also required the caveman to remember the answer since it did not allow for any type of permanent record. Eventually, the caveman developed a simple counting system by making scratches on the walls of his cave. Each mark represented one animal that he had killed. This system became too difficult to read. Since there are no factual records pertaining to this period of time, we can assume that the next step in the development of a numerical system was the use of small pebbles to represent animals. We do know that the caveman eventually became a herder. As his herds grew larger and larger, he had to develop a more practical counting system—one that did not require carrying a heavy load of pebbles. By using a rock to represent a set number of smaller pebbles, the caveman's numerical system continued to become more sophisticated, and eventually evolved into our present day system.
UNIT 1: WHOLE NUMBERS

Addition

- Concept of one-to-one correspondence
  Present the concept of a one-to-one correspondence. In the previous discussion, the caveman's fingers and the animals counted were in one-to-one correspondence. One finger was used to represent one animal. Parents give their children different names so that no two children have the same name. This is also a one-to-one correspondence; call one name and one child answers. Now ask the student for additional examples of one-to-one correspondence (e.g., 4 apples for 4 people, 1 lunch ticket buys 1 lunch, etc.).

- What zero means
  Ask the students what zero means. Stress that zero is a placeholder for place value systems.
  There is no evidence that the earliest counting systems had a symbol to represent zero. They probably considered it foolish to have something represent nothing. Recently, archaeologists have found evidence that zero may have been invented as early as 330 B.C. Whatever the date, historians believe that zero was the last numeral to be invented.

- Infinity
  Introduce the concept of infinity. If something cannot be counted, we say that it goes on to infinity. For example, the number of stars in the sky are considered to be infinite. The symbols for infinity are the lazy eight (∞) and ellipsis (...).

- Whole numbers
  Briefly describe the set of whole numbers. By combining the numeral for zero with the counting numbers, we have a set of whole numbers (0, 1, ...).

3. Present vocabulary concepts.

- Discuss vocabulary words and give examples. See student page 11 for definitions and examples.
  - carrying
  - counting numbers
  - finite
  - infinite
  - natural numbers
  - one-to-one correspondence
  - sum
  - whole numbers
  - zero
UNIT 1: WHOLE NUMBERS

Addition

- Assign vocabulary activity.


- Write the following examples on the board to get the students started on inventing their own numerical system. Let a star represent one, a triangle represent two and an arrow pointing to the right line represent three. So, star, triangle, arrow, all on the same line, represent the numeral 1 2 3 and, (arrow right) minus (triangle) equals (star). ★ △ → = 1 2 3 and → — △ = ★.

- Divide the students into groups of twos, threes, or fours. Have each group create its own numerical system with symbols. Allow only five minutes for this activity.

- Have a student from each group go to the board and write the numeral 35, using his group's numerals. Discuss any similarity between systems after they have all been put on the board.

- Have another student from each group go to the board and write 24 in his group's numerals directly beneath the 35.

- Ask for a volunteer from each group to add the two numbers on the board. Teachers must check with each group to see that the symbols used represent 59.

- Have students do Activity Sheet on page 13 in groups.

5. Present each addition of whole numbers concept with examples.

Three concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.
UNIT 1: WHOLE NUMBERS

Addition

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

☒ Rewriting in vertical form incorrectly

\[
67 + 5 + 103 = 67 + 5 + 103 = 823
\]

Drill that requires students only to write in vertical form—no computation.

☒ Forgetting to use the carried value

\[
\begin{array}{c}
\hline
1 \\
67 \\
5 \\
+ 103 \\
\hline
165
\end{array}
\]

Drill that requires the regrouped amount to be written—then crossed off when used.

☒ Regrouping (carrying) to wrong place

\[
\begin{array}{c}
\hline
1 \\
67 \\
5 \\
+ 103 \\
\hline
265
\end{array}
\]

Drill as above.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Have students play bingo, a "race to the board" game, or other game to practice basic facts.
UNIT 1: WHOLE NUMBERS

Addition

* Have students practice basic addition facts, using microcomputer drill and practice programs.

* Provide an exercise which develops mental computation skills.

* Assign other activities to practice and reinforce, as needed.

* Give repeated timed tests, with the individual students charting their own results and progress.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
Section 2: Subtraction of Whole Numbers

What This Section Is About...

In this section, students will subtract whole numbers with as many as four digits, regrouping when necessary.

Scope and Sequence of Section 2

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<tr>
<td>6. Address common errors.</td>
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<td>9. Administer posttest.</td>
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</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching subtraction concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

   Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 25 and 26).

   **Prerequisite Skills for Section 2**
   - State basic facts of addition and subtraction.
   - Identify place values through ten thousands.

2. Introduce.

   - Discuss how the concept of subtraction may have originated.

     Once the caveman began to use markings on the cave walls, he soon discovered that he needed a method to show that things had been taken away, like the loss of a family member, or the death of an animal. Solicit student input.

   - Compare and contrast addition and subtraction concept.

     Addition is a method of combining two or more objects or groups. You start with two or more numbers and put them together in a special way.

     Subtraction, however, is an action upon one number (or group of objects). Start with a single number, and then remove part or all of it, using subtraction.
UNIT 1: WHOLE NUMBERS

Subtraction

In addition, it doesn't matter what order you write your numbers. In subtraction, you must have the appropriate number written first. (This will become even more important later with integers.)

Discuss subtracting whole numbers as it relates to the students' experience. Solicit student input.

Example: John had $9.00 and spent $6.00. How much did he have left? To find that out, we subtract. Write $9 - $6 = $3 or

\[
\begin{align*}
9 \\
- 6 \\
\hline
3
\end{align*}
\]

The result of subtraction is called the difference. To check, add the difference to the number subtracted. $9 - $6 = $3, because $3 + $6 = $9.

3. Present vocabulary concepts.

Discuss vocabulary words and give examples.

- borrowing
- difference
- renaming
- subtract

Assign vocabulary activity.

4. Conduct initial learning activity.

Have students think of words that mean to subtract (e.g., take away, difference, less than, reduce by, minus, deduct, diminish, etc.).

Discuss the many ways a particular problem may be orally expressed.

Example: 10 - 7
Ten subtract seven
Seven subtracted from ten
Ten minus seven
Ten less seven
UNIT 1: WHOLE NUMBERS

Subtraction

Seven from ten
Difference between ten and seven
Ten reduced by seven
Reduce ten by seven
Ten take seven away, etc.

- Discuss related addition and subtraction facts (e.g., \(3 + 4, 4 + 3, 7 - 3, 7 - 4\)).

5. Present each subtraction of whole numbers concept with examples.

Two concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Borrowing from wrong place
  
  \[
  \begin{array}{c}
  \text{5 1} \\
  \text{2 3} \\
  \text{\textbf{2} 4 7} \\
  \text{6}
  \end{array}
  \]

  Use manipulatives to demonstrate the process.
UNIT 1: WHOLE NUMBERS

Subtraction

- Forgetting that regrouping was done
  \[
  \begin{array}{c}
  11 \\
  6 \ 2 \ 3 \\
  \hline
  2 \ 4 \ 7 \\
  \hline
  4 \ 7 \ 6 \\
  \end{array}
  \]
  Use a drill that requires only regrouping "set-up"—no computation.

- Adding instead of subtracting

- Subtracting from top to bottom

7. Reinforce.

Selected reinforcement strategies are listed below.

- Have students play bingo, a "race to the board" game, or other games to practice basic facts.

- Have students practice basic subtraction facts, using microcomputer drill and practice programs.

- Assign other activities to practice and reinforce, as needed.

- Try a dictation drill using the various subtraction phrases mentioned in number 4 above with other numerals, to determine consistency of understanding.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
UNIT 1: WHOLE NUMBERS

Multiplication

Section 3: Multiplication of Whole Numbers

What This Section Is About...

In this section students will multiply three-digit numbers by a two- or three-digit number.

Scope and Sequence of Section 3

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on prerequisites (p. 43) and pretest (p. 44).</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 45</td>
</tr>
<tr>
<td>5. Present concept and examples.</td>
<td>Assign Activity Sheets.</td>
</tr>
<tr>
<td>a. Multiplication with no regrouping</td>
<td>p. 36</td>
</tr>
<tr>
<td>b. Multiplication with regrouping</td>
<td>p. 38</td>
</tr>
<tr>
<td>c. Working real-world problems</td>
<td>p. 40</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 44</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching multiplication concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest. This is a two-part pretest, which includes a timed test of basic facts and a test related to the objectives and skills (pages 43 and 44).

Prerequisite Skills for Section 3

- State basic facts of multiplication and addition.
- Identify place value through hundreds.
- Add up to four-digit numbers.
- Multiply three-digit by one-digit numbers.
- Apply multiplication properties of 0 and 1.

2. Introduce.

☐ Discuss rationale for learning by using examples relevant to students' experience. Solicit student input.

☐ Just as addition is a "short-cut" method of combining two numbers, multiplication is a short form of repeated addition.

We could count pebbles to add 23 to 47, but it is much quicker to add the modern way. We could count piles of pebbles to add 23, 23, 23, 23, 23, 23, and 23, but it is much quicker to multiply (23 × 7).
UNIT 1: WHOLE NUMBERS

Multiplication

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples.
  - factors
  - multiplication
  - partial product
  - product

- Assign vocabulary activity.

4. Conduct initial learning activity.

- Have students complete the multiplication chart on page 47.
  Correct the tables and return them to the students for future reference.

- Discuss various symbols that may be used to show multiplication—i.e.,
  x, •, ( ) ( ). Solicit student input.

5. Present each multiplication of whole numbers concept with examples.

Three concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Making computational errors**
  
  Recheck work; use calculator.

- **Using an "old" carry at an inappropriate time**
  
  Cross off the carried amount after using it.

\[
\begin{array}{c}
\times 35 \\
427 \\
\hline
2135 \\
1281
\end{array}
\]

- **Incorrect alignment of partial products**
  
  Use graph paper or notebook paper turned sideways.

\[
\begin{array}{c}
\times 35 \\
427 \\
\hline
2135 \\
1281
\end{array}
\]

- **Carrying to wrong place or not carrying**
  
  \[
  \begin{array}{c}
  135 \\
  \times 3 \\
  495
  \end{array}
  \]

- **Forgetting to add amount carried**
  
  \[
  \begin{array}{c}
  31 \\
  135 \\
  \times 3 \\
  395
  \end{array}
  \]
UNIT 1: WHOLE NUMBERS  

Multiplication

- Adding partial products incorrectly
- Multiplying the number carried
- Adding the number carried before multiplying

7. Reinforce.

Selected reinforcement strategies are listed below.

- Have students play bingo, or other games to practice basic facts.
- Have students practice basic multiplication facts, using microcomputer drill and practice programs and timed practice.
- Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or provide an alternate form, to assess skill mastery.
UNIT 1: WHOLE NUMBERS

Section 4: Division of Whole Numbers

What This Section Is About...

In this section students will divide four or five-digit whole numbers by a two-digit number. The shortcut for dividing with powers of ten is included.

Scope and Sequence of Section 4

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
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<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quizzes on prerequisites (pp. 61-62) and pretest (p. 63).</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 64</td>
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<tr>
<td>5. Present concept and examples.</td>
<td>Assign Activity Sheets.</td>
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<tr>
<td>a. Dividing whole numbers</td>
<td>p. 56</td>
</tr>
<tr>
<td>b. Solving real-world word problems</td>
<td>p. 59</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 63</td>
</tr>
</tbody>
</table>

Teacher's Guide
Suggestions for Teaching...

Suggestions are provided below for teaching division concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills, including recall of basic division facts. Administer pretests, as needed. Pretests on prerequisite skills in this section include rounding numbers for estimation of quotient and subtraction of whole numbers. A quiz related to the objectives and skills is also included (pp. 61-63).

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Perform simple operations of addition, subtraction, multiplication, and division.</td>
</tr>
<tr>
<td>✔ State the meaning of remainder in division.</td>
</tr>
<tr>
<td>✔ Round whole numbers.</td>
</tr>
<tr>
<td>✔ Estimate quotients.</td>
</tr>
</tbody>
</table>

2. Introduce.

☐ Discuss division as it relates to student experiences to develop rationale for learning. Solicit student input.
UNIT 1: WHOLE NUMBERS

Division

- Discuss concept of division as repeated subtraction (partitioning).

Example: How many complete packages of 7 pencils each can be made from a box of 144 pencils?

\[
\begin{array}{r}
144 \\
-7 \\
\hline
137 \\
137 \\
-7 \\
\hline
130 \\
-7 \\
\hline
0
\end{array}
\]

1st box

2nd box

3rd box

etc.

Eventually, you'll find out how many boxes.

- Discuss concept of division as sharing or dealing—like cards.

Example: If you have an economy size bag of pens (72) to share among seven students equally, how many pens will each student get? "One for you, one for you, one for you... until you don't have enough left to make a full sweep again.

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples.

  - divide
  - dividend
  - divisor
  - quotient
  - remainder
  - symbols for division

- Assign vocabulary words and activity.
4. Conduct initial learning activity.
   - Have students think of words that mean to divide (e.g., separate, portion, distribute, partition).

   - Show the example: \( 5 \div 100 = 20 \)

   - Show the example: \( 3 \div 10 = 3 \frac{1}{3} \)

   - Stress that the remainder goes over the divisor as a fraction, if you plan to have students write them this way.

   - Show the example: \( 15 \div 210 = 140 \frac{5}{15} = 140 \frac{1}{3} \)

   Note: This is an excellent example to show that the remainder over the divisor has to be reduced. See unit on fractions.

5. Present each division of whole numbers concept with examples.

   Two concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

   - Give rationale for learning the skill. Solicit students' input when developing rationale.

   - Give steps in procedure.

   - Model the strategy with an example. Refer students to the example provided in the Student's Guide.

   - Present other examples and actively involve the student.

   - Assign Activity Sheets.

   - Provide corrective feedback.
UNIT 1: WHOLE NUMBERS

Division

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Dividing by a number in the tens' place, but treating it as a number in the ones' place**

  \[
  \begin{array}{c}
  320 \\
  20 ) 640 \\
  \end{array}
  \]

  The correct answer is 32. The student divided by "2" instead of "20".

- **Omitting a zero as a place holder in the quotient, or including an extra zero in the quotient**

  \[
  \begin{array}{c}
  26 \\
  3 ) 618 \\
  \end{array}
  \]

  instead of 206

  \[
  \begin{array}{c}
  3084 \\
  21 ) 8064 \\
  \end{array}
  \]

  instead of 384

- **Carrying the division problem out to the tenths' place without adding a decimal**

  \[
  \begin{array}{c}
  32 \overline{) 46198} \\
  \hline
  14436 \quad R \quad 28 \\
  \hline
  32 \overline{) 461980} \\
  -32 \\
  \hline
  141 \\
  -128 \\
  \hline
  139 \\
  -128 \\
  \hline
  118 \\
  -96 \\
  \hline
  220 \\
  -192 \\
  \hline
  28 \\
  \end{array}
  \]

  Frequently review the fact that although the decimal point is not usually printed for a whole number, it does "belong" behind the far right digit of the whole number.

  Example: \( 46198 = 46198 \).

Check to see if the answer is reasonable by estimating \( 20 \times 300 = 600 \) (?).

Provide drill which has problems worked out but has many wrong answers. Have students "fix" by placing zeroes appropriately.

Teacher's Guide
UNIT 1: WHOLE NUMBERS
Division

- Estimate one less than the correct factor; then perform an extra division step.

Lead a chalkboard drill: Choose estimates which you know will be insufficient. After each subtraction, compare the difference with the divisor before bringing down the next digit. Make new estimate and try again.

\[
\begin{array}{c}
810 \\
\underline{40 \times 3600} \\
320 \\
\underline{40 \times 3600} \\
0 \\
0 \\
0
\end{array}
\]

- Improper placement of the numbers when the original problem is written using ÷ sign.

Provide mixed drill in which students are given problems in each form, and are required to rewrite in the alternate form.

\[
18 \div 6 = 18 \times 6
\]

- Writing the remainder to the right of the quotient to make a whole number.

- Reversing the remainder and the quotient
- Multiplication or subtraction error

7. Reinforce.

Selected reinforcement strategies are listed below.

* Have students play bingo, a "race to the board" game, or other game to practice basic facts.
UNIT 1: WHOLE NUMBERS

Division

* Have students practice basic division facts, using microcomputer drill and practice programs.
* Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
UNIT 1: WHOLE NUMBERS

Section 1: Addition

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1. counting numbers or natural numbers
2. infinite
3. finite
4. whole numbers
5. carrying
6. sums
7. zero

Page 13

Answers will vary.

Page 14

<p>| | | | | |</p>
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## UNIT 1: WHOLE NUMBERS

### Answer Keys

#### Section 1: Addition

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**Teacher's Guide**

32
## UNIT 1: WHOLE NUMBERS

### Answer Key

**Section 2: Subtraction**

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Teacher's Guide
### UNIT 1: WHOLE NUMBERS

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| m) PP | n) F |

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4. 43,915 pounds
5. $720.00

Page 54
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Teacher's Guide
### Unit 1: Whole Numbers

#### Section 4: Division

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<tr>
<td>7.</td>
<td>375 R 7</td>
<td>8.</td>
<td>115 R 22</td>
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</tr>
<tr>
<td>9.</td>
<td>143 R 4</td>
<td>10.</td>
<td>173 R 40</td>
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**Page 68**

<p>| | | | | |</p>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1.</td>
<td>624 R 24</td>
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<td>603 R 36</td>
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<tr>
<td>3.</td>
<td>845 R 18</td>
<td>4.</td>
<td>714 R 21</td>
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<td>354 R 72</td>
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<td>9.</td>
<td>901 R 12</td>
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<td>376 R 26</td>
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**Page 69**

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<tr>
<td>1.</td>
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<td>2.</td>
<td>690</td>
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<td>3.</td>
<td>308</td>
<td>4.</td>
<td>1,294 R 2</td>
<td></td>
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<tr>
<td>5.</td>
<td>21 R 34</td>
<td>6.</td>
<td>102 R 57</td>
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<td>7.</td>
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<td>2,083 R 31</td>
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<td>9.</td>
<td>3,211</td>
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<td>3,059 R 14</td>
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<tbody>
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<td>1.</td>
<td>4 R 6</td>
<td>2.</td>
<td>92 R 18</td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>10 R 8</td>
<td>5.</td>
<td>2 R 17</td>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
<td>45</td>
<td>8.</td>
<td>59 R 9</td>
<td>9.</td>
</tr>
<tr>
<td>10.</td>
<td>145</td>
<td>11.</td>
<td>59 R 13</td>
<td>12.</td>
</tr>
</tbody>
</table>

**Page 72**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td>228 sheets of paper</td>
<td>2.</td>
<td>68 boxes, 1 baseball left</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>893 hours</td>
<td>4.</td>
<td>$30.00</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>$1,200.00</td>
<td>6.</td>
<td>456 miles</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>1,095 days</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Teacher's Guide**

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UNIT 2: FRACTIONS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
Overview of Unit 2

What This Unit Covers...

Unit 1 provides instruction to assist students in performing mathematical operations with fractions. The objectives and skills for this unit are listed below.

Objective 1

Compute with fractions
Skills:

Add fractions, including whole numbers and mixed numbers less than 100, and proper fractions with denominators 2, 3, 4, 5, 6, 8, or 10.

Subtract fractions, including whole numbers and mixed numbers with denominators 2, 3, 4, 5, 6, 8, 10.

Multiply fractions, including mixed numbers less than 100, with denominators less than 10.

Divide fractions, including mixed numbers less than 100 with denominators less than 10.

Objective 2

Solve real-world problems
Skills:

Solve real-world problems involving fractions with unlike denominators of 2, 3, 4, 5, 6, 8, or 10.

Unit 2 is comprised of four sections. The following chart displays the sections and concepts covered in each section for this unit.
**UNIT 2: FRACTIONS**

### Sections and Concepts of Unit 2

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
</tr>
</thead>
</table>
| Section 1 | Simplifying fractions  
Adding like fractions  
Finding common denominators  
Adding fractions with unlike denominators  
Renaming improper fractions as mixed numbers  
Adding fractions with unlike denominators whose sum is an improper fraction |
| Section 2 | Subtracting proper fractions  
Subtracting whole numbers from mixed numbers  
Subtracting mixed numbers from whole numbers  
Subtracting mixed numbers from mixed numbers |
| Section 3 | Renaming a mixed number as an improper fraction  
Multiplying two fractions  
Multiplying two fractions, using cross cancelling  
Multiplying fractions, mixed numbers, and whole numbers |
| Section 4 | Dividing two fractions  
Dividing a fraction and a whole number  
Dividing two mixed numbers |

**Unit Components...**

The Teacher's Guide in each section of Unit 2 contains the following:

- prerequisite skills  
- vocabulary terms to introduce and explain  
- concepts related to the objectives  
- common errors made by students and selected ideas for remediation  
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 2: FRACTIONS

Addition

Section 1: Addition of Fractions

What This Section Is About...

In this section students will practice addition of fractions. The operations of simplifying, finding common denominators, finding equivalent fractions, and renaming as mixed numbers are included to enable the student to add like and unlike fractions. Sums include both proper and improper fractions.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quizzes (pp. 85-87).</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>pp. 88-89</td>
</tr>
<tr>
<td>a. Simplifying</td>
<td>p. 76</td>
</tr>
<tr>
<td>b. Adding like fractions</td>
<td>p. 77</td>
</tr>
<tr>
<td>c. Finding common denominators</td>
<td>p. 78</td>
</tr>
<tr>
<td>d. Adding fractions with unlike denominators</td>
<td>p. 80</td>
</tr>
<tr>
<td>e. Renaming improper fractions as mixed numbers</td>
<td>p. 81</td>
</tr>
<tr>
<td>f. Adding fractions with unlike denominators whose sum is an improper fraction</td>
<td>p. 82</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>

Teacher's Guide
UNIT 2: FRACTIONS
Addition

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of fractions concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (pp. 1 and 2).

Prerequisite Skills for Section 1

- Add whole numbers.
- Define fraction and mixed number.
- Identify a fraction that is equivalent to a given proper fraction having a denominator of 2, 3, 5, 6, 8, and 10.
- Multiply and factor whole numbers.

2. Introduce.

- Provide rationale for learning by using examples from students' experiences that are relevant. Solicit student input.

- It is important that the student have a well-founded concept of fractions. Use models such as fraction bars (made of paper strips), Cuisenaire Rods, or Unifix cubes to demonstrate addition of fractions with common denominators. Using manipulative aids to demonstrate fractional parts will facilitate concept development. Special transparencies for the overhead projector would be a good tool for upper level students.
UNIT 2: FRACTIONS

Addition

For adding unlike fractions, the mechanics of pushing together two "fractions" may be simple; however, coming up with an appropriate name for the resulting amount (fraction) poses a problem. This may create a need in the student for a method to determine that name.

Fractions are used in many ways. Identify some of these through a brainstorming activity to show the relevance and importance of common fractions. Common classifications include:

- As a part-to-whole comparison, (e.g., 3 of 12 portions of a Hershey bar have been eaten).

- As a ratio—a comparison of two numbers (e.g., 4 out of 5 dentists recommend Fresh toothpaste; number of boys and number of girls in a room).

- As a quotient or indicated division, (e.g., \( \frac{32}{6} \) means \( 6 \div 32 \) or \( 32 \div 6 \))

  Example: 4 cookies, 3 children—if shared equally...\( \frac{4}{3} \)

- As an operator (e.g., think of \( \frac{3}{4} \) as a "3 for 4" machine, where an input of 4 gives an output of 3 (a kind of "stretcher—shrinker" notion).

- As a measure—how much there is of a quantity relative to a specified unit of that quantity. (e.g., \( \frac{2}{3} \) of a package of gummy bears or notebook paper).

- As rate (e.g., speed is relationship between distance and time; wages between dollars and hours).

Note: Deliberate teaching for transfer is recommended to facilitate learning.
UNIT 2: FRACTIONS

Addition

3. Present vocabulary concepts.
   - Discuss vocabulary terms and give examples.
     - common factor
     - denominator
     - factors
     - fraction
     - greatest common factor (GCF)
     - improper fraction
     - least common denominator (LCD)
     - like fractions
     - lowest terms
     - mixed number
     - multiples
     - numerator
     - proper fraction
     - simplify
     - unlike fractions

   - Assign vocabulary activity (pp. 88-89).

4. Conduct initial learning activity.
   - For addition of fractions with unlike denominators, show students the following method, called the teepee method. The teepee method is a way to create a common denominator easily and set up the addition of fractions with unlike denominators. (Stress that although it is not necessary to use the least common denominator, it does make it easier to simplify later.) This method can also be used for subtracting fractions and determining the larger of two fractions. It can only be used when problems are written in horizontal form.

   **Method:**
   - Make a teepee using three arrows. The arrows may not face left or point down. (Wait until this task is accomplished)

   **Examples:**
   - Wrong
   - Wrong
   - Right
UNIT 2: FRACTIONS

Addition

- Stress the importance of having the arrows point in the proper directions.
- Now, use a small x to make a doorway, and to indicate multiplication.
- Put this example on the board.

\[
\frac{1}{2} + \frac{2}{3}
\]

- Now, follow the arrows and multiply each set of numbers.

\[
3 \times 1 = 3, \quad 2 \times 2 = 4 \quad \text{and} \quad 2 \times 3 = 6
\]

- Draw your arrows on the top of the problem like this:

\[
\frac{1}{2} + \frac{2}{3} = \frac{3 + 4}{6} \quad \text{or} \quad \frac{7}{6} = \frac{11}{6}
\]

The bottom arrow gives a common denominator. Others give numerators.

- Use manipulatives or pictures, if needed, to help students visualize.

5. Present each addition of fractions concept with examples.

Six concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Present examples showing fractions with one as the GCF and showing the following cases:

1. Even numbers are those that end in 0, 2, 4, 6, or 8. The following numbers are even: 20, 32, 54, 106, 2018. All even numbers are divisible by 2. Therefore, if the numerator and denominator are both even—they are both divisible by 2.

2. Numbers that end in 0 or 5 are multiples of 5. If both the numerator and denominator end in 0 or 5, 5 can be used to reduce the fraction.
UNIT 2: FRACTIONS

Addition

3. To determine if a fraction can be reduced by 3, see if the digits in the number add up to equal a multiple of 3. When using any of the strategies for Cases 1, 2, and 3, the student needs to be aware that they may need to reduce several times.

- Give rationale for learning the skill. Solicit students’ input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student’s Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

X Renaming incorrectly

Example: \( \frac{2}{3} = \frac{5}{15} \) or \( \frac{2}{3} = \frac{2}{15} \)

\( \frac{2}{3} = \frac{5}{15} \) or \( \frac{2}{3} = \frac{2}{15} \)

Use physical models to verify mechanical process of renaming. Encourage temporarily writing out the thought process:

\( \frac{2}{3} = \frac{2}{15} \)

\( \frac{2}{3} = \frac{2}{5} = \frac{10}{15} \)

Teacher’s Guide
UNIT 2: FRACTIONS

Addition

× Using either one of the unlike denominators and adding the numerators.

This may arise from a poor concept of fractions. Review.

\[
\begin{array}{c}
\text{Example:} \\
8 \quad 5 \quad \frac{3}{8} \\
+ \quad 4 \quad 6 \quad \frac{2}{5} \\
\hline \\
13 \quad 1 \quad \frac{5}{8}
\end{array}
\]

× Reducing and/or regrouping the answer incorrectly or failing to reduce

When renaming fractions (either finding an equivalent or reducing) it's often helpful to introduce the idea of multiplying or dividing by a fraction equal to one. To multiply or divide by one (1) does not change the value.

\[
\text{Example: } \frac{2}{3} = ?
\]

\[
\frac{2}{3} \times \frac{1}{1} = \frac{2}{12}
\]

\[
\frac{2}{3} \times \frac{4}{4} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}
\]

\[
\text{Example: } \frac{10}{15} = ?
\]

\[
\frac{10}{15} + \frac{1}{1} = ?
\]

\[
\frac{10}{15} + \frac{5}{5} = \frac{10 + 5}{15 + 5} = \frac{2}{3}
\]

Teacher's Guide

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UNIT 2: FRACTIONS

Addition

× Reducing and/or regrouping the answer incorrectly, or failing to reduce.

\[
\begin{align*}
8 + \frac{2}{4} &= 4 \text{ or } \frac{12}{3} = 4 \\
8 + \frac{4}{3} &= 2 \text{ or } \frac{12}{3} = 4 \\
45\frac{3}{2} &= 46\frac{1}{2}
\end{align*}
\]

× Adding both numerators and denominators

\[
\begin{align*}
6\frac{7}{5} + 2\frac{1}{6} &= \frac{33}{5} + \frac{13}{6} \\
&= \frac{198 + 65}{30} \\
&= \frac{263}{30} = 8\frac{13}{30}
\end{align*}
\]

Review reading mixed numbers, (e.g., Forty-five and three-halves is equal to forty-five and one and one-half, which is equal to forty-six and one-half).

This may have as its source poor fraction concept. Model addition of fractions using manipulatives.

7. Reinforce.

Selected reinforcement strategies are listed below.

★ Have students practice basic addition facts, using microcomputer drill and practice programs.

★ Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.

Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.
Section 2: Subtraction of Fractions

What This Section Is About...

In this section students will practice subtracting fractions and mixed numbers. Some of the skills learned in the previous section will also be applied here, such as finding common denominators, renaming fractions, and simplifying fractions.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 119.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>a. Subtracting proper fractions</td>
<td>p. 110</td>
</tr>
<tr>
<td>b. Subtracting whole numbers from mixed numbers</td>
<td>p. 111</td>
</tr>
<tr>
<td>c. Subtracting mixed numbers from whole numbers</td>
<td>p. 112</td>
</tr>
<tr>
<td>d. Subtracting mixed numbers from mixed numbers</td>
<td>p. 113</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 119</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching subtraction concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as a pretest (p. 119).

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Subtract whole numbers.</td>
</tr>
<tr>
<td>✓ Show the relationship between the whole number part and the fractional part of a mixed number. Recognize that: $1 = \frac{2}{2}, \frac{3}{3}, \frac{4}{4}$ etc.</td>
</tr>
<tr>
<td>✓ Simplify fractions.</td>
</tr>
</tbody>
</table>

2. Introduce.

Provide rationale for learning by using real-life reasons for learning fractions. For example, language used every day is filled with references to fractional amounts—"She took off work three-quarters of an hour early." (So, how long did she work that day?) Carpenters and seamstresses often need to subtract fractions, since their materials are most commonly measured with customary units (in the United States). Occasionally, a recipe will be written in such a way that the user must subtract some fraction from another.
UNIT 2: FRACTIONS

Subtraction

Comparing customary measures usually requires such skill. In fact, subtracting time (hours, minutes, and seconds) is an extension of the concept of subtraction of fractions.

3. Review vocabulary concepts.

- Review vocabulary terms from Unit 1 Section 2, subtraction of whole numbers and give examples.
  - borrowing
  - difference
  - renaming
  - subtract

- Provide additional practice and reinforcement, as needed.

4. Conduct initial learning activities.

- Review the "Teepee" using Unit 2, Section 1: Addition, but this time rather than adding the two top numbers, subtract them. Then reduce the answers to lowest terms.

  Use example: \[ \frac{2}{3} - \frac{1}{2} = \]

  Stress that this can only be used when dealing with just two fractions. When 3 or more fractions are used, the conventional method of finding a common denominator should be used.

- Model several problems using fractions bars or some other manipulative aid.
  Begin with fractions having the same denominator, progressing to mixed numbers with unlike denominators and needing regrouping.

  Examples:
  \[ \frac{7}{8} - \frac{3}{8} \quad \text{(without renaming)} \]
  \[ \frac{7}{8} - \frac{3}{4} \quad \text{(with renaming)} \]
  \[ \frac{2}{8} - \frac{1}{4} \quad \text{(renaming, no regrouping)} \]
UNIT 2: FRACTIONS

Subtraction

\[
\begin{align*}
4 \frac{1}{3} - 1 \frac{2}{3} & \quad \text{(no renaming, with regrouping)} \\
3 \frac{5}{8} - 1 \frac{3}{4} & \quad \text{(renaming, with regrouping)} \\
\end{align*}
\]

- Stress that when regrouping to subtract, care must be taken to borrow one whole number and choose the best \textit{name} for the borrowed amount.

\[
\begin{align*}
4 \frac{1}{3} - 3 \frac{1}{3} + \frac{3}{3} &= 3 \frac{4}{3} \\
- 1 \frac{2}{3} & \rightarrow 1 \frac{2}{3} - 1 \frac{2}{3} \\
\end{align*}
\]

\[
4 \frac{1}{3} \text{ needs to be regrouped}
\]

\[
\begin{align*}
4 \frac{1}{3} &= 3 + 1 + \frac{1}{3} = 3 + \frac{3}{3} + \frac{1}{3} = 3 \frac{4}{3}
\end{align*}
\]

Compare and contrast regrouping with whole numbers to regrouping with fractions.

5. Present each subtraction of fractions concept with examples.

Four concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
UNIT 2: FRACTIONS

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Subtraction fact error**
  
  Review and drill basic subtraction facts.

- **Failing to regroup**
  
  Model the regrouping process using manipulatives; present drill which requires only set-up of each problem, and/or drill which requires decision-making (to regroup or not to regroup) and set-up.

- **Adding instead of subtracting**
  
  Present randomly mixed drill with simple addition and subtraction problems (maybe with multiplication and division also) to facilitate attention to operation specified.

- **Subtracting the whole numbers only**
  
  Model the process using manipulatives and mimicking the paper-and-pencil routine. Remind students that as in regular subtraction with whole numbers the work progresses from right to left.

- **Subtracting the whole numbers only**
  
  Model the process using manipulatives, with a focus on the physical inability to take fractional part from an (unpartitioned) whole.

- **Incorrectly subtracting smaller from larger, instead of regrouping**
  
  To show an attempt take 4/5 of a candy bar when all you have is a 1/5 of it (or a similar model.) Provide drill which focuses only on the decision to regroup or not to regroup.

---

Example:

\[
\begin{array}{c}
8 \quad \frac{1}{5} \\
+ \quad \frac{17}{5} \\
\hline
6 \quad \frac{3}{5}
\end{array}
\]
UNIT 2: FRACTIONS

Subtraction

7. Reinforce.

Selected reinforcement strategies are listed below.

* Have students play bingo, a "race to the board" game, or other games to practice basic facts.

* Have students practice basic subtraction facts, using microcomputer drill and practice programs.

* Assign other activities to practice and reinforce, as needed.

* Use manipulatives, pictures, and games to reinforce.

* Allow students to independently correct (anonymous) classwork of other students.

8. Sum up with post-organizer.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.
Section 3: Multiplication of Fractions

What This Section Is About...

In this section students will practice multiplying fractions, mixed numbers, and whole numbers. Cancelling and renaming mixed numbers as improper fractions are involved in the operation of multiplication.

Scope and Sequence of Section 3

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz p. 137.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>5. Present concepts and examples</td>
<td>Assign Activity Sheets.</td>
</tr>
<tr>
<td>a. Renaming a mixed number as an improper fraction</td>
<td>p. 130</td>
</tr>
<tr>
<td>b. Multiplying two fractions</td>
<td>p. 130</td>
</tr>
<tr>
<td>c. Multiplying two fractions, using cross cancelling</td>
<td>p. 131</td>
</tr>
<tr>
<td>d. Multiplying fractions, mixed numbers, and whole numbers</td>
<td>p. 133</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 137</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching multiplication concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz as a pretest (p. 137).

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Identify an improper fraction that is equivalent to a mixed number less than 100.</td>
</tr>
<tr>
<td>✓ Multiply whole numbers.</td>
</tr>
<tr>
<td>✓ Show that any whole number may be written with a denominator of one.</td>
</tr>
</tbody>
</table>

2. Introduce.

Multiplication of fractions is an extension of multiplication of whole numbers. When we say "three of those" we may mean three packages (which may each contain seven items), and this may lead us to the use of multiplication (3x7). By the same reasoning, we can compute three-fifths of anything using multiplication.

There are several different uses for multiplying with fractions:

- finding part of a whole: 3/5 x 40
- finding part of a part: 3/5 x 7/10
- finding part of a mixed number: 4/5 x 3 1/2
- finding mixed number products: 4 2/3 x 7 4/5
UNIT 2: FRACTIONS

Multiplication

- Discuss rationale for learning by using examples relevant to students' experience. Solicit student input.

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples.
  - *Property of One*
  - *cross cancellation*

4. Conduct initial learning activity.

- Tell students when multiplying fractions to multiply *numerator* times *numerator* and *denominator* times *denominator*. Be sure that the students do not get multiplication of fractions confused with adding and subtracting fractions.

- Have the students draw \( \frac{2}{3} \times \frac{3}{4} \) on their papers.
  - Now, above the X draw an arrow pointing to the right and below X draw an arrow pointing to the right.
  - Now complete the problem and be sure that the students reduce this to \( \frac{1}{2} \).

- This would be a good time to review putting the answer in lowest terms.

5. Present each multiplication of fractions concept with examples.

Four concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.
UNIT 2: FRACTIONS

Multiplication

☐ Model the strategy with an example. Refer students to the examples provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

X Incorrectly renaming a mixed number as an improper fraction
Model the renaming by showing the whole numbers as the sum of its parts (e.g., 3 1/2 is the same as [1/2 + 1/2] + [1/2 + 1/2] + [1/2 + 1/2] + 1/2) which, in turn, is the same as 7/2. After several such examples most of which do not have unit fractions, teach for transfer to the "denominator x whole number + numerator" method.

X Incorrectly cross cancelling
Use a drill requiring only that students show the cross cancelling steps. The final product is not solicited, nor is it accepted in lieu of the requested steps.

X Multiplying just the whole numbers, then adding the fractions, when multiplying with mixed number
Use a mixed drill requiring only that students (a) decide if renaming as improper fractions is appropriate, and if so, (b) rewrite the problem with any such renaming.

X Multiplying the whole number times just the fractional part of the mixed number
See above suggestion.
UNIT 2: FRACTIONS

Multiplication

× Multiplying incorrectly
Review basic facts as well as multiplication method, as needed.

× Failing to simplify, or simplifying incorrectly
Use several drills (perhaps hand written) which show problems with all computational markings and answers. The answers should be mixed — completely simplified, partially simplified, and not simplified at all. Ask students to check these papers to determine if all the answers have been simplified. This drill may promote the habit of checking for completion.

× Finding a common denominator before multiplying
Provide several examples in which students (a) find common denominators before multiplying, and then (b) multiply without finding common denominators first. Compare the results, pointing out equal answers. Time each method and chart the amount of time saved.

7. Reinforce.

Selected reinforcement strategies are listed below.

* Practice modeling multiplication of fractions, using the method described in the initial learning activity.

* Have students play bingo, or other games to practice basic facts.

* Have students practice basic multiplication facts, using microcomputer drill and practice programs.

* Assign other activities to practice and reinforce, as needed.
8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in the student section, or make an alternate form, to assess skill mastery.
Section 4: Division of Fractions

What This Section Is About...

In this section students will practice finding reciprocals, and dividing fractions, mixed numbers, and whole numbers.

Scope and Sequence of Section 4

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz as pretest.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>p. 160</td>
</tr>
<tr>
<td>a. Dividing two fractions</td>
<td>p. 156</td>
</tr>
<tr>
<td>b. Dividing a fraction and a whole number</td>
<td>p. 157</td>
</tr>
<tr>
<td>c. Dividing two mixed numbers</td>
<td>p. 158</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 159</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching division concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz as a pretest (p. 159).

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Divide whole numbers.</td>
</tr>
<tr>
<td>✓ Multiply fractions and mixed numbers.</td>
</tr>
</tbody>
</table>

2. Introduce.

- Remind students that there are two basic ways to interpret the idea of division:
  - It is a short form of repeated subtraction.
  - It is a short form of partitioning, or "dealing."

  So, the sentence \( 3 \frac{3}{4} + \frac{3}{4} = \) may mean, "How many times can I subtract \( \frac{3}{4} \) from \( 3 \frac{3}{4} \)," or "How many \( \frac{3}{4} \)'s are there in \( 3 \frac{3}{4} \)?"

- Remind students also that division is not commutative, that is, order is important in division—unlike addition or multiplication where it doesn't matter in which order you compute. The symbol + means divided by. \( 3/4 + 1/2 \) must be read "\( 3/4 \) divided by \( 1/2 \)" not "\( 1/2 + 3/4 \)." This discussion may prevent confusion about which fraction to invert before multiplying.

- Discuss division as it relates to student experiences to develop rationale for learning. Solicit student input.
UNIT 2: FRACTIONS

3. Present vocabulary concepts.

- Discuss vocabulary terms (p. 160) and give examples.
  - invert
  - reciprocal

4. Conduct initial learning activities.

- Give this example of a reciprocal, or multiplicative inverse, when vocabulary words are explained.

\[
\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1
\]

Note: Use the word reciprocal for general math students. Explain that this is the key to understanding division of fractions.

- Put these examples on the board for students to copy.

a) \[
\frac{2}{3} + \frac{1}{2} = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3} = 1 \frac{1}{3}
\]

b) \[
1 \frac{2}{5} + \frac{2}{3} = \frac{7}{5} \times \frac{3}{2} = \frac{21}{10} = 2 \frac{1}{10}
\]

c) \[
8 \frac{3}{5} + 5 = \frac{43}{5} + \frac{5}{1} = \frac{43}{5} \times \frac{1}{5} = \frac{43}{25} = 1 \frac{18}{25}
\]

d) \[
2 \frac{1}{2} + 1 \frac{2}{5} = \frac{5}{2} + \frac{7}{5} = \frac{5}{2} \times \frac{5}{7} = \frac{25}{14} = 1 \frac{11}{14}
\]
5. **Present each division of fractions concept with examples.**

Three concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. **Address common errors.**

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Failure to invert before multiplying**
  
  Provide drill which only requires correctly rewriting the problem as multiplication.

- **Inverting dividend instead of divisor**
  
  See comment in the Introduction about + symbol, and provide appropriate drill; see above suggestion.

Note: See also common errors for multiplication of fractions in Section 3.
UNIT 2: FRACTIONS

7. Reinforce.

Selected reinforcement strategies are listed below.

* Have students play bingo, a "race to the board" game, or other game to practice basic facts.

* Have students practice basic division facts, using microcomputer drill and practice programs.

* Assign other activities to practice and reinforce, as needed.

* Use Cuisenaire Rods and other concrete objects to demonstrate fractions visibly.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of fractions; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in the student section, or use alternate form, to assess skill mastery.
UNIT 2: FRACTIONS

Section 1: Addition

Page 85
1. \( \frac{5}{8} \) 
2. \( \frac{1}{3} \) 
3. \( \frac{3}{8} \) 
4. \( \frac{2}{5} \) 

Page 86
5. \( \frac{4}{7} \) 
6. \( \frac{1}{2} \) 
7. \( \frac{1}{2} \) 
8. \( \frac{2}{5} \) 

Page 87
1. \( 2 \frac{2}{3} \) 
2. \( 9 \frac{2}{5} \) 
3. \( \frac{1}{3} \) 
4. \( \frac{1}{2} \) 
5. \( 8 \) 
6. \( \frac{3}{4} \) 
1. \( \frac{4}{7} \) 
2. \( \frac{3}{4} \) 
3. \( 1 \frac{1}{3} \) 
4. \( \frac{9}{10} \) 
5. \( 3 \frac{3}{4} \) 
6. \( 12 \frac{1}{2} \) 

Page 90
1. denominator 
3. improper fraction 
5. lowest terms 
7. mixed number or simplified 
8. lowest term 

2. numerator 
4. mixed number 
6. proper fraction 

Teacher's Guide
UNIT 2: FRACTIONS

Section 1: Addition

Page 91
1. \( \frac{3}{4} \) 1 \( \frac{2345}{1245} \)
2. \( \frac{2}{3} \) 1 \( \frac{4}{1234} \)
3. \( \frac{1}{3} \) 1 \( \frac{3}{139} \)
4. \( \frac{3}{4} \) 1 \( \frac{39}{1234612} \)
5. \( \frac{1}{2} \) 1 \( \frac{5}{1234612} \)

GFC = 8

Page 92
1. c
2. a
3. b
4. a
5. d

Page 93
1. \( \frac{4}{5} \)
2. \( \frac{1}{3} \)
3. \( \frac{1}{2} \)
4. \( \frac{2}{3} \)
5. \( \frac{1}{6} \)
6. \( \frac{1}{3} \)
7. \( \frac{2}{7} \)
8. \( \frac{2}{3} \)
9. \( \frac{1}{2} \)
10. \( \frac{5}{9} \)
11. 2
12. 1

Page 94
1. \( \frac{4}{5} \)
2. \( \frac{7}{8} \)
3. \( \frac{4}{7} \)
4. \( \frac{9}{11} \)

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UNIT 2: FRACTIONS

Section 1: Addition

Page 94

5. \(\frac{11}{15}\)  
6. \(\frac{11}{12}\)
7. \(\frac{9}{10}\)  
8. \(\frac{11}{13}\)
9. \(\frac{3}{5}\)  
10. \(\frac{7}{8}\)

Page 95

1. \(40 \frac{3}{5}\)  
2. \(59 \frac{7}{8}\)  
3. \(65 \frac{2}{3}\)
4. \(81 \frac{2}{5}\)  
5. \(61 \frac{1}{3}\)  
6. \(114 \frac{1}{4}\)
7. \(77 \frac{4}{5}\)  
8. \(88 \frac{1}{2}\)  
9. \(77 \frac{3}{4}\)
10. \(85 \frac{3}{5}\)  
11. 27  
12. \(32 \frac{2}{5}\)

Page 96

1. \(\frac{2}{6} \frac{1}{6}\)  
2. \(\frac{4}{10} \frac{1}{10}\)  
3. \(\frac{6}{14} \frac{5}{14}\)  
4. \(\frac{14}{18} \frac{7}{18}\)  
5. \(\frac{5}{12} \frac{9}{12}\)  
6. \(\frac{3}{16} \frac{4}{16}\)  
7. \(\frac{16}{24} \frac{5}{24}\)  
8. \(\frac{16}{20} \frac{9}{20}\)  
9. \(\frac{21}{27} \frac{4}{27}\)  
10. \(\frac{4}{15} \frac{5}{15}\)
## UNIT 2: FRACTIONS

### Section 1: Addition

**Page 97**

1. \[\frac{6}{15} \quad \frac{10}{15}\]
2. \[\frac{7}{63} \quad \frac{27}{63}\]
3. \[\frac{5}{20} \quad \frac{8}{20}\]
4. \[\frac{27}{72} \quad \frac{16}{72}\]
5. \[\frac{35}{42} \quad \frac{24}{42}\]

6. \[\frac{9}{18} \quad \frac{8}{18}\]
7. \[\frac{16}{120} \quad \frac{15}{120}\]
8. \[\frac{35}{84} \quad \frac{12}{84}\]
9. \[\frac{30}{78} \quad \frac{65}{78}\]
10. \[\frac{30}{110} \quad \frac{77}{110}\]

**Page 98**

1. \[\frac{11}{12}\]
2. \[\frac{3}{4}\]
3. \[\frac{5}{6}\]
4. \[\frac{7}{8}\]
5. \[\frac{11}{12}\]
6. \[\frac{7}{10}\]
7. \[\frac{13}{20}\]
8. \[\frac{7}{10}\]
9. \[\frac{13}{40}\]
10. \[\frac{7}{8}\]
11. \[\frac{1}{2}\]
12. \[\frac{17}{36}\]

**Page 99**

1. \[\frac{11}{10}\]
2. \[\frac{1}{4}\]
3. \[\frac{23}{40}\]
4. \[\frac{9}{10}\]
5. \[\frac{11}{12}\]
6. \[\frac{1}{30}\]
7. \[\frac{1}{6}\]
8. \[\frac{19}{30}\]
9. \[\frac{5}{24}\]
10. \[\frac{3}{20}\]

**Page 100**

1. \[\frac{29}{4}\]
2. \[\frac{70}{15}\]
3. \[\frac{64}{8}\]
4. \[\frac{63}{10}\]
5. \[\frac{73}{24}\]
6. \[\frac{81}{10}\]
7. \[\frac{85}{12}\]
8. \[\frac{104}{40}\]
9. \[\frac{82}{20}\]
10. \[\frac{123}{2}\]
11. \[\frac{74}{15}\]
12. \[\frac{34}{12}\]

---

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UNIT 2: FRACTIONS

Section 1: Addition

Page 101 1. $3 \frac{1}{2}$  
2. $2 \frac{2}{3}$  
3. $1 \frac{5}{6}$  
4. $2 \frac{2}{5}$  
5. $1 \frac{7}{8}$  
6. $3 \frac{3}{10}$  
7. $2 \frac{21}{25}$  
8. $3 \frac{3}{4}$  
9. $3 \frac{21}{50}$  
10. $3 \frac{13}{20}$

Page 102 1. $6 \frac{1}{4}$  
6. $18 \frac{18}{31}$  
2. $1 \frac{1}{12}$  
7. $5 \frac{4}{5}$  
3. $3 \frac{4}{7}$  
8. $2 \frac{1}{7}$  
4. $2 \frac{1}{9}$  
9. $13 \frac{13}{20}$  
5. $5 \frac{2}{5}$  
10. $13 \frac{14}{15}$

Page 103 1. $\frac{4}{7}$  
6. $\frac{6}{7}$  
2. $\frac{2}{3}$  
7. $1$  
3. $1$  
8. $1$  
4. $1$  
9. $1 \frac{1}{5}$  
5. $\frac{3}{5}$  
10. $1 \frac{2}{7}$

Teacher's Guide
UNIT 2: FRACTIONS

Section 1: Addition

| Page 104 | 1.   | 1 5/12 | 2.   | 1 | 3.   | 1 1/4 | 4.   | 17/24 |
|          | 5.   | 1 7/12 | 6.   | 1 19/40 | 7.   | 1 8/15 | 8.   | 1 31/80 |
|          | 9.   | 17/24  | 10.  | 1 7/8   | 11.  | 1 4/15 | 12.  | 19/24   |

| Page 105 | 1.   | 63     | 2.   | 102 2/5 | 3.   | 94     |
|          | 4.   | 56 1/4 | 5.   | 40 3/5  | 6.   | 62     |
|          | 7.   | 131 2/3 | 8.    | 113 1/2 | 9.   | 118 1/5 |
|          | 10.  | 68 3/5 | 11.  | 76 2/7  | 12.  | 66     |

| Page 106 | 1.   | 58 13/24 | 2.   | 144 1/2 | 3.   | 58 1/4 |
|          | 4.   | 105 23/40 | 5.   | 41 5/12 | 6.   | 66 3/10 |
|          | 7.   | 55 5/24 | 8.   | 95 1/30 | 9.   | 70 1/3 |
|          | 10.  | 91 1/8  | 11.  | 42 7/8  | 12.  | 27 5/6 |

| Page 107 | 1.   | 5 7/10 hours |
|          | 2.   | 3 3/4 dozen  |
|          | 3.   | 30 1/6 hours |

Teacher's Guide
UNIT 2: FRACTIONS

Section 1: Addition
4. \(2 \frac{3}{8}\) yards
5. \(18 \frac{11}{16}\) feet long

Section 2: Subtraction

Page 119
1. \(\frac{1}{3}\)  
2. \(\frac{5}{15}\)  
3. \(2 \frac{3}{8}\)  
4. \(\frac{1}{20}\)  
5. \(\frac{4}{8}\)  
6. \(1 \frac{7}{15}\)  
7. \(\frac{21}{3}\)  
8. \(\frac{7}{12}\)  
9. \(\frac{9}{10}\)  
10. \(\frac{5}{30}\)  
11. \(\frac{7}{24}\)  
12. \(3 \frac{3}{5}\)

Page 120
1. \(\frac{7}{12}\)  
2. \(\frac{2}{5}\)  
3. \(\frac{1}{6}\)  
4. \(\frac{1}{12}\)  
5. \(\frac{2}{3}\)  
6. \(\frac{3}{8}\)  
7. \(\frac{1}{4}\)  
8. \(\frac{3}{8}\)  
9. \(\frac{3}{40}\)  
10. \(\frac{1}{2}\)

Page 121
1. \(11 \frac{1}{2}\)  
2. \(14 \frac{2}{3}\)  
3. \(6 \frac{2}{5}\)  
4. \(7 \frac{3}{4}\)  
5. \(54 \frac{5}{6}\)  
6. \(24 \frac{3}{5}\)  
7. \(5 \frac{7}{8}\)  
8. \(8 \frac{1}{5}\)  
9. \(60 \frac{3}{10}\)  
10. \(27 \frac{4}{5}\)  
11. \(30 \frac{3}{4}\)  
12. \(7 \frac{2}{3}\)

Teacher's Guide
UNIT 2: FRACTIONS

Section 2: Subtraction

Page 122
1. $33 \frac{1}{2}$
2. $28 \frac{1}{3}$
3. $12 \frac{1}{4}$
4. $10 \frac{1}{5}$
5. $92 \frac{2}{3}$
6. $13 \frac{2}{5}$
7. $22 \frac{9}{10}$
8. $25 \frac{5}{8}$
9. $21 \frac{1}{5}$
10. $66 \frac{5}{6}$
11. $56 \frac{1}{5}$
12. $10 \frac{1}{4}$

Page 123
1. $4 \frac{1}{2}$
2. $16 \frac{1}{5}$
3. $26 \frac{1}{2}$
4. $14 \frac{5}{8}$
5. $6 \frac{4}{5}$
6. $6 \frac{9}{10}$
7. $62 \frac{1}{3}$
8. $14 \frac{5}{8}$
9. $39 \frac{1}{3}$
10. $55 \frac{7}{10}$
11. $10 \frac{1}{2}$
12. $29 \frac{1}{6}$

Page 124
1. $2 \frac{1}{3}$
2. $31 \frac{1}{2}$
3. $23 \frac{2}{5}$
4. $15 \frac{2}{3}$
5. $47 \frac{1}{5}$
6. $37 \frac{1}{2}$
7. $34 \frac{1}{3}$
8. $55 \frac{1}{5}$
9. $18 \frac{5}{8}$
10. $90 \frac{1}{4}$
11. $75 \frac{1}{5}$
12. $7$

Page 125
1. $21 \frac{5}{6}$
2. $14 \frac{1}{2}$
3. $19 \frac{3}{10}$
4. $65 \frac{1}{24}$
5. $53 \frac{1}{6}$
6. $19 \frac{3}{20}$
7. $27 \frac{3}{8}$
8. $53 \frac{7}{20}$
9. $26 \frac{7}{24}$
10. $48 \frac{11}{30}$
11. $8 \frac{7}{15}$
12. $32 \frac{1}{6}$
Unit 2: Fractions

Section 2: Subtraction

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<td>$54 \frac{3}{5}$</td>
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<td>4</td>
<td>$20 \frac{1}{2}$</td>
<td>5</td>
<td>$\frac{2}{3}$</td>
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<td>7</td>
<td>$15 \frac{4}{5}$</td>
<td>8</td>
<td>$14 \frac{3}{4}$</td>
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<td>$22 \frac{4}{5}$</td>
<td>11</td>
<td>$11 \frac{7}{10}$</td>
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**Page 127**

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<td>$41 \frac{7}{12}$</td>
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<td>$34 \frac{7}{10}$</td>
<td>5</td>
<td>$36 \frac{3}{8}$</td>
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<td>7</td>
<td>$16 \frac{33}{40}$</td>
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<td>10</td>
<td>$\frac{11}{24}$</td>
<td>11</td>
<td>$43 \frac{7}{8}$</td>
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**Page 128**

<p>| | | | |</p>
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<td>$14 \frac{3}{8}$</td>
<td>in.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$6 \frac{1}{2}$</td>
<td>lb</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$9 \frac{1}{4}$</td>
<td>hr</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$974 \frac{1}{2}$</td>
<td>lb</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$4 \frac{1}{8}$</td>
<td>in.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$2 \frac{2}{5}$</td>
<td>degrees</td>
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<td>7</td>
<td>$21 \frac{5}{6}$</td>
<td>trays</td>
<td></td>
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<tr>
<td>8</td>
<td>$12 \frac{3}{20}$</td>
<td>yd</td>
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</tbody>
</table>
### UNIT 2: FRACTIONS

**Section 3: Multiplication**

**Page 137**

1. \( \frac{6}{35} \)  
2. \( \frac{21}{32} \)  
3. \( \frac{16}{25} \)  
4. \( \frac{7}{12} \)  
5. \( \frac{7}{18} \)  
6. \( \frac{2}{3} \)  
7. \( \frac{1}{2} \)  
8. 18  
9. \( \frac{7}{10} \)  
10. \( \frac{3}{4} \)

**Page 139**

1. \( \frac{17}{5} \)  
2. \( \frac{25}{2} \)  
3. \( \frac{53}{10} \)  
4. \( \frac{207}{8} \)  
5. \( \frac{26}{3} \)  
6. \( \frac{63}{4} \)  
7. \( \frac{67}{10} \)  
8. \( \frac{127}{3} \)  
9. \( \frac{84}{5} \)  
10. \( \frac{35}{8} \)  
11. \( \frac{83}{8} \)  
12. \( \frac{72}{5} \)

**Page 140**

1. \( \frac{2}{4} \)  
2. \( \frac{1}{4} \)  
3. \( \frac{1}{5} \)  
4. \( \frac{9}{2} \)  
5. \( \frac{4}{3} \)  
6. \( \frac{3}{7} \)  
7. 8  
8. \( \frac{6}{7} \)  
9. \( \frac{5}{5} \)  
10. 9

---

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### Section 3: Multiplication

**Page 141**

1. \( \frac{27}{8} \)
2. \( \frac{19}{4} \)
3. \( \frac{23}{9} \)
4. \( \frac{38}{7} \)
5. \( \frac{11}{5} \)
6. \( \frac{53}{6} \)
7. \( \frac{73}{10} \)
8. \( \frac{13}{2} \)
9. \( \frac{34}{5} \)
10. \( \frac{29}{3} \)
11. \( \frac{8}{5} \)
12. \( \frac{48}{9} \)

**Page 142**

1. \( \frac{3}{20} \)
6. \( \frac{15}{32} \)
2. \( \frac{5}{48} \)
7. \( \frac{3}{14} \)
3. \( \frac{5}{18} \)
8. \( \frac{7}{18} \)
4. \( \frac{8}{15} \)
9. \( \frac{7}{12} \)
5. \( \frac{7}{48} \)
10. \( \frac{5}{12} \)

**Page 143**

1. \( \frac{6}{35} \)
2. \( \frac{1}{8} \)
3. \( \frac{5}{21} \)
4. \( \frac{3}{5} \)
5. \( \frac{9}{14} \)
6. \( \frac{2}{9} \)
7. \( \frac{1}{3} \)
8. \( \frac{5}{12} \)
9. \( \frac{5}{12} \)
10. \( \frac{7}{48} \)
UNIT 2: FRACTIONS

Section 3: Multiplication

Page 144
1. \( \frac{2}{15} \)
2. \( \frac{5}{28} \)
3. \( \frac{1}{4} \)
4. \( \frac{9}{25} \)
5. \( \frac{21}{32} \)
6. \( 1 \)
7. \( \frac{5}{21} \)
8. \( \frac{1}{4} \)
9. \( \frac{1}{5} \)
10. \( \frac{3}{16} \)

Page 145
1. \( 1 \)
2. \( 6 \)
3. \( 2 \)
4. \( 2 \frac{2}{9} \)
5. \( 22 \frac{2}{9} \)
6. \( 3 \frac{1}{2} \)
7. \( 36 \)
8. \( 2 \frac{2}{35} \)
9. \( 2 \frac{11}{14} \)
10. \( 1 \frac{1}{2} \)

Page 146
1. \( \frac{3}{20} \)
2. \( \frac{1}{10} \)
3. \( \frac{7}{20} \)
4. \( \frac{15}{56} \)
5. \( \frac{5}{7} \)
6. \( \frac{8}{15} \)
7. \( \frac{5}{12} \)
8. \( \frac{2}{9} \)
9. \( \frac{1}{14} \)
10. \( \frac{1}{12} \)

Teacher's Guide
UNIT 2: FRACTIONS

Section 3: Multiplication

Page 147
1. $21 \frac{4}{5}$
2. $6 \frac{1}{2}$
3. $\frac{37}{6}$
4. $\frac{317}{8}$
5. $5 \frac{1}{3}$
6. $24 \frac{2}{5}$
7. $23 \frac{3}{4}$
8. $5$
9. $8$
10. $1 \frac{1}{9}$

Page 148
1. $48$
2. $12 \frac{2}{3}$
3. $12 \frac{1}{4}$
4. $44$
5. $30$
6. $9 \frac{1}{2}$
7. $72$
8. $18$
9. $20 \frac{1}{2}$
10. $28 \frac{1}{8}$

Page 149
1. $\frac{2}{9}$
2. $6 \frac{2}{3}$
3. $25$
4. $\frac{1}{4}$
5. $\frac{7}{12}$
6. $\frac{15}{32}$
7. $8 \frac{1}{6}$
8. $4 \frac{3}{8}$
9. $28$
10. $45 \frac{1}{3}$

Teacher's Guide

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UNIT 2: FRACTIONS

Answer Keys

Section 3: Multiplication

Page 150  
1. \(56 \times \frac{2}{9}\)  
2. \(80 \times \frac{8}{9}\)  
3. \(13 \times \frac{1}{8}\)  
4. \(54 \times \frac{5}{8}\)  
5. \(2 \times \frac{1}{4}\)  
6. \(49 \times \frac{2}{5}\)  
7. \(18 \times \frac{3}{4}\)  
8. \(1 \times \frac{13}{20}\)  
9. \(35 \times \frac{7}{15}\)  
10. \(1 \times \frac{9}{16}\)

Page 151  
1. \(13 \times \frac{3}{5}\)  
2. \(39\)  
3. \(30 \times \frac{2}{3}\)  
4. \(31 \times \frac{5}{7}\)  
5. \(33 \times \frac{1}{3}\)  
6. \(11\)

Page 152  
1. \(5 \times \frac{3}{5}\)  
2. \(2 \times \frac{1}{2}\)  
3. \(5 \times \frac{1}{3}\)  
4. \(1\)  
5. \(12\)  
6. \(24 \times \frac{2}{5}\)  
7. \(13 \times \frac{1}{3}\)  
8. \(1 \times \frac{2}{3}\)  
9. \(3\)  
10. \(3 \times \frac{9}{16}\)
UNIT 2: FRACTIONS

Section 3: Multiplication

Page 153

1. 92
2. 14 \frac{2}{9}
3. 56 \frac{1}{27}
4. 25 \frac{5}{24}
5. 14 \frac{4}{9}
6. 4 \frac{1}{2}
7. 111 \frac{59}{72}
8. 6 \frac{26}{27}
9. 4 \frac{7}{12}
10. 18 \frac{4}{5}

Page 154

1. \frac{1}{4} \text{ of the pie}
2. \frac{1}{4} \text{ yards}
3. 9 \text{ doughnuts}
4. 24 \text{ votes}
5. 5 \frac{1}{4} \text{ cups}

Section 4: Division

Page 159

1. \frac{4}{9}
2. \frac{7}{16}
3. 4 \frac{3}{8}
4. 16
5. \frac{3}{4}
6. \frac{20}{21}
7. 4
8. 2 \frac{1}{3}
9. 1 \frac{47}{85}
10. \frac{1}{8}

Teacher's Guide
UNIT 2: FRACTIONS

Section 4: Division

Page 161
1. \(\frac{3}{2}\)  
2. \(\frac{2}{1}\)  
3. \(\frac{4}{3}\)  
4. \(\frac{8}{7}\)  
5. \(\frac{2}{3}\)  
6. \(\frac{3}{11}\)  
7. \(\frac{1}{8}\)  
8. \(\frac{9}{7}\)  
9. \(\frac{9}{7}\)  
10. \(\frac{1}{15}\)  
11. \(\frac{10}{1}\)  
12. \(\frac{2}{7}\)

Page 162
1. \(\frac{3}{5}\)  
2. \(\frac{2}{3}\)  
3. \(\frac{5}{4}\)  
4. \(\frac{1}{2}\)  
5. \(\frac{5}{6}\)  
6. \(\frac{3}{1}\)  
7. \(\frac{1}{9}\)  
8. \(\frac{1}{14}\)  
9. \(\frac{1}{6}\)  
10. \(\frac{25}{36}\)

Page 163
1. \(\frac{1}{5}\)  
2. \(\frac{3}{4}\)  
3. \(\frac{2}{5}\)  
4. \(\frac{5}{6}\)  
5. \(\frac{5}{6}\)  
6. 3  
7. \(\frac{5}{27}\)  
8. \(\frac{1}{12}\)  
9. 1  
10. 2

Teacher's Guide
UNIT 2: FRACTIONS

Section 4: Division

Page 164
1. $\frac{2}{3}$
2. $\frac{1}{4}$
3. $3\frac{3}{4}$
4. $7\frac{7}{8}$
5. $\frac{8}{63}$

Page 165
1. $1\frac{1}{3}$
2. $4$
3. $8$
4. $\frac{23}{24}$
5. $\frac{2}{3}$
6. $1\frac{1}{4}$
7. $2$
8. $2\frac{3}{16}$
9. $\frac{5}{24}$
10. $1\frac{1}{5}$

Page 166
1. $7\frac{1}{2}$
2. $5$
3. $4\frac{20}{27}$
4. $1$
5. $1\frac{7}{128}$
6. $2\frac{13}{36}$
7. $\frac{75}{88}$
8. $1\frac{13}{32}$
9. $\frac{50}{99}$
10. $4\frac{1}{2}$
UNIT 2: FRACTIONS

Page 167
1. $\frac{1}{3}$
2. $\frac{4}{9}$
3. $\frac{5}{6}$
4. $1 \frac{1}{7}$
5. $1 \frac{1}{9}$
6. $1 \frac{1}{3}$
7. 56
8. 16
9. $\frac{3}{20}$
10. $3 \frac{1}{3}$

Page 168
1. 1
2. 1
3. $3 \frac{3}{5}$
4. $1 \frac{1}{2}$
5. $2 \frac{2}{5}$
6. $4 \frac{4}{25}$
7. $4 \frac{6}{11}$
8. $\frac{2}{3}$
9. $1 \frac{7}{10}$
10. $1 \frac{11}{486}$

Page 169
1. $7.50$
2. 9 skirts
3. $5 \frac{5}{6}$ hours
4. $25 \frac{1}{3}$
5. $.29$ per lb for peas
6. 4 oz.
7. $8 \frac{1}{2}$ hours
8. 336 mph
9. 72¢
10. $35,200$

Teacher's Guide
UNIT 3: DECIMALS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
Section 5: Rounding
UNIT 3: DECIMALS

Overview of Unit 3

What This Unit Covers...

Unit 3 provides instruction to assist students in performing mathematical operations with decimals. The objectives and skills for this unit are listed below.

Objective 1

Compute with decimals

Skills: Add four, five-digit decimal numbers, each having no more than three decimal numbers.

Subtract five-digit decimal numbers, each having no more than three decimal places.

Multiply two decimal numbers, each having no more than two decimal places.

Divide a decimal number named in tenths or hundredths by powers of ten up to 1000.

Divide two numbers, each having no more than two decimal places, where the divisor is less than 100 with no more than two significant digits.

Round a mixed number with a whole-number component less than 100 to the nearest whole number.

Round a number less than 100 with no more than 3 decimal places to any designated number.

Objective 2

Solve real-world problems...
UNIT 3: DECIMALS

Unit 3 is comprised of 5 sections. The chart below displays the sections and concepts covered in each section for this unit.

### Sections and Concepts of Unit 3

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
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<td>Section 1</td>
<td>Adding decimal numbers</td>
</tr>
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<td>Section 2</td>
<td>Subtracting decimal numbers</td>
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<tr>
<td>Section 3</td>
<td>Multiplying decimal numbers</td>
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<td>Section 4</td>
<td>Dividing decimal numbers</td>
</tr>
<tr>
<td>Section 4</td>
<td>Dividing decimal numbers by powers of ten</td>
</tr>
<tr>
<td>Section 5</td>
<td>Rounding decimal numbers</td>
</tr>
</tbody>
</table>

### Unit Components...

The Teacher's Guide in each section in Unit 3 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

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UNIT 3: DECIMALS

Addition

Section 1: Addition of Decimal Numbers

What This Section Is About...

In this section students will practice addition of decimal numbers using a combination of decimals, mixed decimals, and whole numbers. An understanding of decimal values, the use of the decimal point, and the use of zero as a place holder will be essential.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p.175.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>p. 176</td>
</tr>
<tr>
<td>• Addition of decimals</td>
<td>p. 174</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 175</td>
</tr>
</tbody>
</table>
UNIT 3: DECIMALS

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (p. 175).

Prerequisite Skills for Section 1

- Add up to five-digit whole numbers.
- State place value to thousandths.
- Align decimal numbers vertically.

2. Introduce.

- In the late 1500's a mathematician named Vieta suggested using fractions having decimals which were powers of ten, but Stevir is commonly given credit for the invention of the decimal fraction. He published a book in which he explained how all fractional computation could be done as with whole numbers by using decimals. His notation was complicated, but following his work the decimal point was soon introduced, simplifying the notation.

Ask the students about where decimals are used in their "real world," and their parents'. Point out that although money issues may be the most common occurrence for use of decimals in the U.S., in other countries the metric system is in use, calling for great familiarity with decimals.

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples. See student vocabulary for definitions and examples.
UNIT 3: DECIMALS

Addition

- decimal
- decimal point
- mixed decimal

Assign vocabulary activity on page 176.

4. Conduct initial learning activity.

- Select student volunteers to count the change in their pockets and call out the amounts. List the amounts on the board. Do not write them under each other. Use the symbol for cent whenever the amount is less than one dollar.

- Review procedure for placing decimal after a whole number to form a decimal number. (Example: 50 = 50.0)

- Question: "How can we find the total amount of change?" Use this activity to explain lining up decimals. Provide a number of examples. Have students practice lining up problem.

- Review the use of the dollar and cent sign.

5. Present each addition of decimal numbers concept with examples.

One concept is presented in Section 1. The Student's Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.

- Give rationale for learning the skill.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Review the use of the dollar sign and cent sign.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Addition fact error**
  
  \[
  \begin{array}{c}
  2.8 \\
  + 3.7 \\
  \hline
  6.3 \\
  \end{array}
  \]
  
  *Whole number addition review*

- **Incorrect alignment**
  
  *Discuss the value of each digit.*
  *Use graph paper.*

- **Placing decimal point in front of whole number to align it**
  
  *Reinforce place values of digits.*
  *Compare 23, 2.3, .23*

7. Reinforce.

Selected reinforcement strategies are listed below.

- ✗ Have students practice basic addition facts, using microcomputer drill and practice programs and timed drills.

- ✗ Assign other activities to practice and reinforce, as needed.

8. Summarize.

Review the major points discussed in the Introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
UNIT 3: DECIMALS

Subtraction

Section 2: Subtraction of Decimal Numbers

What This Section Is About...

In this section students will practice subtraction, with and without regrouping, of five-digit mixed decimal numbers, having no more than three decimal places.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 185.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary.</td>
<td>p. 176</td>
</tr>
<tr>
<td>6. Subtracting decimal numbers</td>
<td>p. 184</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 185</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching subtraction of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest (p. 185).

**Prerequisite Skills for Section 2**

- State place value to thousandths.
- Subtract up to three-digit whole numbers.
- Align decimal numbers.
- Compare decimal values.

2. Introduce.

- When adding or subtracting with fractions, common denominators must be found. When computing with decimal numerals, however, this is not necessary, since the numerals by their very nature are already written with common denominators.

Regrouping, when necessary, follows the same guidelines as for whole numbers, and empty places may simply be filled in with zeroes to clarify this process.
UNIT 3: DECIMALS

3. Review vocabulary.
   - No new terms are presented in this section.

4. Conduct initial learning activity.
   - Review lining up decimals.

5. Present each decimal concept with examples.
   One concept is presented in Section 2. The Student's Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.
   - Give rationale for learning the skill. Solicit students' input when developing rationale.
   - Give steps in procedure.
   - Model the strategy with an example. Refer students to the example provided in the Student's Guide.
   - Present other examples and actively involve the student.
   - Assign Activity Sheets.
   - Provide corrective feedback.

6. Address common errors.
   Below is a listing of common errors. Selected errors include examples and strategies for remedying.
   - Incorrectly computing
     Review basic subtraction facts.
   - Aligning incorrectly
     Use graph paper.
   - Not borrowing across decimal points
     Review concept of regrouping to subtract mixed numerals (fractions). Relate mixed numerals to mixed decimals.
UNIT 3: DECIMALS

Subtraction

- Placing decimal in front of whole number to align it
  - Reinforce place value of digits.
  - Compare 42., 4.2, .42.

- Subtracting the larger decimal from the smaller
  - Occurs with word problems. Review commutative (order) property of addition. Then compare with subtraction, showing that the principle doesn't apply.

7. Reinforce.

Selected reinforcement strategies are listed below.

* Have students play games to practice basic facts.

* Have students practice basic subtraction facts, using microcomputer drill and practice programs.

* Assign other activities to practice and reinforce as needed.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on subtraction of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
Section 3: Multiplication of Decimal Numbers

What This Section Is About...

In this section students will practice multiplication of decimal numbers each having no more than two decimal places. Other than finding the correct placement for the decimal point in the "answer," there is no difference between the method for multiplying whole numbers and for multiplying decimals. Students will also practice multiplying decimals by powers of ten (e.g., \( \times 10, \times 100, \times 1000 \)).

Scope and Sequence of Section 3

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p.195.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary.</td>
<td>p. 176</td>
</tr>
<tr>
<td>a. Multiplying decimal numbers</td>
<td>p. 192</td>
</tr>
<tr>
<td>b. Multiplying by powers of ten</td>
<td>p. 194</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>

Teacher's Guide
UNIT 3: DECIMALS

Suggestions for Teaching...

Suggestions are provided below for teaching the multiplication of decimals concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 195.

Prerequisite Skills for Section 3

- Multiply up to three-digit whole numbers.
- State place value to ten thousandths.
- Multiply a whole number and a number having no more than two decimal places.

2. Introduce.

Discuss real-life situations where this skill is needed to establish a rationale for learning.

In the manufacturing world, products are not priced tidily. A box of paper clips may be sold by the manufacturer to the retailer for $0.257 each, or twenty-five and seven-tenths of a cent. These same boxes may be sold in packages of six boxes. To determine the cost of a package, multiplication of decimals is used.

Many employers require employees to use a timeclock to record their beginning and ending time for a workday. Sometimes these timeclocks are set for 100-minute hours. An employee may earn $4.75 per hour and have worked shifts totaling 36.79 hour for a given week. To determine gross salary requires multiplication of decimals.
UNIT 3: DECIMALS

3. Review vocabulary.
   □ No new vocabulary words are presented in this section.

4. Conduct initial learning activity.
   □ Remind students that multiplication of decimals is different than multiplication of whole numbers only for the correct placement of decimal in product.

   □ Stress the location of the decimal when it is not written (always on the right in a whole number.) (Example: 52 = 52. = 52.0)

   □ Review procedure for counting decimal places. Write 2.115 on the blackboard.  
   (Question: How many decimal places are in this number?) Locate the decimal point. Count the digits to the right of the decimal point (3). Write .06 on the blackboard.  (Question: How many decimal places are in this number?) 2  
   (Question: What is the total number of decimal places in the two numbers?) 5

   □ Give other examples like the one above to allow students opportunities to practice counting decimal places. Do Activity Sheet page 196.

   □ Explain that the decimal points in multiplication do not have to be aligned as they do in addition and subtraction problems.

5. Present each multiplication concept with examples.

   One concept is presented in Section 3. The Student's Guide contains concepts with examples and steps. For this concept cover the following:

   □ Give rationale for learning the skill. Solicit students' input when developing rationale.

   □ Give steps in procedure.

   □ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

   □ Present other examples and actively involve the student.
6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Multiplying incorrectly
- Placing the decimal point incorrectly in the answer

Review of multiplication facts and of multiplication of whole numbers. Use a drill consisting of horizontal and vertical problems with answers but not decimal points. Have students correctly place decimal point.

7. Reinforce.

Selected reinforcement strategies are listed below.

- Drill on basic multiplication facts.
- Students chart grades, scores, or number correct.
- Students race for completion of a problem with a correct answer.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
UNIT 3: DECIMALS

Section 4: Division of Decimal Numbers

What This Section Is About...

In this section students will practice division of decimal numbers with no more than two decimal places by divisors less than 100. As in the previous section, division is the same as with whole numbers, except for the need to adjust for correct placement of the decimal point in the answer. Students will also practice a shortcut for quick division by powers of ten (e.g., \(10\), \(100\), \(1000\)).

Scope and Sequence of Section 4

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<tr>
<th>Events</th>
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<td>1. Determine present level.</td>
<td>Assign Quiz on p. 205.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary.</td>
<td>p. 176</td>
</tr>
<tr>
<td>a. Dividing decimal numbers</td>
<td>p. 202</td>
</tr>
<tr>
<td>b. Dividing decimal numbers by powers of ten</td>
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</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 205</td>
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Teacher’s Guide
Suggestions for Teaching...

Suggestions are provided below for teaching the division of decimals concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 205.

Prerequisite Skills for Section 4

- Divide whole numbers.
- State place value to thousandths.

2. Introduce.

Discuss situations in real world in which this skill is used such as comparison shopping and unit pricing. Of interest to athletes is the use of averaging times for sporting events. Students could bring in sports events programs or newspaper clippings for examples.

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples.
  - quotient
  - digit
  - repeating decimal
  - terminating decimal
  - non-terminating
  - bar
4. Conduct initial learning activity.

- Stress the location of the decimal when it is not written (always on the right) in a whole number. (Example: 52 = 52.0)

- Review procedure for writing division problems. 3.95 ÷ .36 = .36
  - You must read the problem to be able to set it up correctly: 3.95 ÷ .36 is "3.95 divided by .36".

- Present a series of problems (one at a time) requiring division by a specific power of ten, with a variety of other numbers as dividends. Have the students find the answers any way they can, and record the answers on the board next to each problem. Repeat with another power of ten, again organizing the problems with answers on the board. Solicit input from students regarding any pattern they may see emerging. If the students do not seem to see the emerging pattern, the teacher may call attention to it by underlining the digits behind the decimal point in the divisors. Ask for a volunteer to state the pattern as a rule, or shortcut, for dividing by powers of ten. If the students do not arrive at the rule independently, the teacher may point out that the number of places in the divisor is the same as the number of places the decimal point moved from the dividend to the quotient.

5. Present each division of decimals concept with examples.

Two concepts are presented in Section 4. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign practice Activity Sheets.

- Provide corrective feedback.
6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Computing incorrectly**
  - Review whole number division.

- **Misplacing the decimal**
  - Drill with setting up problems and placing decimal in quotient.
  - Don't require solution or provide quotient without decimal point.

- **Dividing the dividend into the divisor and rounding off—particularly when the symbol (+) is used (dividing backwards)**
  - Give students division problems in one form and ask them to rewrite in the other form.
  - For example:
    
    \[
    3.7 \div 42.9 \quad \text{and} \quad 42.9 \div 3.7
    \]
    \[
    2.8 \div 36 = 36 \div 2.8
    \]

- **Failure to use zero as a place holder or using it incorrectly**
  - Provide a set of problems which require the use of zero as a decimal placeholder (in the quotient and/or in the dividend), and ask the students to compute only to the first significant digit.

- **Setting up problem incorrectly**
  - Show the importance of order in division, as with subtraction.
  - Provide exercise in translating back and forth between the division notations.

- **Failure to annex zeroes in the dividend to complete the division process.**
  - Stress that division is not complete until.... Instruct as to how far to divide.
7. Reinforce.

Selected reinforcement strategies are listed below.

- The student may find it helpful to compare moving the decimal point in division problems with finding equivalent fractions. In the language of decimal numerals, one can write the following:

\[
\begin{align*}
0.07 \div 28 & \text{ is the same as } \frac{28}{0.07} \times \frac{100}{100} = \frac{2800}{7} = 7 \frac{2800}{7} \\
0.007 \div 28 & \text{ is the same as } \frac{28}{0.007} \times \frac{1000}{1000} = \frac{280}{7} = 7 \frac{280}{7}
\end{align*}
\]

\[
\begin{align*}
2.1 \div 42 & \text{ is the same as } \frac{0.42}{2.1} \times \frac{10}{10} = \frac{4.2}{21} = 21 \frac{4.2}{21} \\
21 \div 4.2 & \text{ is the same as } (2.1 \times 10) \div 4.2 \times 10 = 21 \frac{4.2}{21}
\end{align*}
\]

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on division of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
UNIT 3: DECIMALS  

Section 5: Rounding of Decimal Numbers

What This Section Is About...

In this section students will round decimal numbers less than 100 with no more than 3 decimal places to any designated place.

Scope and Sequence of Section 5

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
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<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
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<tr>
<td>3. Review vocabulary.</td>
<td>p. 176</td>
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<tr>
<td>5. Present concepts and examples</td>
<td>Assign Activity Sheets.</td>
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<tr>
<td>• Rounding decimal numbers</td>
<td>p. 212</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
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</table>

Teacher's Guide
UNIT 3: DECIMALS

Rounding

Suggestions for Teaching...

Suggestions are provided below for teaching rounding of decimals. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 215.

Prerequisite Skills for Section 5

✓ Identify decimal place values through thousandths and whole number values through tens.

✓ State that a decimal fraction is part of a whole.

✓ Round whole numbers.

2. Introduce.

☐ One of the more common applications for rounding with decimals falls into the category of unit pricing. Comparison shopping requires the buyer to figure unit prices, and the unit price will often be expressed as a decimal to several decimal places. The buyer is only interested in the price to the nearest cent, and so will round the decimal to the appropriate place.

3. Present vocabulary concepts.

Review relevant vocabulary words. No new words are presented in this section.
UNIT 3: DECIMALS

Rounding

4. Conduct initial learning activity.

- Using a number line drawn on the chalkboard label with integers 1 through 10 and indicate the points .5, 1.5, 2.5, and so on. Have students locate numbers such as 1.7, or 3.2 on the line. Then ask them to find the whole number closest to each decimal. Develop the rules for rounding decimal numbers.

5. Present each rounding of decimals concept with examples.

One concept is presented in Section 5. The Student's Guide contains the concept with examples and steps. For this concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

× Not recognizing that rounding to the nearest whole number is the same as rounding to the ones' or units' place

Practiced by relating the decimal number to its fractional mixed number equivalent, and rounding to the nearest unit. Example:

\[
37.54 = 37 \frac{54}{100} = 38
\]
UNIT 3: DECIMALS

Rounding

- Rounding the number to the wrong place
  
- Rounding up when the number should stay the same
  
- Error when attempting to round to a place that is not next-to-last place in the given numeral
  
- Rounding only the decimal part of the digit number, neglecting the whole number part and the decimal point
  
- Error when more than one digit must be changed

Review places.

Use number line demonstration.

Review the fact that rounding rules are conventions established for consistency around the world.

Relate rounding decimals to rounding whole numbers. For example, when rounding the whole number 3.462 to the nearest hundred, attention is focused only on the place to the right of the hundreds'—the tenths' place. All other digits (on the right) are ignored. In the same way, when rounding the decimal 3.462 to the nearest tenth, attention is focused on the place to the right, or the hundredths' place. The "2" found in the thousandths' place is disregarded, and later discarded.

Round to a generic place using a number whose decimal point has "disappeared." Example: 34.96 Round to underlined place; causes "4" to change also; decimal reappears.

Provide a drill which requires that students determine only whether or not more than one digit will be changed. (This does not refer to trailing zeroes.)
7. Reinforce.

Selected reinforcement strategies are listed below.

★ Extend the initial learning activity to include decimal numbers with place values in the hundredths'. "Magnify" a portion of the line between the whole numbers 29 and 30. Write numbers such as 29.83, 29.86, 29.91, and 29.97 on the chalkboard. Ask students which are closest to 29.9, and which to 29.8. (29.9; 29.8; 29.97).

★ Review rounding whole numbers, and develop the generalized "rule" of looking at the digit to the right of the place to which you wish to round. Relate to rounding decimals.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on rounding decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz in student section, or use an alternate form, to assess skill mastery.
# UNIT 3: DECIMALS

## Answer Keys

### Section 1: Addition

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**Teacher's Guide**

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## UNIT 3: DECIMALS

### Answer Keys

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## Unit 3: Decimals

### Section 2: Subtraction

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### Section 3: Multiplication

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Teacher's Guide
### Unit 3: Decimals

#### Section 3: Multiplication

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**Answer Keys**

**Teacher's Guide**
## UNIT 3: DECIMALS

### Section 4: Division

**Page 203**

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**Teacher's Guide**

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UNIT 3: DECIMALS

Section 4: Division

Page 210

1. a. $1.30
   b. $2.67
2. $323.04
3. 197.1 gallons of gas
4. $4.40
5. 5 pounds of peaches
6. $.36
7. 306.5
8. 19

Section 5: Rounding Decimals

Page 215

1. 3.72
2. 4.4
3. 37
4. 398.4
5. 24

Page 216

1. 16.5
2. 146.98
3. 6.8
4. 72.7
5. 2.48
6. 367.87
7. 34.6
8. 54.08
9. 6.4
10. 84.41

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1. 6.8
2. 47
3. 68.4
4. 8.46
5. 69.4
6. 52.5
7. 68.47
8. 3
9. 36.4
10. 75
UNIT 4: PERCENT

Section 1: Equivalent Forms
Section 2: Percents of Whole Numbers
Section 3: Percents of Decimal Numbers
Overview of Unit 4

What This Unit Covers...

Unit 4 provides instruction to assist students in performing mathematical operations with percent. The objectives and skills for this unit are listed below.

Objective 1

Compute with percents
Skills: Identify decimal number or percent that is equivalent to a proper fraction having a denominator of 2, 3, 4, 5, 20, 25, 50, or 1000.

Write whole-number percents as rational numbers.

Find the percentage, when given a whole number and a whole-number percent less than 100.

Find percentage when given a whole number and a whole-number percent less than 1000.

Objective 2

Solve real-world problems
Skills: Solve real-world problems involving percents using no more than two distinct operations and limited to problems concerning simple interest, sales tax, or rate of discount.
UNIT 4: PERCENT

Unit 4 is comprised of three sections. The following chart displays the sections and concepts covered in each section for this unit.

## Sections and Concepts of Unit 4

<table>
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<th>Sections</th>
<th>Concepts</th>
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<td>Write a fraction as an equivalent decimal</td>
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<tr>
<td></td>
<td>Write a decimal as a percent</td>
</tr>
<tr>
<td></td>
<td>Write a decimal as an equivalent fraction</td>
</tr>
<tr>
<td></td>
<td>Write a percent as a fraction</td>
</tr>
<tr>
<td>Section 2</td>
<td>Find a percent of a whole number</td>
</tr>
<tr>
<td>Section 3</td>
<td>Find a percent of two-place decimal numbers</td>
</tr>
</tbody>
</table>

## Unit Components...

The Teacher's Guide in each section of Unit 4 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.

**Teacher's Guide**

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UNIT 4: PERCENT

Equivalent Forms

Section 1: Equivalent Forms

What This Section Is About...

In this section students will study the interrelationships of the fraction, decimal, and percent forms, and practice renaming from one form to another.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
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<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 225</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>p. 226</td>
</tr>
<tr>
<td>a. Write a fraction as an equivalent decimal</td>
<td>p. 222</td>
</tr>
<tr>
<td>b. Write a decimal as a percent</td>
<td>p. 222</td>
</tr>
<tr>
<td>c. Write a decimal as an equivalent fraction</td>
<td>p. 223</td>
</tr>
<tr>
<td>d. Write a percent as a fraction</td>
<td>p. 224</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
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<tr>
<td>9. Administer posttest.</td>
<td>p. 225</td>
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</table>
Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quiz on p. 225 as a pretest.

<table>
<thead>
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<th>Prerequisite Skills for Section 1</th>
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<tr>
<td>✓ Identify equivalent fractions.</td>
</tr>
<tr>
<td>✓ State place value through thousandths.</td>
</tr>
<tr>
<td>✓ Divide whole and decimal numbers.</td>
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2. Introduce.

☐ Percent is a convenient way to express profit and loss and is used mostly in the business world. In retail sales it is used to show mark-up and mark-down. Sales people are frequently paid on commission, which is figured as a given percent of their sales.

☐ Students will be learning different names for a single value. These equivalent forms are used at different times, depending on which name is most appropriate.

Some names are more familiar than others. Three-fourths, three-quarters, 3/4, $0.75, and 75¢ is one set of equivalent forms which may be familiar to students. Some other values may become familiar quickly.
UNIT 4: PERCENT

Equivalent Forms

3. Present vocabulary concepts.

- Discuss vocabulary terms and give examples.
  - decimal
  - decimal point
  - is
  - percent
  - ratio

4. Conduct initial learning activity.

- Show how to divide the bottom number into the top number to change the fraction to a decimal. Stress that division is only to two decimal places with the remainder written as a fraction. Now, move the decimal two places to the right and attach the symbol for percent (%). Tell the students that percent is a special ratio, in which the second number is always 100.

- In a question and answer session ask the students the following questions:
  (a) How many boys in the room?
  (b) How many girls in the room?
  (c) What is the total number of students in the room?
  (d) How would the number of boys be written as a fraction?
  (e) How would the number of girls be written as a fraction?
  (f) What percent of the total class is boys?
  (g) What percent of the total class is girls?
UNIT 4: PERCENT

Equivalent Forms

Present the students with the following chart of common equivalencies.

<table>
<thead>
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<td>$\frac{1}{2}$</td>
<td>50%</td>
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<td>$\frac{3}{4}$</td>
<td>75%</td>
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<td>$\frac{1}{3}$</td>
<td>33 $\frac{1}{3}$%</td>
</tr>
<tr>
<td>$\frac{2}{3}$</td>
<td>66 $\frac{2}{3}$%</td>
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</table>

Put these examples on the board.

(a) $\frac{3}{5} = \frac{0.6}{0.30} = 60\%$ (Decimal is always on right when it is not written.)

(b) $\frac{2}{3} = \frac{0.6623}{0.18} = 66 \frac{2}{3}\%$ (Decimal always falls between the whole number and fraction when not written [e.g., 66.66].)

When you wish to rename a mixed fraction as a decimal, compute only the fraction part.

(c) $3 \frac{1}{6} = \frac{16}{6} = 3.16$ (Reduce fraction as necessary.)

100% means the whole of anything, or 1, so 3 is the decimal name for 300%.
5. Present each equivalent form concept with examples.

Four concepts are presented in Section 1. The Student’s Guide contains concepts with examples and steps. Follow the sequence of instruction suggested below.

- Give rationale for learning the skill.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student’s Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

× Misplacing or omitting the decimal point

Stress the importance of the decimal point by comparing two numbers whose digits are identical except for the placement of the decimal point.

Example: 54.321 vs 543.2

The first is a bit more than 54; the second is larger than 543. (This section may cause difficulty for students who need vision correction, or who are not wearing their prescribed glasses. Be alert to this problem.)
UNIT 4: PERCENT

Equivalent Forms

× Dividing the denominator by the numerator

Discuss the meaning of the fraction bar in terms of division. Include examples which may tend to lead the student to an error (e.g., since most examples will not be improper fractions, mix these into the drill).

× Misplacing or omitting zeros

× Forming the decimal by placing the numerator and denominator next to each other

× Failing to move the decimal two places to the right.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Teach for transfer to calculator use. The calculator user must understand how the percent key functions.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on identifying equivalent forms; include all major concepts covered. Reinforce the importance and need for skill mastery.


Assign Quiz provided in the student section, or use an alternate form, to assess mastery of skills.
Section 2: Percents of Whole Numbers

What This Section Is About...

In this section students will practice finding percent of whole numbers. They will learn that this is a multiplicative operation and will apply skills learned in earlier lessons.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 235.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary.</td>
<td>p. 226</td>
</tr>
<tr>
<td>• Finding a percent of a whole number</td>
<td>Page 234</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 235</td>
</tr>
</tbody>
</table>
UNIT 4: PERCENT  Whole Numbers

Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p. 235.

Prerequisite Skills for Section 2

✓ Write a whole number percent as a decimal.
✓ Multiply a whole number and a number having no more than two decimal places.

2. Introduce.

☐ Buying at a discount, mark-up and mark-down, payroll commission, banking, and investments are just a few circumstances students may encounter in their future applications of finding a percent of a whole number.

☐ Provide examples of real-world situations where finding percent might be necessary.

3. Review vocabulary concepts.

☐ No new vocabulary words are presented in this section.
4. Conduct initial learning activity.

- Explain that % of means to multiply after writing the percent as a decimal or fraction.
- Explain that is means equal to.

5. Present the percent of whole numbers concept with examples.

One concept is presented in Section 2. The Student's Guide contains the concept with example and steps. Follow the sequence of instruction suggested below.

- Give rationale for learning the skill.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Using the wrong operation (e.g. dividing instead of multiplying) Demonstrate the conflicting results—i.e., the multiplication answer vs. the division answer, making use of familiar percents and numbers. For example: 25% of 100
  \[ .25 \times 100 = 25 \]
  \[ .25 \div 100 = .0025 \]
  \[ 100 \div .25 = 400 \]
UNIT 4: PERCENT

Whole Numbers

- Misplacing the decimal point
  Use an activity in which students are given problems with the answers without decimal points. Provide practice for this specific skill.

- Failing to compute correctly
  Review multiplication of decimals.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Teach for transfer with specific calculator skills.

※ Provide practice for estimating percents of whole numbers. Use the context of shopping during a sale in which merchandise is not marked with the sale prices, although signs indicate the percent of reduction. Provide strategies for mentally figuring the percent of reduction.

※ Teach for transfer with various wording. For example:

Find 10% of 46.
What is 10% of 46?
18% of 46 is what?

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on finding percents of whole numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.
Section 3: Percents of Decimal Numbers

What This Section Is About...

In this section students will practice finding percents of decimal numbers. They will learn this is a multiplicative operation, and will apply skills learned in earlier lessons.

Scope and Sequence of Section 3

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary.</td>
<td>p. 226</td>
</tr>
<tr>
<td>• Finding percents of decimal</td>
<td>p. 242</td>
</tr>
<tr>
<td>numbers</td>
<td></td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching the percent concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.
   Determine if students possess prerequisite skills. Administer pretest on p. 243.

   **Prerequisite Skills for Section 3**
   ✓ Write a whole number percent as a decimal.
   ✓ Multiply two-place decimal numbers.

2. Introduce.
   ✓ Provide examples of real-world situations where finding a percent of a decimal is used. Review introduction from previous section.

3. Review vocabulary.
   ✓ No new terms are presented in this section. Review previous words as appropriate.

4. Conduct initial learning activity.
   ✓ Explain that \% of means to multiply after writing the percent as a decimal or fraction.
   ✓ Explain that is means equal to.
UNIT 4: PERCENT

Decimals

- Relate to cost savings through reductions and discounts. For example, end-of-month sales and all items marked are 40% off. The outfit you have selected is originally $57.49. How much will you save? How much will it cost? Is the ticket marked correctly? Did the cashier ring the correct amount?

5. Present each percent of decimals concept with examples.

One concept is presented in Section 2. The Student's Guide contains concept with example and steps. Follow the sequence of instruction suggested below.

- Give rationale for learning the skill.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Using the wrong operation (e.g., dividing instead of multiplying) Demonstrate the conflicting results—i.e., the multiplication answer vs. the division answer, making use of familiar percents and numbers. For example:
  
  \[
  .25 \times 100 = 25 \\
  .25 + 100 = .0025 \\
  100 + .25 = 400
  \]
UNIT 4: PERCENT

Decimals

1. Misplacing the decimal point

Use an activity in which students are given problems with the answers without decimal points. Provide practice for this specific skill.

2. Failing to compute correctly

Review multiplication of decimals.

7. Reinforce.

- Provide instruction and practice using a calculator for computing percent. Have students perform calculations without a) keying in any decimal points or b) using the percent key.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on finding percents of decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in the student section, or use an alternate form, to assess skill mastery.
### UNIT 4: PERCENTS

**Answer Keys**

#### Section 1: Equivalent Forms

<table>
<thead>
<tr>
<th>Page 225</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>.50</td>
<td>50%</td>
</tr>
<tr>
<td>2.</td>
<td>.20</td>
<td>20%</td>
</tr>
<tr>
<td>3.</td>
<td>.66 2/3</td>
<td>66 2/3%</td>
</tr>
<tr>
<td>4.</td>
<td>.75</td>
<td>75%</td>
</tr>
<tr>
<td>5.</td>
<td>.33 1/3</td>
<td>33 1/3%</td>
</tr>
<tr>
<td>6.</td>
<td>2.10</td>
<td>210%</td>
</tr>
<tr>
<td>7.</td>
<td>2.66 2/3</td>
<td>266 2/3%</td>
</tr>
<tr>
<td>8.</td>
<td>1.25</td>
<td>125%</td>
</tr>
<tr>
<td>9.</td>
<td>.80</td>
<td>80%</td>
</tr>
<tr>
<td>10.</td>
<td>.625</td>
<td>62 1/2% or 62.5%</td>
</tr>
</tbody>
</table>

| Page 227 | 1. C |
|          | 2. A |
|          | 3. G |
|          | 4. D |
|          | 5. B |
|          | 6. E |
|          | 7. I |
|          | 8. F |
|          | 9. H |

| Page 228 | 1. .5 |
|          | 2. .2 |
|          | 3. .4 |
|          | 4. .6 |
|          | 5. .8 |
|          | 6. .15|
|          | 7. .35|
|          | 8. .25|
|          | 9. .14|

| Page 229 | 1. 4/10 = .4 | 2. 1/10 = .1 |
|          | 3. 25/100 = .5 | 4. 4/100 = .04 |
|          | 5. 6/10 = .6 | 6. 8/10 = .8 |
|          | 7. 75/100 = .75 | 8. 5/100 = .05 |
|          | 9. 65/100 = .65 | 10. 30/100 = .30 |

---

**Teacher's Guide**
# UNIT 4: PERCENTS

## Section 1: Equivalent Forms

### Page 230

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. .50</td>
<td>50%</td>
</tr>
<tr>
<td>2. .25</td>
<td>25%</td>
</tr>
<tr>
<td>3. .75</td>
<td>75%</td>
</tr>
<tr>
<td>4. .89</td>
<td>89%</td>
</tr>
<tr>
<td>5. .80</td>
<td>80%</td>
</tr>
<tr>
<td>6. .40</td>
<td>40%</td>
</tr>
<tr>
<td>7. .33 1/3</td>
<td>33 1/3%</td>
</tr>
<tr>
<td>8. .12</td>
<td>12%</td>
</tr>
<tr>
<td>9. .35</td>
<td>35%</td>
</tr>
<tr>
<td>10. .46</td>
<td>46%</td>
</tr>
</tbody>
</table>

### Page 231

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 2.25</td>
<td>225%</td>
</tr>
<tr>
<td>2. 3.20</td>
<td>320%</td>
</tr>
<tr>
<td>3. .20</td>
<td>20%</td>
</tr>
<tr>
<td>4. 2.75</td>
<td>275%</td>
</tr>
<tr>
<td>5. 1.625</td>
<td>162.5%</td>
</tr>
<tr>
<td>6. 1.75</td>
<td>175%</td>
</tr>
<tr>
<td>7. .02</td>
<td>2%</td>
</tr>
<tr>
<td>8. 2.1</td>
<td>210%</td>
</tr>
<tr>
<td>9. .2</td>
<td>20%</td>
</tr>
<tr>
<td>10. 6.667</td>
<td>666.7%</td>
</tr>
</tbody>
</table>

### Page 232

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 3 3/4</td>
<td>.25</td>
<td>25%</td>
</tr>
<tr>
<td>2. 3 3/4</td>
<td>.25</td>
<td>375%</td>
</tr>
<tr>
<td>3. 9/20</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>4. 1/5</td>
<td>.25</td>
<td>20%</td>
</tr>
<tr>
<td>5. 66 2/3</td>
<td>.66 2/3</td>
<td>66 2/3%</td>
</tr>
<tr>
<td>6. 1/3</td>
<td>.33 1/3</td>
<td></td>
</tr>
</tbody>
</table>
# UNIT 4: PERCENTS

## Answer Keys

### Section 1: Equivalent Forms

<table>
<thead>
<tr>
<th>Page 232</th>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>( \frac{61}{4} )</td>
<td></td>
<td>625%</td>
</tr>
<tr>
<td>8.</td>
<td>( \frac{1}{4} )</td>
<td>.25</td>
<td>25%</td>
</tr>
<tr>
<td>9.</td>
<td>.75</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>10.</td>
<td>( \frac{3}{5} )</td>
<td>.60</td>
<td></td>
</tr>
</tbody>
</table>

### Section 2: Percents of Whole Numbers

<table>
<thead>
<tr>
<th>Page 235</th>
<th>1. 8.28</th>
<th>2. 1.44</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. 9</td>
<td>4. 234</td>
<td></td>
</tr>
<tr>
<td>5. 1.45</td>
<td>6. 14.72</td>
<td></td>
</tr>
<tr>
<td>7. 105</td>
<td>8. 1.2</td>
<td></td>
</tr>
<tr>
<td>9. 292.5</td>
<td>10. 12</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 236</th>
<th>1. 12.48</th>
<th>2. .36</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. .72</td>
<td>4. 11.2</td>
<td></td>
</tr>
<tr>
<td>5. 4.2</td>
<td>6. 38.4</td>
<td></td>
</tr>
<tr>
<td>7. 4.5</td>
<td>8. 19.5</td>
<td></td>
</tr>
<tr>
<td>9. 368.55</td>
<td>10. 3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 237</th>
<th>1. 2</th>
<th>2. 1.88</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. 9</td>
<td>4. 1.592</td>
<td></td>
</tr>
<tr>
<td>5. 6.72</td>
<td>6. 4</td>
<td></td>
</tr>
<tr>
<td>7. 5.76</td>
<td>8. .45</td>
<td></td>
</tr>
<tr>
<td>9. .0378</td>
<td>10. 1.2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 238</th>
<th>1. 3</th>
<th>2. 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. 26</td>
<td>4. 69</td>
<td></td>
</tr>
<tr>
<td>5. 96</td>
<td>6. 128.64</td>
<td></td>
</tr>
<tr>
<td>7. 120</td>
<td>8. 82</td>
<td></td>
</tr>
<tr>
<td>9. 147</td>
<td>10. 144</td>
<td></td>
</tr>
</tbody>
</table>
UNIT 4: PERCENTS

Section 2: Percents of Whole Numbers

Page 239
1. 36
2. 27
3. 17.94
4. 63%
5. 300
6. 95%
7. 60%
8. $ .43
9. $132.60
10. $22.50
11. $840.00
12. $432.00

Section 3: Percents of Decimal Numbers

Page 243
1. 1.062
2. .675
3. 1.3975
4. .09
5. .128

Page 244
1. .184
2. .472
3. 4.29
4. .63
5. 1.394
6. .1178
7. .192
8. .05
9. .24
10. 1.652

Page 245
1. .2576
2. 2.69
3. 54.672
4. 1.434
5. 5.778
6. 2.55
7. 10.05
8. .9995
9. 1.221
10. .516
UNIT 5: GEOMETRY

Section 1: Basic Figures
Section 2: Angles and Triangles
Section 3: Polygons
UNIT 5: GEOMETRY

Overview of Unit 5

What This Unit Covers...

Unit 5 provides instruction to assist students in performing mathematical operations with geometry. The objective and skills for this unit are listed below.

Objective 3

Understand basic geometric concepts and relations
Skills: Identify points, rays, line segments, lines, and angles.

Identify triangles by angles and sides.

Identify quadrilaterals to include squares, rectangles, parallelograms, trapezoids, and rhombi.

Identify pentagons, hexagons, and octagons.

Identify acute, obtuse, right, straight, complementary, and supplementary angles.

Identify parallel and perpendicular lines.

Identify congruent and similar polygons.

Measure angles less than 180° using a protractor.
UNIT 5: GEOMETRY

Unit 5 is comprised of 3 sections. The following chart displays the sections and concepts covered in each section for this unit.

Sections and Concepts of Unit 5

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1</td>
<td>Identify basic geometric figures—points, rays, line segments, lines,</td>
</tr>
<tr>
<td></td>
<td>angles, parallel lines, and perpendicular lines</td>
</tr>
<tr>
<td>Section 2</td>
<td>Identify types of angles—acute, obtuse, right, straight, complementary,</td>
</tr>
<tr>
<td></td>
<td>and supplementary</td>
</tr>
<tr>
<td></td>
<td>Measure angles using a protractor</td>
</tr>
<tr>
<td></td>
<td>Identify triangles by angles</td>
</tr>
<tr>
<td></td>
<td>identify triangles by sides</td>
</tr>
<tr>
<td>Section 3</td>
<td>Identify various quadrilaterals—squares, rectangles, parallelograms,</td>
</tr>
<tr>
<td></td>
<td>rhombi, trapezoids</td>
</tr>
<tr>
<td></td>
<td>Identify pentagons, hexagons, heptagons, and octagons</td>
</tr>
<tr>
<td></td>
<td>Identify congruent and similar polygons</td>
</tr>
</tbody>
</table>

Unit Components...

The Teacher’s Guide in Unit 5 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student’s Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
SECTION 1: BASIC FIGURES

WHAT THIS SECTION IS ABOUT...

In this section students will learn how to identify basic geometric figures called points, rays, lines, line segments, and angles. The identification of lines will include both parallel and perpendicular.

SCOPE AND SEQUENCE OF SECTION 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 255.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 257</td>
</tr>
<tr>
<td>5. Present concept and examples.</td>
<td>Assign Activity Sheets.</td>
</tr>
<tr>
<td>a. Identify points</td>
<td>p. 250</td>
</tr>
<tr>
<td>b. Identify lines</td>
<td>p. 250</td>
</tr>
<tr>
<td>c. Identify line segments</td>
<td>p. 251</td>
</tr>
<tr>
<td>d. Identify rays</td>
<td>p. 251</td>
</tr>
<tr>
<td>e. Identify angles</td>
<td>p. 252</td>
</tr>
<tr>
<td>f. Identify parallel lines</td>
<td>p. 253</td>
</tr>
<tr>
<td>g. Identify perpendicular lines</td>
<td>p. 253</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching the geometry concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Draw straight lines using a ruler.</td>
</tr>
<tr>
<td>✔ Read a protractor.</td>
</tr>
</tbody>
</table>

2. Introduce.

- Although geometric figures are creations of the mind, every day we see objects which suggest the ideal figures of geometry, and diagrams can be drawn which represent these geometric ideas.

- Provide opportunities for students to measure line segments on paper and also in real-world situations, such as measuring a room and drawing it to scale.

3. Present vocabulary concepts.

- Discuss vocabulary words as concepts are presented and provide examples.
  - angle
  - dimensions
  - horizontal
  - line
  - line segment
  - intersecting
  - parallel
  - perpendicular
  - point
  - ray
  - vertical

- Assign vocabulary list for study and Vocabulary Activities on pp. 258-259.
UNIT 5: GEOMETRY

4. Conduct initial learning activity.

- Demonstrate terms concretely by having students do the following on the count of three:
  
  (a) Touch index finger to palm to represent a point.

  (b) Run index finger across palm to represent a line.

  (c) Place flat hand across palm to represent a plane.

  (d) Place clenched fist across palm to represent space.

- Discuss each of the above ideas with regard to its respective dimension—i.e., a point has no dimension—it takes up no room and cannot be measured. A line has a single dimension, length, and has no width. A plane has two dimensions, length and width. Space is three dimensional—having length, width and height. The "figures" we draw are only representative of each concept.

- Have students identify objects in the classroom that represent points and lines. (For example: points—intersection of two walls and the floor in the corners—intersection of two walls.)

5. Present each basic figures concept with examples.

Seven concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
UNIT 5: GEOMETRY

Basic Figures


- Inability to differentiate between vertical and horizontal
  To assist students in keeping these straight suggest they associate "vertical—vertebra, horizontal—horizon."

- Incorrectly defining an angle as the space between the rays
  (a) Build angles with rays made from straws. (b) Discuss the difference between the measure of an angle and the angle itself

- Incorrectly naming an angle by not listing the vertex in the proper position
  Have students name angles, and demonstrate appropriate labeling. When students name an angle incorrectly, show them an angle by the given name.

7. Reinforce.

Selected reinforcement strategies are listed below.

- Using compass and straight-edge (not a ruler), construct equal segments, parallel lines, and perpendicular lines.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on basic figures; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
Section 2: Angles and Triangles

What This Section Is About...

In this section students will learn to identify angles by their measure and by their relationship to another angle, and will learn to use a protractor. Students will also learn to classify triangles by angles or sides.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quizzes on pp. 273-274.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 276</td>
</tr>
<tr>
<td>a. Identify types of angles</td>
<td>p. 266</td>
</tr>
<tr>
<td>b. Measure angles using a protractor</td>
<td>p. 270</td>
</tr>
<tr>
<td>c. Identify triangles by angles</td>
<td>p. 272</td>
</tr>
<tr>
<td>d. Identify angles by sides</td>
<td>p. 272</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching identifying the angles and triangles concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as pretest.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Read a protractor.</td>
</tr>
<tr>
<td>✓ Measure with a ruler.</td>
</tr>
<tr>
<td>✓ Define angle.</td>
</tr>
<tr>
<td>✓ Recognize symbol (°) for degrees.</td>
</tr>
</tbody>
</table>

2. Introduce.

- Carpentry and the craft of architecture are but two skilled professions which make use of angle and their relationships.

  When a craftsman is preparing trim for a baseboard, chair railing, or crown molding, he or she must cut the wood so that the angles "fit" all corners exactly.

  Solicit from the fishermen in your class the origin of the meaning of the word angler—one who fished with a hook—from the Greek meaning "barbed hook." Is a person who always fishes with a net an angler?
UNIT 5: GEOMETRY

Angles and Triangles

3. Present vocabulary concepts.

- Discuss vocabulary words and give examples. Review vocabulary words from Section 1.
  - acute angle
  - degree
  - complementary angle(s)
  - equilateral triangle
  - isosceles triangle
  - obtuse angle
  - protractor
  - right angle
  - right triangle
  - scalene triangle
  - straight angle
  - supplementary angle (s)
  - triangle
  - vertex
  - vertices

- Assign vocabulary activity.

4. Conduct initial learning activity.

- Draw a circle on the chalkboard, showing a dot at the center. Ask the class what unit (degree) is used to measure angles, and how many "units" there are in a circle (360 degrees).

  Have them estimate the size of a few angles which have three vertices at the center (center angles).

- Provide opportunities to practice measuring angles using a protractor. (Note: You may prefer to do a lesson covering performance standard 3.02 prior to this one.)

- Plan activities to illustrate the three types of angles. (Note: You may want to present the lessons covering performance standard 3.05 prior to this lesson.)

5. Present each angle and triangle concept with examples.

Four concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
UNIT 5: GEOMETRY

Angles and Triangles

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.


☒ Reading a protractor incorrectly

Since most protractors have 0 to 180 running both right-to-left and left-to-right, students often choose the wrong number for measure. Practice confirming the measure by asking "Is this angle acute or obtuse?" If acute, the measure is less than 90°; if it is obtuse, the measure will be greater than 90°.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Provide an activity in which triangles are classified by both sides and angles. Include special cases, like isosceles right triangles, obtuse and acute triangles, scalene right triangles, etc.

※ Discover the sum of the measures of any triangle. Tear (don't cut!) the "corners" from several triangles drawn (and carefully cut out) by students, being careful to keep them in respective sets. Then piece together the three corners with their vertices meeting in such a way that a straight line is formed along one side.
Repeat with several sets of "corners." The result should always form a line. Since a straight angle measures 180°, the total sum of the measures of the angles must be 180°!

Ask students to attempt to build triangles having more than one obtuse triangle or more than one right angle. What happens?

Construct various kinds of angles and triangles using compass and straight edge (not a ruler).

7. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on angles and triangles; include all major concepts covered. Reinforce the importance and need for skill mastery.

8. Administer posttest.

Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 5: GEOMETRY

Polygons

Section 3: Polygons

What This Section Is About...

In this section students will learn to identify polygons with up to eight sides, and learn to identify congruent and similar polygons.

Scope and Sequence of Section 3

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 295.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 298</td>
</tr>
<tr>
<td>a. Identify various quadrilaterals</td>
<td>p. 290</td>
</tr>
<tr>
<td>b. Identify pentagons, hexagons, heptagons, and octagons</td>
<td>p. 292</td>
</tr>
<tr>
<td>c. Identify congruent and similar polygons</td>
<td>p. 294</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching geometry concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest.

Prerequisite Skills for Section 3

- Identify parts of basic geometric figures.
- Identify line segments having equal measures.
- Identify angles having equal measures.
- Measure different types of angles.

2. Introduce.

- Find polygons in common objects.
- Provide examples of polygons and have students count number of sides.
- Have students practice drawing polygons.
UNIT 5: GEOMETRY

Polygons

3. Present vocabulary concepts.

- Discuss vocabulary words and give examples.
  - congruent polygon
  - heptagon
  - hexagon
  - octagon
  - parallelogram
  - pentagon
  - trapezoid
  - polygon
  - quadrilateral
  - rectangle
  - rhombus
  - similar polygon
  - square
  - plane

- Assign vocabulary activity.

4. Conduct initial learning activity.

- Have students bring in pictures or ads and identify various polygons. Find examples of each shape in furniture, architecture, nature, art objects, etc.

5. Present each polygon concept with examples.

Five concepts are presented in Section 3. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
UNIT 5: GEOMETRY

Polygons


✗ Inability to identify polygons not "sitting" on a horizontal base

Provide students with opportunities to classify all figures given a variety of orientations.

7. Reinforce.

Selected reinforcement strategies are listed below.

☆ Provide students with as many opportunities for practice as needed. Play "concentration" games to match shapes with their names.

☆ Use construction paper, rulers, and scissors and templates to draw and cut out shapes.

☆ Using Venn diagrams, discuss the relationships between various quadrilaterals. For example:
  - a square is also a rectangle, a rhombus, and a parallelogram
  - a rhombus is also a parallelogram
  - a rectangle is also a parallelogram
  - a trapezoid cannot be classified except as a quadrilateral, etc.

☆ Enhance students' intuitive understanding of the interrelationships between polygons by using various polygons and having students create tessellations, or tile patterns, in which the shapes fit against each other perfectly. This activity may be modified by limiting the students to using regular polygons. A regular polygon is one having all angles and all sides of equal measure. You may wish to solicit an art teacher's assistance.

☆ Using only compass and straight edge, construct squares, parallelograms, regular hexagons, etc. Regular polygons with five, seven, or nine sides provide a unique challenge in construction.
8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on polygons; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 5: GEOMETRY

Section 1: Basic Figures

Page 255
1. ray
2. point
3. angle
4. line segment
5. line

Page 256
1. perpendicular
2. parallel
3. parallel
4. perpendicular

Page 258
1. point
2. angle
3. ray
4. line
5. line segment

Page 259
1. parallel lines
2. protractor
3. vertical lines
4. perpendicular line
5. horizontal line

Page 260
1. \( XY \)
2. \( ST \)
3. \( HG,\ EF \)
4. \( EEFF\ and\ GGHH \)
5. \( AB \)
6. \( PQ\ and\ FG \)

1. \[ \text{AB} \quad \text{CD} \]
2. \[ \text{G} \quad \text{H} \]
3. \[ \text{F} \quad \text{E} \]
4. \[ \text{L} \quad \text{M} \]
## UNIT 5: GEOMETRY

### Section 1: Basic Figures

#### Page 261

<table>
<thead>
<tr>
<th>In Words</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. segment FG</td>
<td>FG</td>
</tr>
<tr>
<td>2. line FG</td>
<td>FG</td>
</tr>
<tr>
<td>3. angle ABC</td>
<td>( \angle ABC )</td>
</tr>
<tr>
<td>4. ray CA</td>
<td>AC</td>
</tr>
<tr>
<td>5. ray ZF</td>
<td>ZF</td>
</tr>
</tbody>
</table>

#### Page 262

<table>
<thead>
<tr>
<th>In Words</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ab, JK, EF</td>
<td></td>
</tr>
<tr>
<td>2. AB, XY</td>
<td></td>
</tr>
<tr>
<td>3. CD, RS</td>
<td></td>
</tr>
<tr>
<td>4. ( \angle STX )</td>
<td>( \angle JKL )</td>
</tr>
<tr>
<td>5. A, B</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>C, D</td>
</tr>
<tr>
<td>7. F, G</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>B, C</td>
</tr>
</tbody>
</table>

Teacher's Guide
UNIT 5: GEOMETRY

Answer Keys

Section 1: Basic Figures

Page 263
1. AD is parallel to BC
2. EG and FH are horizontal line segments
3. HJ is perpendicular to KI
4. ON and PM are vertical lines.
5. RS is a ray.

Section 2: Angles and Triangles

Page 273
1. straight
2. supplementary
3. right
4. complementary
5. acute
6. obtuse

Page 274
1. $50^\circ$
2. $20^\circ$
3. $120^\circ$
4. $45^\circ$
5. $90^\circ$
6. $130^\circ$

Page 276
1. b
2. c
3. a
4. e
5. f
6. d

Page 277
1. acute
2. right
3. straight
4. obtuse
5. supplementary
6. complementary

Page 277
1. h
2. c
3. e
4. g
5. b
6. f

Teacher's Guide
UNIT 5: GEOMETRY

Section 2: Angles and Triangles

Page 278 1. acute
2. straight
3. right
4. obtuse

Page 279 1. 30°  2. 80°
3. 100°  4. 45°
5. 150°  6. 70°
7. 90°  8. 20°

Page 280 a. 40°  b. 40°  c. 5°
d. 2°  e. 13°  f. 70°
g. 40°  h. 45°  i. 20°

Page 281 a. 150°  b. 30°
c. 100°  d. 90°
e-h answers will vary

Page 282 1. a 30°  2. b 60°
c  60°
d  60°
3. EDF 90°  4. g. 60°
h. 120°
i. 120°
j. 60°
5. k  50°

Page 283 1. 60  2. 30
3. 130  4. 90
5. 90  6. 20

Page 284 7. 75  8. 70
9. 110
10. 160

Page 285 1. P  2. N
3. PP  4. N
5. PP  6. P
UNIT 5: GEOMETRY

Section 2: Angles and Triangles

Page 286 1. isosceles
2. equilateral
3. scalene
4. scalene
5. scalene

Page 287 1. right
2. obtuse
3. acute
4. obtuse
5. right

Section 3: Polygons

Page 295 1. square
2. rectangle
3. trapezoid
4. parallelogram
5. rhombus

Page 296 1. triangle  2. rectangle
3. pentagon  4. hexagon
5. heptagon  6. octagon

Page 297 1. S
2. S
3. N
4. C
5. N
6. S

Page 300 1. P
2. C
3. S
4. C
5. P
6. S

Teacher's Guide
Section 3: Polygons

Page 301
1. rectangle
2. square
3. trapezoid
4. rhombus
5. parallelogram
6. quadrilateral
7. polygon

Page 302
1. square
2. parallelogram
3. rectangle
4. trapezoid
5. parallelogram

Page 303
1. d
2. a
3. c
4. b
5. f
6. e

Page 304
1. pentagon
2. hexagon
3. octagon
4. heptagon

Page 305
1. Answers will vary, A, D, C, B R or P
2. RA, RC, or RP
3. DA or DC
4. ADC
5. ADCB

Page 306
1. A C
2. C S
3. E C
4. B C
5. F C

Page 307
1–6 Answers will vary
Overview of Unit 6

What This Unit Covers...

Unit 6 provides instruction to assist students in performing mathematical operations with measurement. The objectives and skills for this unit are listed below.

Objective 4

Solve problems involving measuring time, distance, capacity, and mass/weight

Skills: Determine the elapsed time between two events stated in seconds, minutes, hours, days, weeks, months, or years.

Solve a problem related to length, width, or height, given in a table of metric or customary units, up to kilometers or miles (conversion within the system).

Solve a problem involving capacity using units given in a table—milliliters, liters, teaspoons, tablespoons, cups, pints, quarts, gallons (conversion within the system).

Solve a problem involving weight/mass using units given in a table—milligrams, grams, kilograms, metric tons, ounces, pounds, tons (conversion within the system).

Objective 2

Solve real-world problems...
Unit 6 is comprised of one section. The chart below displays the concepts covered in this unit.

### Concepts of Unit 6

1. Find elapsed time
2. Solve problems involving units of distance/length
3. Solve problems involving units of capacity
4. Solve problems involving units of weight/mass

### Unit Components...

The Teacher's Guide in Unit 6 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objectives
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 6: MEASUREMENT

Measurement

What This Unit Is About...

In this unit students will study four different areas of measurement: elapsed time, distance/length, capacity, and weight/mass. Both customary and metric systems are used. Problem-solving will include using tables, charts, and conversion factors to convert smaller units to larger and back within one system.

Scope and Sequence

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quizzes on pp. 321, 322, 332, 341, 342,</td>
</tr>
<tr>
<td></td>
<td>and 347.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>p. 323</td>
</tr>
<tr>
<td>a. Find elapsed time</td>
<td>p. 312</td>
</tr>
<tr>
<td>b. Solve problems involving units</td>
<td>p. 314</td>
</tr>
<tr>
<td>of distance/length</td>
<td></td>
</tr>
<tr>
<td>c. Solve problems involving units</td>
<td>p. 315</td>
</tr>
<tr>
<td>of capacity</td>
<td></td>
</tr>
<tr>
<td>d. Solve problems involving units</td>
<td>p. 316</td>
</tr>
<tr>
<td>of weight/mass</td>
<td></td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>

Teacher's Guide
Suggestions for Teaching...

Suggestions are provided below for teaching measurement concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

   Determine students' present level. Administer Quizzes in student section.

   **Prerequisite Skills for Unit 6**
   - Perform basic operations with whole numbers.
   - Interpret tables.
   - Round whole numbers, fractions, and decimals.
   - Give basic units for measuring, including abbreviations used.

2. Introduce.

   **Measurement.** Briefly discuss the history of measurement. Measurement in some form has been used by man since earliest times. We cannot avoid measurement in our day-to-day living. Many years ago, there were no standard units of measurement, and so people used fingers, hands, feet, and arms to measure length and distance. The width of the finger was called a *digit*, the distance across the open base of the fingers was called a *palm*, the greatest stretch of the open hand from the tip of the thumb to the tip of the little finger was called a *span*. The distance from the tip of the elbow to the end of the hand was called a *cubit*. The length across two outstretched arms from fingertip to fingertip was called a *fathom*. 
UNIT 6: MEASUREMENT

Each town had its own standard of measurement which naturally varied from town to town. A yard of cloth purchased in one town would not necessarily be the same length as a yard of cloth purchased in another town. Obviously, trade between towns and countries was very difficult. Today we have the International Standard Units of Measurement located in Paris, France, and we also have the National Bureau of Standards in Washington, D.C. These standards are periodically checked against the international standards in Paris. If a manufacturer wished to make a measuring instrument, he must be certain that the product matches the official standard.

Solicit student responses to the questions that follow and perhaps allow students to later research the unanswered questions.

- Why do we need a system for measurement?
- What is the difference between the customary system of measurement used in our nation as compared to the metric system?
- How does converting within the systems compare? Is one system easier? Why?
- How did the customary system originate?
- How did the metric system originate?

- Elapsed Time. Discuss reasons for computing elapsed time such as confirming timecard tabulations or interpreting schedules for travel by bus, train, or air. Sports events are often reported by elapsed time (e.g., boxing, tennis).

- Distance. Distance is usually thought of in terms of long distances, and the term length is usually used to refer to shorter measures. In this unit you will find the terms used interchangeably. People frequently speak of distances using familiar references, saying things like, "it's just three blocks down the road," or "it's bigger than a breadbox."

For more detailed descriptions, a common reference is needed, hence the development of systems of measure. In the U.S., the customary system is used much more frequently than the metric system, except in scientific circles.

It is interesting to note that in our law books a yard is defined in terms of a meter; in other words, the customary system in use is described by referring to the meter.
UNIT 6: MEASUREMENT

- **Capacity.** In this culture most of our grocery products are packaged using customary units. Frequently a shopper may find that a package also has the metric size listed. To compare one package to another requires an ability to work with the sizes given. This is called unit pricing. Elicit examples of products in grocery store and in what units these are packaged. For example, soft drinks—liter, juice—gallon.

- **Weight/Mass.** Although some grocery items are packaged by capacity or volume, most are sold by weight. Solicit student examples (e.g., milk, juices, liquids). Shoppers may have noticed on a box of crackers a statement such as:

  "This package is sold by weight, not by volume. Packed as full as practicable by modern automatic equipment, it contains full net weight indicated. If it does not appear full when opened, it is because contents may have settled during shipping."

As with capacity, an ability to compare packages requires familiarity with unit pricing. Ability to convert units is necessary.

3. **Present vocabulary concepts.**

- Discuss vocabulary words and give examples. See the student section for definitions and examples.

  - capacity
  - conversion factor
  - distance
  - elapsed time
  - estimate
  - length

  - linear
  - mass
  - meter
  - military time
  - weight

- Charts with equivalencies and abbreviations are included in the student section.

- **Assign Vocabulary Activity.**
UNIT 6: MEASUREMENT

4. Conduct initial learning activity.

- Hand out equivalency charts and tables and review conversion. Stress that conversions will only be within a given system. In the metric system, the conversion factors are directly related to the prefixes. Show how the same prefixes are used for all kinds of metric measurement—distance/length, capacity, and weight/mass.

- Review with students the conversion of unlike units.

- Measurement. Elicit from students the type of measurement used with various units. For example, given a certain unit, students will name the kind of measurement (e.g., cup—capacity; foot—length; mile—distance; pound—weight). Give both customary and metric examples.

- Time. Have students list as many units of time as they can. They should be able to name additional units not on the list provided, such as decade, score, century or millenium. Point out that the units of time are the same for both the metric and customary systems.

Discuss and review conversion, having provided students with the appropriate chart. Review also the corresponding abbreviations for the units.

Tell students that computing to find elapsed time is very similar to subtracting mixed numbers. The regrouping process is only partly the same as for regular subtraction of whole numbers.

Practice reading military time orally.

- Distance/Length. Have two students measure the classroom. Give one an unmarked stick about one yard long to measure the length of the room. Let the second student measure the width of the room with an unmarked stick about one foot long. (The sticks do not have to be a standard length.) Compare their measurements. Ask, "Which is greater, the room's length or its width?" Accept answers such as, "7 and 1/2 bigsticks" or "15 and 1/2 shortsticks." Then ask, "How many sticks larger is one dimension than the other?" The students should recognize the need to convert to one length before comparing.
UNIT 6: MEASUREMENT

- **Capacity.** Provide items which hold an ounce, one cup, a quart, gallon, five milliliters, a liter, etc. Provide also familiar objects, without the capacity marked, like a coffee cup, soft drink cup, mayonnaise jar, and bottles of varying sizes, etc. Allow students time to practice *guesstimating* capacities in both metric and customary units.

- **Weight/Mass.** Provide items which weigh an ounce, ten pounds, one milligram, a gram, five grams, a kilogram, etc. Provide also familiar objects (which do not have the weight marked), like a brick, or cinderblock, a package of hamburger, chalk, chalkboard eraser, textbooks of varying sizes. Allow students time to practice *guesstimating* weights in both metric units and customary units.

5. **Present each measurement concept with examples.**

Four concepts are presented in Unit 6. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.

- Assign Activity Sheets.

- Provide corrective feedback.
6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Choosing the wrong operation when making conversions

  Example: Convert 4 yd to in.
  \[36 \div 4 \text{ instead of } 4 \times 36\]

- Choosing an inappropriate conversion factor

  Example: Convert 5 da to hr
  \[5 \times 60 \text{ instead of } 5 \times 24\]

7. Reinforce.

Selected reinforcement strategies are listed below.

- Practice estimation by asking students to name something that is about a foot (yd, cm, etc.) long. Name something that weighs about a lb (oz, kg, gm, etc.). Set out various containers (paper cup, jar, coffee mug, box, etc.). Have students *guesstimate* their capacity in customary and metric units.

- Practice reading bus/train/airline schedules, and determining elapsed time between departures and arrivals.

- Provide calculator drills appropriate to each lesson.

- Provide worksheets having mixed operations, all relating to time (or distance, or capacity, or weight).

- Provide drill which gives practice selecting the conversion factor needed.

- Provide drill which gives practice selecting the operation needed to make a conversion.

- Provide review for multiplication and division by powers of ten, as applied to metric conversion.
8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on measurement; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 6: MEASUREMENT

Time

Page 321

1. 48 months
2. 30 months
3. 104 weeks
4. 113 weeks
5. 1,461 days
6. 565 days
7. 42 days
8. 120 hours
9. 224 hrs
10. 3 years
11. 2 years
12. 1 year 7 months
13. 7 days
14. 14 days
15. 4 weeks
16. 23 weeks
17. 15 days
18. 2,016 hours
19. 1,826 or 1827 days
20. 20.2 years

Page 322

1. 2 hr 55 min
2. 7 hr 20 min
3. 12 hr 30 min
4. 3 da 9 hr 20 min
5. 11 hr
6. 3 da 1 hr
7. 3 hr 45 min
8. 12 hr 45 min
9. 1 da 3 hr
10. 10 hr 40 min

Page 324

1. meter
2. capacity
3. length
4. time
5. distance
6. weight
7. gram
8. liter
9. mass

Page 327

A. 1. 36
2. 52
3. 115
4. 24
5. 69

B. 1. 104
2. 172
3. 182
4. 93
5. 216

C. 1. 56
2. 2,190
3. 550
4. 215

D. 1. 52
2. 6,048
3. 11,640
4. 720

E. 1. 1 1/4 yr
2. 2 2/3 yr
3. 6 2/3 yr

Teacher's Guide

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UNIT 6: MEASUREMENT

Time

Page 328
A. 1. 300
   2. 90
   3. 848
   4. 1260
   5. 1080
B. 1. 420
   2. 320
   3. 1440
   4. 3120
   5. 2706
C. 1. 2 wk 1 da
   2. 1 wk 4 da
   3. 5 wk 3 da
   4. 8 wk 6 da
   5. 12 wk 6 da

Page 329
A. 1. 8
   2. 2
   3. 1 hr 24 min
   4. 15 hr 42 min
   5. $\frac{1}{2}$ hr
B. 1. 9
   2. 13
   3. 1 min 12 sec
   4. 1170
   5. 135
C. 1. 53 wk 4 da
   2. 4 wk 1 da
   3. 2 wk 1 da
   4. 1 wk 4 da
   5. 5 wk 3 da

Page 330
1. 1825 da
2. 2 yr
3. 104 wk
4. 23 wk
5. 224 hr
6. 1170 min
7. 2707 sec
8. 550 da
9. 720 hr
10. 42 mo

Page 331
1. 5 hr
   2. 9 hr
   3. 4 hr
   4. 5 hr
   5. 5 hr
   6. 6 hr
   7. 4 hr
   15 min
   34 min
   15 min
   51 min
   15 min
   30 min

Teacher's Guide
UNIT 6: MEASUREMENT

Time

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<tr>
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Distance

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<td>4 yds 1 ft</td>
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<tr>
<td>C.</td>
<td>6.</td>
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<td>7.</td>
<td>270</td>
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<td>D.</td>
<td>8.</td>
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<td></td>
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<td>.625</td>
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<td>10.</td>
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Teacher's Guide
UNIT 6: MEASUREMENT

Distance

Page 336
A. 1. 22 in. B. 4. 10 ft C. 7. 60 in.
2. 71 in. 5. 17 ft D. 10. 12,320 yd
3. 259 in. 6. 106 $\frac{1}{2}$ ft E. 13. 3 $\frac{1}{3}$ mi
C. 7. 60 in. D. 10. 12,320 yd
6. 83 in. E. 13. 3 $\frac{1}{3}$ mi
9. 18 in. F. 15. 0.0852 mi

Page 337
1. 4
2. 64
3. 84
4. 81
5. 2
6. 2 $\frac{1}{4}$
7. 55
8. 81
9. 221
10. 9
11. 14
12. 19
13. 53,800
14. 75
15. 0.625 or $\frac{5}{8}$

Page 338
1. 10
2. 100
3. 10
4. 10
5. 10
6. 10
7. 10
8. 1
9. 6
10. 20
UNIT 6: MEASUREMENT

Answer Keys

Distance

Page 339
1. 4
2. 7
3. 1760.3
4. 30
5. 2
6. 21
7. 210
8. 11
9. 111
10. 210

Page 340
1. 5
2. 74
3. 60
4. 205
5. 9
6. 40
7. 4000
8. 2.5 gal.
9. 45.5
10. 6.5

Capacity

Page 341
1. 4
2. 2
3. 12
4. 2
5. 1
6. 2
7. 2
8. 2
9. \( \frac{1}{2} \)
10. 10

Teacher's Guide
UNIT 6: MEASUREMENT

Capacity

**Page 342**
1. 1
2. 10
3. 10
4. 1000
5. 100
6. \(\frac{1}{1000}\)
7. \(\frac{1}{10}\)
8. 10
9. 10
10. 10

**Page 344**

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<th></th>
<th>B</th>
<th></th>
<th>C</th>
<th></th>
<th>D</th>
<th></th>
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<td>6</td>
<td>7</td>
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<td>13.</td>
<td>2 (\frac{1}{2})</td>
<td>19.</td>
<td>3000</td>
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<td>40</td>
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<td>8</td>
<td>100</td>
<td>11.</td>
<td>2 (\frac{1}{4})</td>
<td>14.</td>
<td>5 (\frac{5}{8})</td>
<td>20.</td>
<td>500</td>
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<td>3</td>
<td>88</td>
<td>6.</td>
<td>50</td>
<td>9</td>
<td>832</td>
<td>12.</td>
<td>3 (\frac{3}{8})</td>
<td>15.</td>
<td>1 (\frac{1}{2})</td>
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**Page 345**

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<tr>
<td>6</td>
<td>6 (\frac{1}{2})</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>11 (\frac{1}{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>10</td>
<td>16</td>
<td></td>
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### Capacity

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<thead>
<tr>
<th>Page</th>
<th>1.</th>
<th>112 oz</th>
<th>or</th>
<th>3 ( \frac{1}{2} ) qt</th>
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<tr>
<td>2.</td>
<td>11 pt</td>
<td>or</td>
<td>1 gal. 1 qt 1 pt</td>
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</tr>
<tr>
<td>3.</td>
<td>160 oz</td>
<td>or</td>
<td>10 pt</td>
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</tr>
<tr>
<td>4.</td>
<td>( \frac{21}{4} ) pt</td>
<td>or</td>
<td>36 oz</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>32 qt</td>
<td>or</td>
<td>64 pt</td>
<td></td>
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<tr>
<td>6.</td>
<td>5 pt</td>
<td>or</td>
<td>2 ( \frac{1}{2} ) qt</td>
<td></td>
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<tr>
<td>7.</td>
<td>7 gal.</td>
<td>or</td>
<td>28 qt</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>19 pt</td>
<td>or</td>
<td>2 ( \frac{3}{8} ) gal.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>2 metric c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>20 metric c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>3 gal.</td>
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<td>12.</td>
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### Weight/Mass

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<tr>
<td>4.</td>
<td>8 oz</td>
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<tr>
<td>5.</td>
<td>( \frac{1}{4} ) lb</td>
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<tr>
<td>6.</td>
<td>( \frac{1}{2} ) T</td>
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</tr>
<tr>
<td>7.</td>
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</tr>
<tr>
<td>8.</td>
<td>1000 mg</td>
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</tr>
<tr>
<td>9.</td>
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<tr>
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<td>1 hg</td>
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<tr>
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<tr>
<td>12.</td>
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<tr>
<td>13.</td>
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<tr>
<td>14.</td>
<td>.110 kg</td>
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<tr>
<td>15.</td>
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UNIT 6: MEASUREMENT

Answer Keys

Weight/Mass

Page 349
7. 5,000
8. 176
9. 4
10. 6,000

Page 350
1. 48 oz
2. 4 oz
3. 14,000 lb
4. 12,000 lb
5. 2 lb
6. 1 lb 5 oz
7. 2 T
8. 4 T
9. 19 oz
10. \( \frac{1}{2} \) lb

Volume

Page 351
1. W
2. C
3. L
4. L
5. L
6. W
7. C
8. L
9. W
10. C
11. L
12. C
13. W
14. L
15. L
16. L
17. W
18. C
19. W

Denominate Numbers

Page 352

A. 1. 23 hr
2. 6 da 23 hr
3. 5 yr 11 mo

B. 1. 13 ft 11 in.
2. 6 mi 5 ft
3. 4 yd 1 ft 7 in.

C. 1. 8 gal. 3 qt
2. 4 c 3 oz
3. 14 gal. 1 qt 1 pt

D. 1. 12 lb 3 oz
2. 12 lb 2 oz
3. 11 lb 11 oz

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## UNIT 6: MEASUREMENT

### Denominate Numbers

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<th>2. 1 mo 3 wk</th>
<th>3. 7 hr 2 min</th>
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<td>B.</td>
<td>1. 4 ft 3 in.</td>
<td>2. 3 yd 1 ft</td>
<td>3. 4 mi 5100 ft</td>
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<td>C.</td>
<td>1. 3 qt</td>
<td>2. 10 oz</td>
<td>3. 3 gal. 2 qt</td>
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<td></td>
<td>D.</td>
<td>1. 5 lb 7 oz</td>
<td>2. 7 T 200 lb</td>
<td>3. 3 lb 9 oz</td>
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<th>2. 15 yr 9 mo</th>
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<td>2. 37 mi 940 yd</td>
<td>3. 11 yd 1 ft</td>
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<td>2. 2 qt 1 pt 7 oz</td>
<td>3. 3 gal. 1 pt</td>
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<td>D.</td>
<td>1. 20 T 500 lb</td>
<td>2. 50 lb</td>
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<td></td>
<td>d.</td>
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<tr>
<td></td>
<td>e.</td>
<td>7</td>
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<td></td>
<td>f.</td>
<td>1</td>
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<td></td>
<td>g.</td>
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</tr>
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<td></td>
<td>h.</td>
<td>8</td>
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<td></td>
<td>i.</td>
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<tr>
<td></td>
<td>j.</td>
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UNIT 6: MEASUREMENT

Word Problems

Page 356
1. 8 fl oz
2. more
3. 6 lb 8 oz
4. Tom's; 2 oz
5. yes; 1 lb box
6. 5 in.
7. 102 boards
8. 7 1/2 yd
9. 180 km

Page 357
10. 2.58 m
11. 10 oz
12. 2 da 10 hr 35 min
13. 11:03 a.m.
14. 11 hr 50 min
15. 3 bags
16. 120 quart bottles
17. .00142 kg
18. 37 1/2 hours
19. 4 hr 40 min
UNIT 7: PERIMETER/AREA

Section 1: Perimeter
Section 2: Area
UNIT 7: PERIMETER/AREA

Overview of Unit 7

What This Unit Covers...

Unit 7 provides instruction to assist students in performing mathematical operations with perimeter and area. The objectives and skills for this unit are listed below.

Objective 5

Solve problems involving area and perimeter

Skills:

Find the perimeter of a polygon with no more than 8 sides.

Find the circumference of a circle (let \( \pi = 3.14 \)) when given the formula.

Find the area of a rectangle or square.

Find the area of a triangle, parallelogram or trapezoid, when given the formula.

Find the area of a circle, when given the formula (let \( \pi = 3.14 \)).
UNIT 7: PERIMETER/AREA

Unit 7 is comprised of two sections. The chart below displays the concepts covered in this unit.

Sections and Concepts of Unit 7

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1</td>
<td>Find the perimeter of a polygon</td>
</tr>
<tr>
<td></td>
<td>Find the circumference of a circle</td>
</tr>
<tr>
<td>Section 2</td>
<td>Find the area of a rectangle</td>
</tr>
<tr>
<td></td>
<td>Find the area of a square</td>
</tr>
<tr>
<td></td>
<td>Find the area of a triangle</td>
</tr>
<tr>
<td></td>
<td>Find the area of a parallelogram</td>
</tr>
<tr>
<td></td>
<td>Find the area of a trapezoid</td>
</tr>
<tr>
<td></td>
<td>Find the area of a circle</td>
</tr>
</tbody>
</table>

Unit Components...

The Teacher's Guide in each section of Unit 7 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
Section 1: Perimeter

What This Section Is About...

In this section students will practice finding perimeter of polygons and circumference of circles.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 367-370</td>
</tr>
<tr>
<td>a. Find the perimeter of a polygon</td>
<td>p. 362</td>
</tr>
<tr>
<td>b. Find the circumference of a circle</td>
<td>p. 364</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
UNIT 7: PERIMETER/AREA

Suggestions for Teaching...

Suggestions are provided below for teaching perimeter concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as a pretest.

Prerequisite Skills for Section 1

- Multiply whole numbers, fractions, and decimals.
- Add whole numbers, fractions, and decimals.
- Locate base and height of a triangle.
- Convert linear units of measurement.
- Identify circles, triangles, parallelograms, and other polygons up to eight sides.

2. Introduce.

Perimeter is often an unfamiliar word to students. Students may have heard of guards (or guard dogs) "patrolling the perimeter of the grounds." This means the guard is walking along the border, all the way around the edge of a particular property.

Perimeter is the distance around an object. It can be found by adding the lengths of all the sides. For special figures like rectangles, finding perimeter always follows a pattern and can be computed using a formula.
There are basically three different circumstances under which perimeter will be computed—regular or semi-regular polygons, polygons with no special features, and circles.

The perimeter of a circle has a name all its own—circumference. Mathematicians have found that the circumference of a circle is a little more than three times the diameter of the circle. Circumference can be calculated using diameter and $\pi(\pi)$.

3. Present vocabulary concepts.

- Discuss vocabulary words and give examples.
  - circle
  - circumference
  - diameter
  - formula
  - parallelogram
  - perimeter
  - $\pi(\pi)$
  - polygon
  - quadrilateral
  - radius
  - rectangle
  - regular polygon
  - square
  - trapezoid

- Assign vocabulary activity.

4. Conduct initial learning activities.

- To introduce perimeter of any polygon, present students with a variety of polygons. Mix the examples to provide different numbers of sides and special shapes, as well. Each side of each polygon should be labeled with a length—even the squares and other special polygons.

  Ask the students to find the perimeter for each figure. Discuss and clarify that for any polygon, perimeter can be found by adding the lengths of all sides.
UNIT 7: PERIMETER/AREA

Perimeter

- Discuss perimeter of a rectangle or square. Describe the attributes of each figure shown as it pertains to finding perimeter. Ask: Why is finding the perimeter of a regular figure easier than finding the perimeter of an irregular figure? Why can finding the perimeter of a rectangle be easier than finding the perimeter of an irregular quadrilateral?

- Obviously, a circle is not a polygon. It has no sides. Therefore, a different method is needed to calculate its perimeter, more specifically called circumference.

Using a compass, draw a circle after marking a spot for its center. With the compass open to the same radius, construct a hexagon by marking off six equal arcs. Then connect these marked points on the circle to form a regular hexagon. (If you wish, you could further divide the circle by marking half-way between each point.) Then cut the circle into the sectors so determined. If you arrange the sectors approximately in the shape of a parallelogram, the perimeters will appear the same.

- Use tagboard cutouts of polygons and circles. Use string to measure perimeters and circumference.

- Discuss formulas, derivations, abbreviations. Note similarities between formulas, especially \( C = \pi d \) and \( C = \pi r^2 \).

5. Present each perimeter concept with examples.

Two concepts are presented in Section 1. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students input when developing rational.

- Give steps in procedure.

- Model the strategy with an example. Refer students to the example provided in the Student's Guide.

- Present other examples and actively involve the student.
UNIT 7: PERIMETER/AREA

Perimeter

☐ Assign Activity Sheets.
☐ Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

✗ inability to differentiate between the use of \( r \) (radius) and \( d \) (diameter)

To develop an understanding of the relationship between radius and diameter, present several examples of circles with diameters identified, and lead students to determine the radii of those circles; repeat using circles with given radii, determining diameters.

7. Reinforce.

Selected reinforcement strategies are listed below.

✗ Make Bingo type games with pictures of geometric figures. Call out names of figures and have student cover shapes.

✗ Find circular objects such as a record, wheel, spool, and can. Have students measure diameter and circumference.

✗ Use geoboard or graph paper to draw quadrilaterals and calculate area by counting square units.

✗ Lead student to discover the more specific formulas for finding perimeter of rectangles \((2l + 2w)\) and squares \((4s)\).

✗ Provide numerous examples of rectangles which have sides whose measures are larger numbers (for example: sides measuring 43, 57, 43, 57, or 125, 36, 125, 36). Challenge them to hunt for a faster method to compute perimeter. When several students seem to have discovered a quicker method, ask them to share their procedure with the class. Develop the generalization \(2l + 2w\).

Teacher's Guide
UNIT 7: PERIMETER/AREA

Perimeter

* In the same way challenge them to use multiplication to compute the perimeter of squares by providing examples having sides whose measures would be less tedious to multiply than add (327 or 59), using 4s for their new formula.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on perimeter; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
Section 2: Area

What This Section Is About...

In this section students will practice finding the area of rectangles, squares, triangles, parallelograms, trapezoids, and circles.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 385-386</td>
</tr>
<tr>
<td>a. Find the area of a rectangle</td>
<td>p. 376</td>
</tr>
<tr>
<td>b. Find the area of a square</td>
<td>p. 377</td>
</tr>
<tr>
<td>c. Find the area of a triangle</td>
<td>p. 378</td>
</tr>
<tr>
<td>d. Find the area of a parallelogram</td>
<td>p. 379</td>
</tr>
<tr>
<td>e. Find the area of a trapezoid</td>
<td>p. 380</td>
</tr>
<tr>
<td>f. Find the area of a circle</td>
<td>p. 381</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching area concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer Quizzes on pp. 383 and 384 as a pretest.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Multiply whole numbers, fractions, and decimals.</td>
</tr>
<tr>
<td>✓ Locate base and height of a triangle.</td>
</tr>
<tr>
<td>✓ Convert linear units of measurement.</td>
</tr>
<tr>
<td>✓ Identify circles, triangles, parallelogram, and other polygons up to eight sides.</td>
</tr>
</tbody>
</table>

2. Introduce.

In the first section of this unit students studied how to find perimeter. Perimeter is a linear measure; a measure of dimension. Area, however, is a two-dimensional measure, and finding areas results in a measure in terms of a square unit. Area describes the surface covered.
3. Present vocabulary concepts.

- Discuss vocabulary words and give examples. Review vocabulary words from Section 1.
  - altitude
  - base
  - area
  - height

- Assign vocabulary activity.

4. Conduct initial learning activities.

- Provide numerous unlabeled examples of rectangles on a handout. Review the meaning of area, and discuss the difference between measuring with linear and square units.

  Demonstrate how a rectangle with sides measuring 3 units and 5 units can be marked off into 15 square units. Repeat with other examples, having greater and greater lengths of sides, until a student volunteers the concepts behind the formula, and then provide the formula in its generalized form \( A = bh \).

- Develop the formulas for finding areas of triangles, parallelograms, and trapezoids using the formula for rectangles.

  Draw a rectangle on the chalkboard and divide it by drawing in one diagonal. Point out that two triangles can now be seen. Repeat with tagboard cut into the shape of a rectangle. Ask students to predict the area of either of the triangles which will be created by cutting along the diagonal; then, make the cut.

  Show the students that the triangles have the same area by laying one on top of the other. Repeat with other tagboard rectangles. Ask the students how they could compute the area of each triangle if they knew the area of the original rectangles. Practice using the handout previously prepared.

  After students have successfully computed the area of the triangles, provide them with generalized form \( A = (bh)/2 \).
UNIT 7: PERIMETER/AREA

For a parallelogram use the same procedure, only this time, cut off the end-piece triangles formed by drawing in the altitudes. Create a rectangle by rearranging the three pieces.

Repeat for parallelograms and trapezoids.

For circles, follow the same activity as for finding perimeter, with necessary substitutions for area.

5. Present each area concept with examples.

Six concepts are presented in Section 2. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students input when developing rational.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.
UNIT 7: PERIMETER/AREA

Area

- Choosing a non-vertical side to represent the height of a triangle
  Discuss the specific meaning of height, and demonstrate the difference in area of two triangles, one having...

- Choosing the incorrect formula for area of a circle
  Discuss the result obtained for each formula (2\pi r or \pi r^2) in terms of dimension. 2\pi r yields a linear unit; \pi r^2 yields a square unit.

- Choosing incorrect formula (perimeter vs. area)
  With all formulas listed on one side of the chalk board, drill orally. Sketch figures with all measures labeled; ask students to write the correct formula with substitutions for area or perimeter.

7. Reinforce.

Selected reinforcement strategies are listed below.

* To provide mixed practice, provide a activity sheet containing circles, triangles, rectangles, parallelograms, trapezoids, and squares. Have students find both area and perimeter for each figure.

* Provide practice with students constructing the altitude for triangles, parallelograms, and trapezoids.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on area; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.

Teacher's Guide
### UNIT 7: PERIMETER/AREA

#### Section 1: Perimeter

| Page 365 | 1. | 26 in.       | 2. | 24 ft       |
|          | 3. | 26 yd        | 4. | 15 ft       |
|          | 5. | 18 yd        | 6. | 24 in.      |
| Page 366 | 1. | 175.84       | 2. | 307.72      |
|          | 3. | 25.12        | 4. | 18.84       |
|          | 5. | 43.96        | 6. | 94.2        |
| Page 368 | 1. | square       | 2. | rectangle   |
|          | 3. | trapezoid    | 4. | circle      |
| Page 369 | 5. | radius       | 6. | polygon     |
|          | 7. | parallelogram| 8. | polygon     |
|          | 9. | parallelogram| 10.| diameter    |
| Page 371 | 1. | $22 \frac{1}{2}$ | 2. | 36          |
|          | 4. | $33 \frac{1}{3}$ | 5. | 10          |
|          | 7. | $27 \frac{1}{2}$ | 8. | 41.6        |
| Page 372 | 1. | 32           | 2. | 28          |
|          | 4. | 12           | 5. | 20          |
|          | 7. | 20           | 8. | 24          |
| Page 373 | 1. | $16 \frac{1}{4}$ | 2. | 12          |
|          | 4. | 30           | 5. | 20.8        |
|          | 6. | 29           |
|          | 7. | 70 ft        |
|          | 8. | 150          |
| Page 374 | 1. | 65.94        | 2. | 43.96       |
|          | 4. | 16.485       | 5. | 31.40       |
|          | 7. | 50.24        | 8. | 12.56       |

#### Teacher's Guide

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## UNIT 7: PERIMETER/AREA

### Answer Keys

**Section 2: Area**

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<th>1. 91</th>
<th>2. $72 \frac{1}{4}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. 12</td>
<td>4. 144</td>
</tr>
<tr>
<td></td>
<td>5. 95</td>
<td>6. 113</td>
</tr>
<tr>
<td>Page 384</td>
<td>7. 18</td>
<td>8. $22 \frac{1}{2}$</td>
</tr>
<tr>
<td></td>
<td>9. 16.5</td>
<td>10. 84</td>
</tr>
<tr>
<td>Page 387</td>
<td>1. 236</td>
<td>2. 46</td>
</tr>
<tr>
<td></td>
<td>3. 42</td>
<td>4. 49.5</td>
</tr>
<tr>
<td></td>
<td>5. 78.5</td>
<td>6. 16.6</td>
</tr>
<tr>
<td>Page 388</td>
<td>1. $52 \frac{1}{2}$</td>
<td>2. 106</td>
</tr>
<tr>
<td></td>
<td>3. 30</td>
<td>4. 230</td>
</tr>
<tr>
<td></td>
<td>5. 9.6</td>
<td>6. 153.9</td>
</tr>
<tr>
<td>Page 389</td>
<td>1. 144</td>
<td>2. 21</td>
</tr>
<tr>
<td></td>
<td>3. 30</td>
<td>4. 230</td>
</tr>
<tr>
<td></td>
<td>5. 39.6</td>
<td>6. 153.9</td>
</tr>
<tr>
<td></td>
<td>7. 17.25</td>
<td>8. 16</td>
</tr>
<tr>
<td>Page 390</td>
<td>1. 56</td>
<td>2. 259</td>
</tr>
<tr>
<td></td>
<td>3. 10</td>
<td>4. 158</td>
</tr>
<tr>
<td></td>
<td>5. 72</td>
<td>6. .79</td>
</tr>
</tbody>
</table>
Overview of Unit 8

What This Unit Covers...

Unit 8 provides instruction to assist students in performing mathematical operations with graphs. The objective and skills for this unit are listed below.

Objective 6

Demonstrate knowledge of line, bar, and circle graphs

Skills: Determine relationships described by line graphs, bar graphs, circle graphs, or tables.

Organize data into a line graph, bar graph, or table.
Unit 8 is comprised of one section. The chart below displays the section and concepts covered in this unit.

### Concepts of Unit 8

1. Interpret line, bar, and circle graphs
2. Construct line, bar, and circle graphs

### Unit Components...

The Teacher's Guide in Unit 8 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 8: GRAPHS

Graphs

What This Unit Is About...

In this unit students will study how circle, line, and bar graphs are used to provide information in concise forms. They will learn how to interpret and create circle, line, and bar graphs.

Scope and Sequence

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quizzes on pp. 401-403.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary.</td>
<td>p. 404</td>
</tr>
<tr>
<td>a. Interpret graphs</td>
<td>p. 394</td>
</tr>
<tr>
<td>b. Construct graphs</td>
<td>p. 397</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>pp. 401-403</td>
</tr>
</tbody>
</table>
UNIT 8: GRAPHS

Suggestions for Teaching...

Suggestions are provided below for teaching graph concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer quiz as pretest.

Prerequisite Skills for Unit 8

- Use a protractor.
- Draw a circle.
- Identify fractional parts and percentages.
- Compute with whole numbers, fractions, and decimals.

2. Introduce.

Beginning in this unit on graphs, descriptive statistics will be introduced. In Unit 9 students will study measures of central tendency, another area of descriptive statistics.

Sometimes it is sufficient to display data in the form of a table. Other times the data is easier to interpret when presented in the form of a graph. Bar graphs help give a visual comparison of the size of various items. Line graphs show data that continually changes. Circle graphs help make comparisons between parts and the whole unit.
UNIT 8:  GRAPHS

3. Present vocabulary concepts.
   - Discuss vocabulary words and give examples. See student page 404 for definitions and examples.
     - bar graph
     - circle graph
     - line graph

4. Conduct initial learning activity.
   - Have the students write the answers to questions such as the following:
     (Round to whole hours based on weekdays only.)
     How many hours per day do you attend school?
     How many hours per day do you watch TV?
     How many hours per day do you work?
     How many hours per day do you spend eating?
     How many hours per day do you talk on the telephone?
     How many hours per day do you sleep?

     Add the total time and subtract from 24. This answer goes under miscellaneous. (If the answer is over 24 hours, adjust the individual times.) Design a bar graph to display information. (See p. 405.)

     Have students determine how many hours per day they watch TV. Construct a line graph with the number of hours on one scale and the days of the week on the other. Each student should graph the number of hours of TV viewing by day. (See p. 405.)

   - Go to vocabulary list (p. 404) and give an example of each type of graph shown there. The circle will be most difficult. Use this example: Sleep 8 hours 8/24 = 1/3 of the circle, or 1/3 x 360° (which is the number of degrees in the circle) is equal to 120°. Use the degree method when you have a protractor and greater accuracy is desired.
UNIT 8: GRAPHS

5. Present each graph concept with examples.

Two concepts are presented in Unit 8. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

☐ Give rationale for learning the skill. Solicit students' input when developing rationale.

☐ Give steps in procedure.

☐ Model the strategy with an example. Refer students to the example provided in the Student's Guide.

☐ Present other examples and actively involve the student.

☐ Assign Activity Sheets.

☐ Provide corrective feedback.

6. Address common errors.

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

X Selecting an inappropriate scale  Provide students with sets of data on the board. Ask them to decide on appropriate scales. Examples: 30, 35, 45, 30, 20 (units of five); 4, 8, 10, 16, 20, (units of two); 700, 1100, 200, 3000, (units of 500).

X Omission of labels or inappropriate use of title or labels  Use graphs found in magazines or newspapers. Ask students questions related to these graphs. Point out that each graph has a title and the scale are always labeled.

X Incorrect computation for angle measure in circle graphs  Provide drill for making this computation.
UNIT 8: GRAPHS

Incorrectly labeling spaces, instead of lines for bar graphs (leading to confusion in marking points)

Discuss the contrast between bar and line graphs. Point out the need (when using a line graph) for a specific point to be identified.

7. Reinforce.

Selected reinforcement strategies are listed below.

* When possible, coordinate the teaching of this unit with the social studies classes' coverage of interpreting graphs.

* Extend the initial learning activities. Have students keep track of this data for week. Then have them create graphs to represent their data. Compare with the estimations they used earlier.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on graphs include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 8: GRAPHS

Page 401

Graph 1

1. 16 reports
2. January (greatest) April (least)
3. 36 reports

Graph 2

2. no—decreased
3. August (greatest) December (least)

PAGE 402

Graph 3

1. 15 points
2. 10 points
3. 45 points

Graph 4

1. 15%
2. $75. 50% of $150 = $75
$15 - $75 = $75
3. 50%

Page 403

Auto Sales

No. of sales


Page 405

Answers will vary.

Page 406

2. 145 3. 18 4. 6

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UNIT 8: GRAPHS

Refer to student’s graph as per scale.

Page 408
1. Temperature changes 6. Hits - 150
2. Line Graph
3. 70°
4. 55°, 9 a.m.
5. 25°

Page 409

![Bar Graph]

Page 410
1. Jan. 138 lb
   Feb. 131 lb
   Mar. 130 lb
   April 128 lb
   May 128 lb
   June 126 lb
   July 124 lb
2. March, May, and June
3. 120 lb
4. Graph 2
   Paper $90.00
   Printing $50.00
   Postage $20.00
   Supplies $40.00

Page 411

![Membership Record]

Teacher's Guide
UNIT 9: CENTRAL TENDENCY

Overview of Unit 9

What This Unit Covers...

Unit 9 provides instruction to assist students in performing mathematical operations with measures of central tendency. The objective and skills for this unit are listed below.

Objective 7

Demonstrate knowledge of the basic measures of central tendency

Skills:

Find the mean of a set of data consisting of no more than five 2-digit numbers.

Find the mode of a set of data consisting of no more than five 2-digit numbers.

Find the median of a set of data consisting of no more than five 2-digit numbers.

Find the range of a set of data consisting of no more than five 2-digit numbers.
UNIT 9: CENTRAL TENDENCY

Unit 9 is comprised of one section. The chart below displays the concepts covered in this unit.

<table>
<thead>
<tr>
<th>Concepts of Unit 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Finding the mean</td>
</tr>
<tr>
<td>2. Finding the mode</td>
</tr>
<tr>
<td>3. Finding the median</td>
</tr>
<tr>
<td>4. Finding the range</td>
</tr>
</tbody>
</table>

Unit Components...

The Teacher's Guide in Unit 9 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 9: CENTRAL TENDENCY

Central Tendency

What This Unit Is About...

In this unit students will study four basic measures of central tendency: mean, mode, median, and range.

Scope and Sequence of Unit 9

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 419.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 420</td>
</tr>
<tr>
<td>a. Finding the mean</td>
<td>p. 416</td>
</tr>
<tr>
<td>b. Finding the median</td>
<td>p. 417</td>
</tr>
<tr>
<td>c. Finding the mode</td>
<td>p. 417</td>
</tr>
<tr>
<td>d. Finding the range</td>
<td>p. 418</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 419</td>
</tr>
</tbody>
</table>
UNIT 9: CENTRAL TENDENCY

Suggestions for Teaching...

Suggestions are provided below for teaching the four central tendency concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Administer pretest on p 419.

Prerequisite Skills for Unit 9

- Order a set of no more than 5 numbers, including whole and decimal numbers and fractions.
- Determine the average of a set of numbers.
- Round decimal numbers.
- Perform basic operations with whole numbers.

2. Introduce.

A measure of central tendency can be thought of as a single value that summarizes or represents the general significance of a statistical set of unequal values. Mean, median, mode, and range are descriptions of a set of data that tell us respectively, their average, which one is in the middle, which one occurs most frequently, and how spread out they are.

To enhance understanding, have the students tell which statistical measure is implied in statements like these like these:

- The most popular brand of soft drink is Quenchers. (mode)
- Everyone finished the race within 12 seconds of the winner. (range)
- Half the class did better than I on the test. (median)
- When we went out to dinner, we split the check six ways. (mean)
UNIT 9: CENTRAL TENDENCY

3. Present vocabulary concepts.

   - Discuss vocabulary words and give examples.
     - data
     - frequency
     - mean
     - median
     - mode
     - range
     - statistics

4. Conduct initial learning activity.

   - Have students determine their hat sizes to the nearest centimeter using a piece of string and a centimeter ruler, and write the numbers (sizes) on the chalkboard. From this data have students construct a table and tally the number of students having each size. Ask the students to decide the following:
     a. the average size hat worn in their class
     b. which size would be called "medium"
     c. the size worn most often
     d. the difference in size from the smallest to largest.

      (This activity could be tailored to fit any class by choosing appropriate data to be gathered.)

5. Present each central tendency concept with examples.

   Four concepts are presented in Unit 9. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

   - Give rationale for learning the skill. Solicit students' input when developing rationale.

   - Give steps in procedure.

   - Model the strategy with an example. Refer students to the example provided in the Student's Guide.
UNIT 9: CENTRAL TENDENCY

- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address common errors.

Below is a listing of common misconceptions which may lead to errors in problem-solving.

- Expecting the mean to be one of the given numbers
- Finding the median of a set of data with an even number of members
- Handling a set of numbers that does not have a mode, or has more than one mode

For each case, present examples very early during instruction which clarify each concept—examples which help students avoid misconceptions—i.e., several sets of data for which the mean is not one of the members, for which the data set has an even number of elements, or for which there is no mode or there is more than one mode.

7. Reinforce.

Selected reinforcement strategies are listed below.

- Using index cards and a set of numbers, write one number on each card and mix the order. Have students arrange the set of cards in numerical order and select the median, mode, and range, and calculate the mean. Practice with different sets of data.
- Discuss the use of calculators for finding mean, median, mode, and range. Solicit students' opinions on the usefulness of the calculator for each of the concepts. Students should conclude that the calculator is useful only for finding mean and range. Allow the use of calculators for most of these activities.
8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on central tendency; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 9: CENTRAL TENDENCY

Mean, Median, Mode, Range

Page 419
1. 84
2. 7
3. a. 6; b. 4.7
4. a. 15 b. 34
5. mean is 6; modes are 6, 8, 9 median is 7; range is 7

Page 421
1. statistics
2. data
3. a. range; b. median; c. mean; d. mode; e. frequency

Page 422
1. a. 1.14 b. 12.8
2. a. 8 b. none C. 5
3. a. 4 b. 3.2 c. 35

Page 423
1. a. 72 b. none
2. a. 7 b. 10
3. a. 71° b. 3.6

Page 424
1. a. 3 b. 3 c. none
2. a. 1.3 b. .9 c. .5
3. a. 19.9 b. 20 c. 18, 23
4. a. 7 b. 7.5 c. 8, 9

Teacher's Guide
### UNIT 9: CENTRAL TENDENCY

**Mean, Median, Mode, Range**

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<tbody>
<tr>
<td>1.</td>
<td>84</td>
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<tr>
<td>2.</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>21.5</td>
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<tr>
<td>4.</td>
<td>1.7</td>
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<tr>
<td>5.</td>
<td>7.5</td>
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</tr>
<tr>
<td>6.</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>2</td>
<td></td>
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<tr>
<td>8.</td>
<td>70°</td>
<td></td>
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<tr>
<td>9.</td>
<td>73°</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>76°</td>
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<tbody>
<tr>
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<td>2.</td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
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<tr>
<td>6.</td>
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</table>

<table>
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<tr>
<th>Page 427</th>
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</thead>
<tbody>
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<td>7.</td>
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<tr>
<td>8.</td>
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<tr>
<td>9.</td>
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<tr>
<td>10.</td>
</tr>
<tr>
<td>11.</td>
</tr>
<tr>
<td>12.</td>
</tr>
<tr>
<td>13.</td>
</tr>
<tr>
<td>14.</td>
</tr>
</tbody>
</table>

**Teacher's Guide**
UNIT 10: INTEGERS

Section 1: Addition
Section 2: Multiplication
UNIT 10: INTEGERS

Overview of Unit 10

What This Unit Covers...

Unit 10 provides instruction to assist students in performing mathematical operations with integers. The objective and skills for this unit are listed below.

Objective 8

Computes with integers
Skills: Add two integers having no more than two digits given in either vertical or horizontal form.

Multiply two integers having no more than two digits.
**UNIT 10: INTEGERS**

Unit 10 is comprised of two sections. The chart below displays the sections and concepts covered in each section for this unit.

### Sections and Concepts of Unit 10

<table>
<thead>
<tr>
<th>Sections</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1</td>
<td>Addition of integers</td>
</tr>
<tr>
<td>Section 2</td>
<td>Multiplication of integers</td>
</tr>
</tbody>
</table>

**Unit Components...**

The Teacher's Guide in each section of Unit 10 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 10: INTEGERS
Addition

Section 1: Addition of Integers

What This Section Is About...

In this section students will study addition of integers. Problems are written both vertically and horizontally with two integers having no more than two digits.

Scope and Sequence of Section 1

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 435.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 436</td>
</tr>
<tr>
<td>• Addition of integers</td>
<td>p. 432</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 435</td>
</tr>
</tbody>
</table>
UNIT 10: INTEGERS

Addition

Suggestions for Teaching...

Suggestions are provided below for teaching the addition of integers concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills. Use quizzes on basic facts in Unit 1 or others as needed.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ Add whole numbers to two digits.</td>
</tr>
<tr>
<td>✅ Subtract whole numbers.</td>
</tr>
</tbody>
</table>

2. Introduce.

- In the very early years of mankind's existence the counting numbers were conceptualized. Men "counted" livestock and other things, and eventually developed symbols for numbers.

  The Chinese are credited with first using the concept of negative numbers. Their notation may have been a number inside a circle, perhaps leading to the financial expression of being "in the hole."

A need for negative numbers is probably clear to most students now. Solicit students' suggestions for ways negative numbers are used today. Being in debt, scorekeeping in many games, and temperatures below zero are just a few situations in which negative numbers would be useful. Positive and negative numbers are used in science, statistics, weather reports, stock reports, sports, and many other fields to express opposite meanings or directions.
UNIT 10: INTEGERS

Addition

3. Present vocabulary concepts.

- Discuss vocabulary words and give examples on p. 436.
  - absolute value
  - common signs
  - integers
  - negative
  - opposite
  - positive
  - sign

4. Conduct initial learning activity.

- Review the sets of numbers students have encountered in their mathematical career (prior to integers): counting numbers, whole numbers, fractional numbers, and decimal numbers.

  Relate each of these sets to its number line representation. Remind students that a number line is an abstract representation of all numbers. In graphing a set, those numbers which belong to a set are shown at the same time you show all numbers which do not belong by excluding non-members.

  Select small sets of numbers with values from zero (0) to ten (10) for students to practice graphing on number lines. Various sets should include whole numbers, fractions, and decimals. Number lines should be drawn with zero on the left, and an arrow at the right indicating the line continues forever; expand the number line to include numbers less than zero—in other words, extend it to the left of zero.

- Use such a number line (one having both negative and positive numbers) to demonstrate addition of two positive integers, two negative integers, and a positive and negative integer. After several such examples, give students specific examples and have them continue the demonstration.

  Follow this activity with one which provides number lines with the demonstration already drawn in, and ask students to come up with the problems with which to label the line.

- Point out that parentheses ( ) are used in textbooks to set off numbers with positive and negative signs to distinguish from subtraction and addition signs.
5. Present the addition of integers concept with examples.

One concept is presented in section 1. The Student's Guide contains the concept with examples and steps. For the concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- Confusion of difference between positive and negative and plus and minus
  
  Encourage appropriate word usage and correct terminology.

- Naming the number that represents movement from a non-zero number to another number (on a number line)
  
  Draw a large number line on the floor or chalkboard. Provide students with a starting point and have them move a given number of units in a positive or negative direction. Ask them to tell where on the number line they end up. Repeat with other numbers.
UNIT 10: INTEGERS

Addition

× Adding numbers with opposite signs

Allow students to draw a number line as an aid.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Use a vertical number line, with positives above negatives.

※ Have students use the change sign key on a calculator or find the opposite of a given number.

※ To relate mathematics to the students' lives, have students find examples of the use of positive and negative numbers in newspapers. For each situation, have the students identify the meanings of the given number and then determine the opposite meaning as well.

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on addition of integers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 10: INTEGERS

Multiplication

Section 2: Multiplication of Integers

What This Section Is About...

In this section students will multiply integers having no more than two integers, learning the rules for the signs.

Scope and Sequence of Section 2

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Review vocabulary terms.</td>
<td></td>
</tr>
<tr>
<td>• Multiplication of integers</td>
<td>p. 444</td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
</tbody>
</table>
Suggestions for Teaching...

Suggestions are provided below for teaching the multiplication of integers concept. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

   Determine if students possess prerequisite skills. Use test of basic facts in Unit 1 to determine accuracy and speed, if needed.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Add whole numbers to two digits.</td>
</tr>
<tr>
<td>✔ Multiply two-digit numbers.</td>
</tr>
</tbody>
</table>

2. Introduce.

   □ Relate multiplication of integers to addition of integers. Review vocabulary.

3. Present vocabulary concepts.

   □ Review vocabulary words and give examples.

   • absolute value
   • common signs
   • integers
   • negative
   • opposite
   • positive
   • sign

   □ Present a vocabulary activity for reinforcement, as appropriate.
4. Conduct initial learning activity.

To introduce the idea of multiplying with a negative number, have students assist in developing a chart like the one below. Use a familiar number at first. Begin with the higher values and proceed to the smaller ones.

\[
\begin{array}{c|c}
5 & 8 \\
5 & 7 \\
5 & 6 \\
5 & 5 \\
5 & 4 \\
5 & 3 \\
5 & 2 \\
5 & 1 \\
5 & 0 \\
\end{array}
\]

\[
\begin{array}{c|c}
5 	imes 8 & = 40 \\
5 	imes 7 & = 35 \\
5 	imes 6 & = 30 \\
5 	imes 5 & = 25 \\
5 	imes 4 & = 20 \\
5 	imes 3 & = ___ \\
5 	imes 2 & = ___ \\
5 	imes 1 & = ___ \\
5 	imes 0 & = ___ \\
\end{array}
\]

Have students fill in the missing values. Then ask, "If we were able to add another line, how would it look?" Students should be able to provide the correct line.

\[
5 \times 0 = 0
\]

Ask, "How about the next line? What would it be?" Some students may respond "5 \times -1 = -5," but for those who cannot, lead them to see that if the pattern is followed, the next factor, will be "-1," and the corresponding product will be "-5."

Continue, building the chart for a short while, then beginning a new chart, such as the multiples of 10. This should lead the students to see that the product of a negative number with a positive number will be negative.

To develop the concept for multiplying two negatives, begin a chart similar to the one described above, with the following differences (now that they've learned how to multiply a negative and a positive):

\[
\begin{array}{c|c}
-5 & 6 \\
-5 & 5 \\
-5 & 4 \\
-5 & 3 \\
-5 & 2 \\
-5 & 1 \\
-5 & 0 \\
+ & = ___ \\
+ & = ___ \\
\end{array}
\]
UNIT 10: INTEGERS

Multiplication

Complete and extend this chart to include \(-5 \times -4 = 20\), thus leading the students to discover the rule for finding the product of two negative numbers.

5. **Present the multiplication of Integers concept with examples.**

One concept is presented in Section 2. The Student's Guide contains concept with examples and steps. For this concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.

6. **Address common errors.**

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

- **Writing the wrong sign for a product of two or more signed numbers**

  *Provide drill which requires only that students determine the correct sign of the final product. Include examples having more than two factors. Assist students in discovering a generalization for cases where there is an even number of negative factors and also for cases where there is an odd number of negative factors.*
UNIT 10: INTEGERS

7. Reinforce.

* To enhance understanding, have students compute the second, third, fourth, fifth, and sixth powers of several positive and negative numbers; look for a pattern. That is, any even power of a negative number is positive; and any odd power if a negative number is negative. Then predict the signs of such powers as $(-2)^{25}$ (negative) and $(-8)^{30}$ (positive).

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on multiplication of integers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 10: INTEGERS

Answer Keys

Section 1: Addition

Page 435
1. ...-1, 0, +1...
2. Signs alike, add and take the common sign. Signs not alike, subtract and use the sign of the larger number.
3. Number without its sign
4. Numbers left of zero on number line
5. +5, -5, +14, -10, -8, -8
6. -9 (-21 +21)
7. left
8. Zero does not have a sign.

Page 437
1. a. add, common
   b. subtract, sign, larger
2. a. 10   b. -5   c. 33   d. -16   e. -25
   f. -13   g. -78   h. -67   i. 57   j. 16
   k. -21   l. -29   m. 121   n. 31   o. -3
3. a. -15
   b. -19
   c. -6

Page 438
1. negative, positive
2. Write no sign
3. a. 7
   b. -13
   c. -7
   d. -172
   e. 0
   f. 37
   g. -8
   h. -100
UNIT 10: INTEGERS

Section 1: Addition

Page 439
1. F
2. T
3. F
4. T
5. T
6. F
7. T
8. T
9. T
10. T
11. 3
12. -7
13. -1
14. -1
15. 19
16. 36

Page 440
1. have not, 1 yd, short
2. have, 1 yd, over
3. 20
4. 

Page 441
a. 18
b. -17
c. -2
d. -1
e. -187
f. 183
g. 173
h. 171
i. 6
j. -166
k. -61
l. -6
m. -1
n. -23
o. -1
p. 50
q. 9
r. -37
s. -43
### UNIT 10: INTEGERS

**Section 2: Multiplication**

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<th>2. addition</th>
<th>3. multiply</th>
<th>4. multiply</th>
<th>5. multiply</th>
<th>6. multiply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7. -15 8. 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>9. 30 10. 72</td>
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<td>11. 30 12. 0</td>
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<table>
<thead>
<tr>
<th>Page 446</th>
<th>1. positive</th>
<th>2. negative</th>
<th>3. positive</th>
<th>4. signs, different</th>
<th>5. negative, positive</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6. 9 7. -10</td>
<td>8. 32 9. 32</td>
<td></td>
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<tr>
<td></td>
<td>10. -75 11. 0</td>
<td>12. -55 13. -30</td>
<td></td>
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<td></td>
<td>14. negative</td>
<td>15. negative</td>
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<td>16. positive</td>
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<table>
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<tr>
<th>Page 447</th>
<th>1. positive</th>
<th>2. positive</th>
<th>3. negative</th>
<th>4. positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5. +33</td>
<td>6. -15</td>
<td>7. -125</td>
<td>8. 600</td>
</tr>
<tr>
<td></td>
<td>9. -30</td>
<td>10. -64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page 448</th>
<th>1. positive, negative</th>
<th>2. two</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. + 4. -</td>
<td>5. + 6. -</td>
</tr>
<tr>
<td></td>
<td>7. + 8. +</td>
<td>9. - 10. +</td>
</tr>
<tr>
<td></td>
<td>11. + 12. -</td>
<td>13. + 14. -</td>
</tr>
<tr>
<td></td>
<td>15. -</td>
<td>16. +</td>
</tr>
</tbody>
</table>

**Teacher's Guide**
Overview of Unit 11

What This Unit Covers...

Unit 11 provides instruction to assist students in performing mathematical operations with equations. The objective and skills for this unit are listed below.

Objective 9

Solve first degree equations with one variable

Skills: Solve equations of the form \( ax = b \), where \( a \) and \( b \) are whole numbers and \( a \neq 0 \).

Solve equations of the form \( ax + b = c \), where \( a, b, \) and \( c \) are whole numbers and \( a \neq 0 \).
UNIT 11: EQUATIONS

Unit 11 is comprised of one section. The following chart displays the section and concepts covered in this unit.

Concepts of Unit 11

1. Solve equations of the form \( ax = b \)
2. Solve equations of the form \( x + a = b \)
3. Solve equations of the form \( ax + b = c \)

Unit Components...

The Teacher's Guide in Unit 11 contains the following:

- prerequisite skills
- vocabulary terms to introduce and explain
- concepts related to the objective
- common errors made by students and selected ideas for remediation
- suggestions for teaching the sections.

The Suggestions for Teaching section offers ideas for introducing the section concepts, suggested initial learning activities, ideas for additional practice and reinforcement, and points to summarize.

The Student's Guide contains the concepts with examples and problem-solving steps. Quizzes, Vocabulary, and Activity Sheets are found in the student section.
UNIT 11: EQUATIONS

Equations

What This Unit Is About...

In Unit 11 students will practice solving simple equations involving multiplication, addition, and a combination of multiplication and addition.

Scope and Sequence of Unit 11

<table>
<thead>
<tr>
<th>Events</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine present level.</td>
<td>Assign Quiz on p. 455.</td>
</tr>
<tr>
<td>2. Introduce.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>3. Present vocabulary terms.</td>
<td>p. 456</td>
</tr>
<tr>
<td>a. Solve equations of the form</td>
<td>p. 452</td>
</tr>
<tr>
<td>[ ax = b ]</td>
<td></td>
</tr>
<tr>
<td>b. Solve equations of the form</td>
<td>p. 453</td>
</tr>
<tr>
<td>[ x + a = b ]</td>
<td></td>
</tr>
<tr>
<td>c. Solve equations of the form</td>
<td>p. 454</td>
</tr>
<tr>
<td>[ ax + b = c ]</td>
<td></td>
</tr>
<tr>
<td>6. Address common errors.</td>
<td>See Suggestions for Teaching.</td>
</tr>
<tr>
<td>9. Administer posttest.</td>
<td>p. 455</td>
</tr>
</tbody>
</table>
UNIT 11: EQUATIONS

Suggestions for Teaching...

Suggestions are provided below for teaching equation concepts. The suggestions parallel and describe more fully the events listed in the Scope and Sequence chart.

1. Determine prerequisite skills.

Determine if students possess prerequisite skills.

<table>
<thead>
<tr>
<th>Prerequisite Skills for Unit 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Add, multiply, and divide integers and rational numbers.</td>
</tr>
<tr>
<td>✔ Perform opposite operations of addition and subtraction and multiplication and division.</td>
</tr>
<tr>
<td>✔ Identify opposite operations.</td>
</tr>
<tr>
<td>✔ Perform opposite operations of addition and subtraction and multiplication and division.</td>
</tr>
</tbody>
</table>

2. Introduce.

Although equations should be solved by inspection whenever possible, many students rely on this ability, or on trial and error, to the extent that they do not learn how to transform (or manipulate) equations to discover solutions. Even mathematically inclined students often fall into this "old habit" trap.

Skills of transformation will become necessary as equations become more complex. In addition, the more complicated the equation, the more overtaxed the memory may become if one tries to solve by inspection or by trial and error. It is also important to note that as students progress into algebra, the emphasis shifts from finding the answer to the process used for finding solutions. Therefore, encourage students to practice writing the steps required to solve equations.
UNIT 11: EQUATIONS

3. Present vocabulary concepts.
   - Discuss vocabulary words and phrases, and give examples.
     - adding the opposite
     - equation
     - isolate the variable
     - solve
     - substitution
     - variable

4. Conduct initial learning activity.
   - Have prepared:
     - three small brown bags containing five identical marbles each
     - two bags containing seven marbles
     - four bags containing two marbles each
     - have on hand enough loose marbles for the activity.

   Using a balance scale, demonstrate the equation $3x = 15$ by placing the three bags of five marbles each together in one of the trays of the scale, and place 15 loose marbles in the second tray. Tell students that each of the bagged amounts are the same, and solicit ways they could determine the exact marble count in each bag. Remind students that in order to maintain the equality, the scale must remain balanced.

   Lead the students to discover that if they divide each tray's contents by three (3), the number of bags, the result will show one bag in the first tray and five (5) marbles in the second tray.

   In the same way demonstrate the following two equations: $14 = 2x$ and $4x = 8$.

   - Discuss the relationship between the rules for multiplication of integers and for dividing integers. Demonstrate that they are the same.
UNIT 11: EQUATIONS

Have prepared three bags with seven, 10, and 20 marbles in them. Using a balance scale, demonstrate the equation \( x + 5 = 12 \) by placing the bag containing seven marbles together with five loose marbles in one of the trays of the scale, and place loose marbles in the second tray. Solicit ways they could determine the exact marble count in the bag. Remind students that in order to maintain equality, the scale must remain balanced.

In this activity, students will probably want to subtract or "take away" five (5) from each tray. The result will show one bag in the first tray and seven (7) marbles in the second tray, thus there are seven (7) marbles in the bag. Lead the students to discover that if they add the opposite (-5) of the visible contents (5), the result should be the same as subtracting. Encourage the students to use addition of the opposite instead of subtraction (since subtraction of integers was not covered in the unit on integers).

In the same way demonstrate the following two equations: \( 3 + x = 13 \) and \( 28 = x + 8 \).

5. Present each equation concept with examples.

Three concepts are presented in Unit 11. The Student's Guide contains concepts with examples and steps. For each concept cover the following:

- Give rationale for learning the skill. Solicit students' input when developing rationale.
- Give steps in procedure.
- Model the strategy with an example. Refer students to the example provided in the Student's Guide.
- Present other examples and actively involve the student.
- Assign Activity Sheets.
- Provide corrective feedback.
UNIT 11: EQUATIONS

6. Address Common Errors

Below is a listing of common errors. Selected errors include examples and strategies for remedying.

× Error when the unknown (variable) is in the right-hand side of the equation

Present equations in a variety of layouts early in the instructional sequence. (This will also help develop the concept of equality). Examples: \(5x + 6 = 16, 16 = 5x + 6, 16 = 6 + 5x\). All represent an equality which should look the same if demonstrated using a balance scale.

7. Reinforce.

Selected reinforcement strategies are listed below.

※ Using familiar formulas like those finding area, perimeter, or the conversion from Fahrenheit to Celsius, etc. Instruct students how to make appropriate replacements before attempting to solve for the unknown. For example: Find the width of a rectangle given an area of 24 and a length of 8. Use the formula \(A = 2l + 2w\). Replace \(l\) with 8 and \(A\) with 23, and solve for \(w\).

\[
\begin{align*}
24 &= 2(8) + 2w \\
24 &= 16 + 2w \\
24 + -16 &= 16 + -16 + 2w \\
8 &= 0 + 2w \\
8 &= 2w \\
8 &= 2w \\
2 &= 2 \\
4 &= 2 \\
\end{align*}
\]

Solution: The width is 4.
UNIT 11: EQUATIONS

8. Summarize.

Review the major points discussed in the introduction, as appropriate. Additional ideas and applications that have emerged should be elicited from students. Also, ask students to name the skills learned in this section on rounding decimal numbers; include all major concepts covered. Reinforce the importance and need for skill mastery.


Give Quiz provided in student section, or use an alternate form, to assess skill mastery.
UNIT 11: EQUATIONS

Answer Keys

Page 455

1. 6
2. $-1 \frac{1}{2}$
3. $\frac{1}{2}$
4. $\frac{1}{4}$
5. -4

Page 457

1. -2
2. $\frac{1}{2}$
3. $-\frac{2}{3}$
4. -3
5. $-\frac{1}{9}$
6. $-\frac{1}{5}$
7. 5
8. $-\frac{1}{3}$
9. -6
10. 6

Teacher's Guide
Unit 11: EQUATIONS

Answer Keys

Page 458
1. $\frac{1}{2}$
2. $-2$
3. $-\frac{1}{5}$
4. 5
5. $-\frac{1}{3}$
6. $-9$
7. $-\frac{1}{9}$
8. $-5$
9. $\frac{2}{3}$
10. 2

Page 459
1. $-8$
2. $-32$
3. $-75$
4. 27
5. 58

Page 460
1. $z = -5$
2. $x = 19$
3. $b = 13$
4. $x = -33$
5. $y = -38$
6. $c = -16$
7. $k = -10$
8. $a = 15$
9. $p = 0$
10. $q = 0$

Page 461
1. 4
2. 2
UNIT 11: EQUATIONS

Answer Keys

Page 461
3. \(-3\)
4. \(6\)
5. \(2\frac{1}{2}\)

Page 462
1. \(3\)
2. \(1\frac{1}{5}\)
3. \(-2\)
4. \(-1\frac{4}{9}\)
5. \(5\)

Page 463
1. \(-1\frac{1}{4}\)
2. \(5\)
3. \(\frac{2}{3}\)
4. \(2\)
5. \(1\)
6. \(\frac{1}{2}\)
7. \(1\frac{1}{6}\)
8. \(7\)
9. \(1\frac{6}{7}\)
10. \(2\)

Teacher's Guide
APPENDIX
## Concepts

<table>
<thead>
<tr>
<th>Unit</th>
<th>Section</th>
<th>Concepts</th>
</tr>
</thead>
</table>
| 1    | 1       | • Adding whole numbers  
       |         | • Rewriting in vertical form to add  
       |         | • Working real-world word problems  
|      | 2       | • Subtracting whole numbers  
       |         | • Working real-world word problems  
|      | 3       | • Multiplying with no regrouping  
       |         | • Multiplying with regrouping  
       |         | • Working real-world word problems  
|      | 4       | • Dividing whole numbers  
       |         | • Working real-world word problems  
| 2    | 1       | • Simplifying fractions  
       |         | • Adding like fractions  
       |         | • Finding common denominators  
       |         | • Adding fractions with unlike denominators  
       |         | • Renaming improper fractions as mixed numbers  
       |         | • Adding fractions with unlike denominators whose sum is an improper fraction  
|      | 2       | • Subtracting proper fractions  
       |         | • Subtracting whole numbers from mixed numbers  
       |         | • Subtracting mixed numbers from whole numbers  
       |         | • Subtracting mixed numbers from mixed numbers  
|      | 3       | • Renaming a mixed number as an improper fraction  
       |         | • Multiplying two fractions  
       |         | • Multiplying two fractions, using cross cancelling  
       |         | • Multiplying fractions, mixed numbers, and whole numbers  
|      | 4       | • Dividing two fractions  
       |         | • Dividing a fraction and a whole number  
       |         | • Dividing two mixed numbers  
| 3    | 1       | • Adding decimal numbers  
|      | 2       | • Subtracting decimal numbers  
|      | 3       | • Multiplying decimal numbers  
|      | 4       | • Dividing decimal numbers  
|      | 5       | • Dividing decimal numbers by powers of ten  
|      |         | • Rounding decimal numbers  
| 4    | 1       | • Write a fraction as an equivalent decimal  
       |         | • Write a decimal as a percent  
       |         | • Write a decimal as an equivalent fraction  
       |         | • Write a percent as a fraction  
|      | 2       | • Find a percent of a whole number  
|      | 3       | • Find a percent of two-place decimal numbers  

269 255
<table>
<thead>
<tr>
<th>Unit</th>
<th>Section</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>- Identify basic geometric figures—points, rays, line segments, lines, angles, parallel lines, and perpendicular lines</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>- Identify types of angles—acute, obtuse, right, straight, complementary, and supplementary</td>
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<td></td>
<td></td>
<td>- Measure angles using a protractor</td>
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<td></td>
<td>- Identify triangles by angles</td>
</tr>
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<td></td>
<td>- Identify triangles by sides</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>- Identify various quadrilaterals—squares, rectangles, parallelograms, rhombi, trapezoids</td>
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<tr>
<td></td>
<td></td>
<td>- Identify pentagons, hexagons, heptagons, and octagons</td>
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<tr>
<td></td>
<td></td>
<td>- Identify congruent and similar polygons</td>
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<tr>
<td>6</td>
<td></td>
<td>- Find elapsed time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Solve problems involving units of distance/length</td>
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<tr>
<td></td>
<td></td>
<td>- Solve problems involving units of capacity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Solve problems involving units of weight/mass</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>- Find the perimeter of a polygon</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>- Find the circumference of a circle</td>
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<tr>
<td></td>
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<td>- Find the area of a rectangle</td>
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<td>- Find the area of a square</td>
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<td>- Find the area of a triangle</td>
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<td>- Find the area of a parallelogram</td>
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<tr>
<td></td>
<td></td>
<td>- Find the area of a trapezoid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Find the area of a circle</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>- Interpret graphs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Construct graphs</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>- Finding the mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Finding the mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Finding the median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Finding the range</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>- Addition of integers</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>- Multiplication of integers</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>- Solve equations of the form $ax = b$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Solve equations of the form $x + a = b$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Solve equations of the form $ax + b = c$</td>
</tr>
</tbody>
</table>
## Appendix

### Unit Correlation to Objectives and Skills

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Skills</th>
<th>Fully Addressed</th>
<th>Partially Addressed</th>
<th>Not Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.</td>
<td>Add no more than 4 numbers up to four digits, regrouping when necessary.</td>
<td>Unit 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subtract any two whole numbers up to four digits, regrouping when necessary.</td>
<td>Unit 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiply a three or more digit number by a two- or three-digit number.</td>
<td>Unit 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divide a four- or five-digit whole number by a two-digit number including multiples of 10 and 100.</td>
<td>Unit 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add fractions including whole numbers and mixed numbers less than 100, and proper fractions with denominators 2, 3, 4, 5, 6, 8, or 10.</td>
<td>Unit 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subtract fractions, including whole numbers and mixed numbers less than 100 and proper fractions with denominators of 2, 3, 4, 5, 6, 8, or 10.</td>
<td>Unit 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Order a given list of no more than three proper fractions with denominators of 2, 3, 4, 5, 6, 8, or 10.</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
## Appendix

### Unit Correlation to Objectives and Skills

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</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.</td>
<td>Multiply fractions, including mixed numbers less than 100 denominators less than 100.</td>
<td>Unit 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divide fractions, including mixed numbers less than 100 with denominators less than 10.</td>
<td>Unit 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add four five-digit decimal numbers, each having no more than three decimal numbers.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subtract five-digit decimal numbers, each having no more than three decimal places.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiply two decimal numbers, each having no more than three decimal places.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divide a decimal number named in tenths or hundredths by powers of 10 up to 1000.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divide two numbers, each having no more than two decimal places, where the divisor is less than 100 with no more than two significant digits.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix

## Unit Correlation to Objectives and Skills

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</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate the ability to compute with whole numbers, decimals, fractions, and percents.</td>
<td>Identify a decimal or percent that is equivalent to a proper fraction having a denominator of 2, 3, 4, 5, 20, 25, 50, or 1000</td>
<td>Unit 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Find the percent that one number is of another.</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Write whole-number percents as rational numbers.</td>
<td>Unit 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Find the percentage when given a whole number and a whole-number percent less than 100.</td>
<td>Unit 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Find the percentage when given a whole number and a whole-number percent less than 1000.</td>
<td>Unit 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Round a mixed number with a whole number component less than 100 to the nearest whole number.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Round a number less than 100 with no more than three decimal places to a designated place.</td>
<td>Unit 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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</tr>
</thead>
<tbody>
<tr>
<td>2. Demonstrate the ability to solve real-world problems involving whole numbers, decimals, fractions, and percents.</td>
<td>Solve real-world problems involving no more than two whole number operations.</td>
<td>Unit 1</td>
<td>Unit 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solve real-world problems involving fractions with unlike denominators of 2, 3, 4, 5, 6, 8, or 10.</td>
<td>Unit 2</td>
<td>Unit 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solve real-world problems involving decimal numbers not to exceed three decimal places using no more than two distinct operations.</td>
<td>Unit 3</td>
<td>Unit 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solve real-world problems involving percents using no more than two distinct operations and limited to problems concerning simple interest, sales tax, or rate of discount.</td>
<td>Unit 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solve real-world problems involving averages of no more than 10 numbers and no more than two distinct operations.</td>
<td>Unit 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimate answers to real-world problems involving whole numbers, common fractions, or decimal numbers.</td>
<td>Unit 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix

### Unit Correlation to Objectives and Skills

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<th>Not Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Understand basic geometric concepts and relations.</td>
<td>Identify points, rays, line segments, lines, and angles.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify triangles by angles and sides.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify quadrilaterals to include squares, rectangles, parallelograms, trapezoids, and rhombi.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify pentagons, hexagons, and octagons.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify acute, obtuse, right, straight, complementary, and supplementary angles.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify parallel and perpendicular lines.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify congruent and similar polygons.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measure angles less than 180° using a protractor.</td>
<td>Unit 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Demonstrate the ability to solve problems involving measuring time, distance, capacity, and mass/weight.</td>
<td>Determine the elapsed time between two events stated in seconds, minutes, hours, days, weeks, months, and years.</td>
<td>Unit 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix

### Unit Correlation to Objectives and Skills

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</tr>
</thead>
<tbody>
<tr>
<td><strong>4. Demonstrate the ability to solve problems involving measuring time, distance, capacity, and mass/weight.</strong></td>
<td>Solve a problem related to length, width, or height given in a table of metric or customary units up to kilometers or miles (conversion within the system).</td>
<td></td>
<td></td>
<td>Unit 6</td>
</tr>
<tr>
<td></td>
<td>Solve a problem using capacity using units given in a table (milliliter, liter, teaspoons, tablespoons, cups, pints, quart, gallons) (conversion within the system).</td>
<td></td>
<td></td>
<td>Unit 6</td>
</tr>
<tr>
<td></td>
<td>Solve a problem involving weight/mass using units given in a table (milligrams, grams, kilograms, metric tons, ounces, pounds, tons) (conversion within the system).</td>
<td></td>
<td></td>
<td>Unit 6</td>
</tr>
<tr>
<td></td>
<td>Estimate answers to measurement problems.</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determine length, width, or height by measuring objects to the nearest millimeter or 1/8 inch.</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix

**Unit Correlation to Objectives and Skills**

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</thead>
<tbody>
<tr>
<td><strong>5. Demonstrate the ability to solve problems involving area and perimeter.</strong></td>
<td>Find the perimeter of a polygon with no more than eight sides.</td>
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<tr>
<td></td>
<td>Find the circumference of a circle (let $\pi = 3.14$).</td>
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<td></td>
<td>Find the area of a rectangle or square.</td>
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<tr>
<td></td>
<td>Find the area of a triangle, parallelogram, or trapezoid when given the formula.</td>
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<tr>
<td></td>
<td>Find the area of a circle when given the formula (let $\pi = 3.14$).</td>
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<tr>
<td><strong>6. Demonstrate knowledge of line, bar, and circle graphs.</strong></td>
<td>Demonstrate knowledge of line, bar, and circle graphs.</td>
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<td></td>
<td>Organize data into a line graph, bar graph, or table.</td>
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<tr>
<td><strong>7. Demonstrate knowledge of the basic measures of central tendency.</strong></td>
<td>Find the mean of a set of data consisting of no more than two-digit numbers.</td>
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<td></td>
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<tr>
<td></td>
<td>Find the mode of a set of data consisting of no more than five two-digit numbers.</td>
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## Appendix

### Unit Correlation to Objectives and Skills

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<td>7. Demonstrate knowledge of the basic measures of central tendency.</td>
<td>Find the median of a set of data consisting of no more than five two-digit numbers.</td>
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<td>Find the range of a set of data consisting of no more than five two-digit numbers.</td>
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<td>8. Compute with integers.</td>
<td>Add two integers having no more than two digits given in either vertical or horizontal form.</td>
<td>Unit 10</td>
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<td></td>
<td>Multiply two integers having no more than two digits.</td>
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<tr>
<td>9. Solve first-degree equations with one variable.</td>
<td>Solve equations of the form $ax = b$, where $a$ and $b$ are whole numbers and $a \neq 0$.</td>
<td>Unit 11</td>
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<td></td>
<td>Solve equations of the form $ax + b = c$, where $a$, $b$, and $c$ are whole numbers and $a \neq 0$.</td>
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REFERENCES


Building General Mathematic Skills

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Building General Mathematic Skills

Revised Edition

Florida Department of Education
Division of Public Schools
Bureau of Student Services and Exceptional Education

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The Parallel Alternative Strategies for Students (PASS) volume: Building General Mathematic Skills was developed in 1991 and was based on the PASS: General Mathematics I. The individuals listed below, including both general education and exceptional student education teachers, assisted in the extensive revision and redesign.

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INTRODUCTION

The Parallel Alternative Strategies for Students (PASS): Building General Mathematic Skills is designed as a supplementary text and workbook. Building General Mathematic Skills is divided into two books—one for the student and one for the teacher. Each book contains eleven units of study: Whole Numbers, Fractions, Decimals, Percents, Geometry, Measurement, Perimeter/Area, Graphs, Central Tendency, Integers, and Equations.

In the student's book, each unit or section contains a Student's Guide with a suggested plan for the unit. The guide presents each of the mathematic concepts with examples and problem-solving steps. Following the guide are the worksheets—comprised of Quizzes, Vocabulary, Study Sheets, and Activity Sheets.

You may take the Quiz as a pretest to determine your present level. The Quizzes may also be used as a posttest at the end of the section or unit to assess skill mastery. New words are presented on Vocabulary pages; these may include examples to further explain the terms. Some sections have Vocabulary Activities to provide practice to become more familiar with the terms. Study Sheets are found in some units. These contain charts with information organized in a way to help you remember important facts. Activity Sheets are the pages provided to practice each of the concepts presented in the text.

This modified text presents only a limited sample of learning activities. The practice of the skills and application of the concepts will necessarily include other materials. These materials were designed to be sufficiently general and adaptable enough to accompany other textbooks. This book will probably not be used as the primary or complete text. Sections may be selected and used in conjunction with the chosen basic textbook or with the teacher's course outline. Other sections or activities may be omitted, if the teacher desires.

The objectives and skills covered in this PASS are correlated to the units and listed in a correlation chart found in the Appendix in the Teacher's Guide. This group of skills was formerly the intended outcomes and student performance standards for the discontinued General Mathematics 1 course no. 1205340.
UNIT 1: WHOLE NUMBERS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
UNIT 1: WHOLE NUMBERS

Addition

Section 1

What This Section is About...

In this section you will practice adding whole numbers. **Whole numbers** are natural numbers such as 0,1,2,3,... Addition problems, in this section, have as many as four numbers. The numbers added (addends) will have no more than four digits; so, the largest possible addend will be 9,999.

Suggested Plan

<table>
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<tr>
<th>Checkpoints</th>
<th>Activities</th>
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<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✈ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✈ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Adding whole numbers</td>
<td></td>
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<tr>
<td>2. Rewriting in vertical form to add</td>
<td></td>
</tr>
<tr>
<td>3. Working real-world word problems</td>
<td></td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>✈ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✈ See Vocabulary.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>✈ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>✈ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✈ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>

Student’s Guide
UNIT 1: WHOLE NUMBERS

Addition

Concept:
Adding Whole Numbers Written In Vertical Form

Example:

283
55
232
83

Step 1: Add each column starting from top to bottom with the ones' place at the far right. If the sum of any column is ten or more, write the last digit of the sum in the answer column and carry the other digit to the next column to the left.

The sum of the ones' column (3 + 5 + 2 + 3) is 13; write the 3 in the answer column and carry the 1.

\[
\begin{array}{c}
1 \\
283 \\
55 \\
232 \\
+83 \\
\hline
3
\end{array}
\]

The sum of the tens' column (1 + 8 + 5 + 3 + 8) is 25 so write the 5 in the answer column and carry the 2.

\[
\begin{array}{c}
21 \\
283 \\
55 \\
232 \\
+83 \\
\hline
53
\end{array}
\]

The sum of the hundreds' column (2 + 2 + 2) is 6. So write the 6 in the answer column.

\[
\begin{array}{c}
21 \\
283 \\
55 \\
232 \\
+83 \\
\hline
653
\end{array}
\]
UNIT 1: WHOLE NUMBERS
Addition

Step 2: Check by making a second attempt on a separate sheet of paper and adding from bottom to top.

\[
\begin{align*}
2 & \ 1 \\
2 & \ 8 \ 3 \\
5 & \ 5 \\
2 & \ 3 \ 2 \\
+ & \ \ 8 \ 3 \\
\hline
6 & \ 5 \ 3
\end{align*}
\]

(3 + 2 + 5 + 3 = 13)
(8 + 3 + 5 + 8 + 1 = 25)
(2 + 2 + 2 = 6)

Concept: Rewriting the Problem in Vertical Form to Add

Example: \(849 + 79 + 707 =\)

Step 1: Rewrite each horizontally written problem in vertical form.

\[
\begin{align*}
8 & \ 4 \ 9 \\
7 & \ 9 \\
+ & \ 7 \ 0 \ 7 \\
\hline
1 & \ 6 \ 3 \ 5
\end{align*}
\]

Step 2: Check to make sure all digits in each number are written in the correct place.

Step 3: Use the addition strategy to find and check the sums.

\[
\begin{align*}
1 & \ 2 \\
8 & \ 4 \ 9 \\
7 & \ 9 \\
+ & \ 7 \ 0 \ 7 \ \\
\hline
1 & \ 6 \ 3 \ 5
\end{align*}
\]
Concept Working Real-World Addition Problems

What steps do you use to work real-world problems?

Step 1: Read the problem.

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game; and 5,625 the fourth game. How many people attended all four home basketball games?

Step 2: Circle key words.

- how many
- all

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game, and 5,625 the fourth game. How many people attended all four home basketball games?

Step 3: Underline the question or what is being asked.

South High School had four home basketball games during January. There were 5,225 people who attended the first game; 3,450 the second game; 4,317 the third game; and 5,625 the fourth game. How many people attended all four home basketball games?

Step 4: Determine the operation.

This problem requires addition.
UNIT 1: WHOLE NUMBERS

Addition

Step 5: Write a number sentence. (Draw pictures if needed.)

<p>| | | | |</p>
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<tbody>
<tr>
<td>5,225</td>
<td>+</td>
<td>3,450</td>
<td>+</td>
</tr>
</tbody>
</table>

Step 6: Compute the answer.

5,225
3,450
4,317
+ 5,625
18,617

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

5,000 + 3,000 + 4,000 + 6,000 = 18,000

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer.

Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 18,617.
Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

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**Quiz**

Directions: Add.

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**Unit 1: Section 1**
Vocabulary

Directions: Read and study.

carrying — to transfer from one column to the next; also called regrouping

finite — can be counted or measured

infinite — cannot be counted or measured

natural or counting numbers — {1, 2, 3...}

one-to-one correspondence — the relationship between the number of things in a group and the natural numbers (1, 2, 3...)

sum — the numbers obtained by adding numbers; the result of addition

whole numbers — natural numbers together with zero {0, 1, 2, 3...}

zero — last numeral to be invented; the absence of quantity; nothing
Vocabulary Activity

Directions: Fill in each blank with one of the words from the vocabulary list.

1. The __________ __________ do not include the symbol for zero.

2. The number of stars in the sky is ___________ because there are too many stars to count.

3. The number of students in this class is ______________ because the students can all be counted.

4. The set of ____________ ____________ includes zero.

5. When you transfer one column to the next, you are ______________

6. The answer to an addition problem is called the ____________.

7. The absence of quantity is called ____________.
Directions: Replace each numeral below with a corresponding numeral from the system that your group developed. Then, add each problem.

Example: \[ \begin{array}{c}
1 \star \\
+ 2 \blacktriangle \\
\hline
3 \rightarrow \\
\end{array} \]

1. \[ \begin{array}{c}
3 \\
+ 5 \\
\hline
\end{array} \]

2. \[ \begin{array}{c}
2 \\
+ 4 \\
\hline
\end{array} \]

3. \[ \begin{array}{c}
1 \\
+ 6 \\
\hline
\end{array} \]

4. \[ \begin{array}{c}
7 \\
+ 8 \\
\hline
\end{array} \]

5. \[ \begin{array}{c}
1 \\
+ 9 \\
\hline
\end{array} \]

6. \[ \begin{array}{c}
3 \\
+ 3 \\
\hline
\end{array} \]

7. \[ \begin{array}{c}
6 \\
+ 5 \\
\hline
\end{array} \]

8. \[ \begin{array}{c}
5 \\
+ 8 \\
\hline
\end{array} \]

9. \[ \begin{array}{c}
8 \\
+ 9 \\
\hline
\end{array} \]

10. \[ \begin{array}{c}
9 \\
+ 5 \\
\hline
\end{array} \]
Activity Sheet

Directions: Add.

1.  
   4246
   6928
   2288
   + 7578
   6862

2.  
   6926
   1611
   6337
   + 911
   1515

3.  
   5640
   60
   9
   + 926
   6636

4.  
   503
   8
   55
   + 1448
   1604

Directions: Find the sum of:

5.  86; 153; 7,128; 249

6.  1,469; 8,355; 2,076; 123

7.  37; 382; 8,500; 175

8.  Twelve hundred, twenty-eight and forty seven

9.  One hundred ninety-four; eighteen; six thousand, four hundred; and fifty-five

10. Six hundred twenty; seven hundred twelve; eighty; and two thousand, eight hundred thirty-nine

Unit 1: Section 1
Directions: Add.

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</table>
Directions: Add.

1. \[86 + 43 + 51 + 88 + 15 = 263\]
2. \[26 + 98 + 77 + 95 + 73 = 371\]

3. \[654 + 408 + 442 = 1504\]
4. \[637 + 214 + 685 = 1536\]

5. \[778 + 585 + 443 + 457 = 2263\]
6. \[634 + 478 + 692 + 803 = 2497\]

7. \[3292 + 7529 + 9835 = 19656\]
8. \[6254 + 5883 + 4887 = 16\,924\]

9. \[5792 + 6218 + 7426 + 3078 = 22,674\]
10. \[5129 + 4595 + 6334 + 4762 = 20,700\]
Activity Sheet

Directions: Use the example in the Student's Guide to add and check the following problems.

1. \(827 + 633 = \)

2. \(962 + 8521 + 16 = \)

3. \(2187 + 8292 + 1324 = \)

4. \(3421 + 1843 + 1510 + 2643 = \)

5. \(209 + 413 + 184 + 431 = \)

6. \(73 + 62 + 18 = \)

7. \(394 + 24,631 = \)

8. \(2643 + 8596 + 3666 = \)

9. \(9436 + 3621 = \)

10. \(624 + 18 + 3555 + 4679 = \)
Word Problems

Directions: Use the eight steps below for solving addition word problems.

Step 1: Read the problem.
Step 2: Circle key words and phrases.
  - deposited
  - increased by
  - sum
  - total
  - how many (in all)
  - plus
  - altogether
Step 3: Underline the objective statement or question (what is being asked).
Step 4: Determine the operation.
Step 5: Write a number sentence. (Draw pictures if needed.)
Step 6: Compute the answer.
Step 7: Reread, and ask: "Is the answer reasonable?"
Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.
**Word Problems**

Directions: Follow the eight steps on page 18 to solve the problems.

1. John drove 419 miles in one week. The second week he drove 389 miles. The third week he drove 653 miles. What was the total number of miles that he drove?

2. There were 42,987 people at Saturday's football game and 5,795 seats were empty. What was the total seating capacity of the stadium?

3. Paul and Joan were selling sodas at a football game. He sold 1,122 sodas. She sold 3,239. What was the total number of sodas sold?

4. Tom's farm contained 2,128 pine trees, 539 maple trees, and 2,454 birch trees. How many trees were there in all?

5. The college's drama class gave four performances of the play. There were 921 at the first performance. The second had 1,539; the third had 789. The last one had 1,475. How many people went to the four performances?
Section 2

What This Section is About...

In this section you will practice subtracting whole numbers. Whole numbers are natural numbers or integers such as 0, 1, 2, 3,... In this section you will subtract whole numbers having up to four digits. Regrouping will be necessary.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
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<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>☐ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>☐ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Subtracting whole numbers</td>
<td>☐ Take Quiz as pretest.</td>
</tr>
<tr>
<td>2. Working real-world word problems</td>
<td>☐ See Vocabulary.</td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>☐ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>☐ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>☐ Take Quiz as posttest.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td></td>
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<tr>
<td>✓ Have I mastered these concepts?</td>
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</tbody>
</table>
UNIT 1: WHOLE NUMBERS

Subtraction

Concept: Subtracting Whole Numbers

How do you subtract whole numbers?

Example: Subtract 5404 - 3586

Step 1: Rewrite the problem vertically, if necessary.

\[
\begin{array}{c}
5404 \\
-3586 \\
\end{array}
\]

Step 2: Subtract each column, starting at the right with the ones' place. If the digit on the top is smaller than the digit on bottom, borrow one from the column to the left.

\[
\begin{array}{c}
3314 \\
5404 \\
3586 \\
\hline
1818 \\
\end{array}
\]

Step 3: Check your answer by adding the bottom number in the problem to the difference. If the sum is the same as the top number in the problem, your answer is correct.

\[
\begin{array}{c}
5404 \\
-3586 \\
\hline
1818 \\
+1818 \\
\hline
5404 \\
\end{array}
\]

Student's Guide
Concept: Working Real-World Subtraction Problems

What steps do you use to work real-world word problems?

Step 1: Read the problem.

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many fewer votes did Mike receive?

Step 2: Circle key words.

fewer

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many fewer votes did Mike receive?

Step 3: Underline the question or what is being asked.

In the student government election, Jean received 1,206 votes, and Mike 988 votes. How many fewer votes did Mike receive?

Step 4: Determine the operation.

This problem requires subtraction.

Step 5: Write a number sentence. (Draw pictures if needed.)

1206 − 988

Step 6: Compute the answer.

\[
\begin{array}{c}
1206 \\
- 988 \\
\hline
218
\end{array}
\]
Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

\[ 1200 - 1000 = 200 \]

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 218 votes.
Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

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Directions: Subtract.

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<tr>
<td>23</td>
<td>96,762 - 8341 =</td>
<td>24</td>
<td>7545 - 2837 =</td>
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</table>
Vocabulary

Directions: Study the words and definitions.

borrowing — to take one from the digit immediately to the left and add its place value to the digit from which you're subtracting; also called regrouping

\[
\begin{array}{c}
3 \quad 10 \\
\downarrow \\
4 \quad 0 \\
\downarrow \\
- \quad 1 \quad 7 \\
\hline
\end{array}
\]

difference — the numbers obtained by subtracting the answer to a subtraction problem; the result of subtraction

\[
\begin{array}{c}
2 \quad 7 \\
\downarrow \\
- \quad 1 \quad 2 \\
\hline
1 \quad 5
\end{array}
\]

regrouping — borrowing; renaming

renaming — borrowing; regrouping

subtract — to take away or reduce by a set amount

\[\square \quad \square \quad \square \quad \square \quad \square \quad \square\]
Directions: Write S for Subtract, if the following sentences suggest subtraction; Write N for No, if they do not suggest subtraction.

1. Depositing money in a checking account.

2. Writing a check to take money out of a checking account.

3. A downpayment on a car to make the total amount owed less.

4. An increase in pay.

5. The amount of fuel used as a plane flies.

6. The amount of water in a lake when it is raining.

7. The amount of water in a lake when the sun is shining.

8. Getting docked for missing days of work.


10. Losing change through a hole in your pocket.
Directions: Use the example in the Student's Guide to subtract and check the following problems.

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<thead>
<tr>
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<td>-4724</td>
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<td>-3805</td>
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<tr>
<td>10.</td>
<td>2413</td>
<td>11.</td>
<td>7354 - 232 =</td>
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<td></td>
<td>-1858</td>
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<td></td>
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<tr>
<td>12.</td>
<td>5541 - 538 =</td>
<td>13.</td>
<td>3817 - 454 =</td>
</tr>
<tr>
<td>14.</td>
<td>9381 - 1470 =</td>
<td>15.</td>
<td>4607 - 3858 =</td>
</tr>
</tbody>
</table>
Directions: Subtract and check the following problems.

1. \[848 - 42 = \boxed{806}\]
2. \[435 - 38 = \boxed{407}\]
3. \[472 - 273 = \boxed{199}\]
4. \[9023 - 3655 = \boxed{5368}\]
5. \[6001 - 3675 = \boxed{2326}\]
6. \[923 - 677 = \boxed{246}\]
7. \[3000 - 9 = \boxed{2991}\]
8. \[674 - 7 = \boxed{667}\]
9. \[5395 - 59 = \boxed{5336}\]
10. \[2006 - 8 = \boxed{1998}\]
11. \[5010 - 4298 = \boxed{712}\]
12. \[7432 - 803 = \boxed{6629}\]
13. \[8652 - 93 = \boxed{8559}\]
14. \[8701 - 898 = \boxed{7803}\]
15. \[2923 - 1913 = \boxed{1010}\]
Directions: Subtract and check the following problems.

1. \[ 7355 - 224 = 7131 \]
2. \[ 8631 - 420 = 8211 \]
3. \[ 253 - 126 = 127 \]

4. \[ 628 - 29 = 619 \]
5. \[ 4231 - 2453 = 1778 \]
6. \[ 5154 - 84 = 5110 \]

7. \[ 4189 - 768 = 3421 \]
8. \[ 6009 - 5296 = 713 \]
9. \[ 4610 - 340 = 4270 \]

10. From 1518 take 341 \[ = 1177 \]
11. Take 75 from 322 \[ = 247 \]

12. Take 4518 from 5831 \[ = 1313 \]
13. From 7381 take 545 \[ = 6836 \]

14. From 4728 take 2581 \[ = 2147 \]
15. Take 858 from 7604 \[ = 6746 \]
**Activity Sheet**

**Directions:** Subtract and check the following problems.

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<tbody>
<tr>
<td>1.</td>
<td>798</td>
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<tr>
<td>2.</td>
<td>1281</td>
<td>-613</td>
<td></td>
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<tr>
<td>3.</td>
<td>6397</td>
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<td>5.</td>
<td>4470</td>
<td>-721</td>
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<td>7.</td>
<td>2357</td>
<td>-909</td>
<td></td>
<td>7.</td>
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<tr>
<td>8.</td>
<td>8190</td>
<td>-6514</td>
<td></td>
<td>8.</td>
</tr>
<tr>
<td>11.</td>
<td>3420</td>
<td>-1807</td>
<td></td>
<td>11.</td>
</tr>
<tr>
<td>12.</td>
<td>6386</td>
<td>-727</td>
<td></td>
<td>12.</td>
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<tr>
<td>15.</td>
<td>4045</td>
<td>-2609</td>
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<tr>
<td>16.</td>
<td>7155</td>
<td>-816</td>
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<td>16.</td>
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<td>17.</td>
<td>837</td>
<td>-451</td>
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<td>17.</td>
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<tr>
<td>18.</td>
<td>8760</td>
<td>-933</td>
<td></td>
<td>18.</td>
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<tr>
<td>19.</td>
<td>8372</td>
<td>-5833</td>
<td></td>
<td>19.</td>
</tr>
<tr>
<td>20.</td>
<td>4006</td>
<td>-3897</td>
<td></td>
<td>20.</td>
</tr>
</tbody>
</table>
Directions: Use the steps below for solving subtraction word problems.

Step 1: Read the problem.

Step 2: Circle key words and phrases.

- difference
- reduced by
- fewer
- left
- decrease
- how many more
- how many less
- minus

Step 3: Underline the objective statement or question (what is being asked).

Step 4: Determine the operation.

Step 5: Write a number sentence. (Draw pictures if needed.)

Step 6: Compute the answer.

Step 7: Reread, and ask: "Is the answer reasonable?"

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.
Word Problems

Directions: Follow the steps on page 18 or 33. Add or subtract to find the solutions to the problems below.

1. A truck driver drove 528 miles on the first trip and 746 on the next. How many miles did the truck driver drive all together?

2. Last month three jets were flown the following number of miles: 42,168; 5,214; and 83,652. What was the total number of miles flown?

3. There are 2,651 students enrolled at Madison High School; of these, 269 are girls. How many are boys?

4. At the end of last year the odometer reading on your car was 33,843. You drove your car 29,584 miles last year. What was the reading at the beginning of last year?

5. Last year 68,198 orders for yo-yos were shipped from the warehouse. So far this year 9,958 orders have been shipped. How many orders must be shipped this year to match the total for last year?

6. The odometer in Arnie’s car reads 52,611, the odometer in Ken’s car reads 38,999. How many more miles are on Arnie’s car than on Ken’s?

7. In two weeks Mr. Fish carried the following number of passengers on his bus: 4,216; 3,584; and 7,821. What was the total number of passengers carried in two weeks?
## Section 3

### What This Section is About...

In this section you will practice multiplying whole numbers. **Whole numbers** are natural numbers or integers such as 0, 1, 2, 3,... You will multiply a three-digit number by a two- or three-digit number.

### Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔ Do I have the necessary prerequisite skills?</td>
<td>✗ Take Quiz.</td>
</tr>
<tr>
<td>✔ What concepts will be presented?</td>
<td>✗ See examples on the following pages.</td>
</tr>
<tr>
<td>☑ 1. Multiplying with no regrouping</td>
<td></td>
</tr>
<tr>
<td>☑ 2. Multiplying with regrouping</td>
<td></td>
</tr>
<tr>
<td>☑ 3. Working real-world word problems</td>
<td></td>
</tr>
<tr>
<td>✔ How much do I already know?</td>
<td>✗ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✔ What vocabulary words are introduced?</td>
<td>✗ See Vocabulary.</td>
</tr>
<tr>
<td>✔ What practice is provided?</td>
<td>✗ Do Activity Sheets.</td>
</tr>
<tr>
<td>✔ What if I need extra help?</td>
<td>✗ Refer to examples in this section.</td>
</tr>
<tr>
<td>✔ Have I mastered these concepts?</td>
<td>✗ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>
UNIT 1: WHOLE NUMBERS

Multiplication

Concept: Multiplication With No Regrouping

How do you multiply whole numbers with no regrouping?

Example: Multiply: $321 \times 242 = $

Step 1: Rewrite the problem in vertical form.

$$
\begin{array}{c}
321 \\
\times 242 \\
\end{array}
$$

Step 2: Draw a grid to align partial products.

$$
\begin{array}{c}
321 \\
\times 242 \\
\end{array}
$$

Step 3: Find the bottom digit in the ones' place and multiply it times the top digit.

$$
\begin{array}{c}
321 \\
\times 242 \\
\end{array}
$$

Step 4: Place a zero under the number in the ones' place.

$$
\begin{array}{c}
321 \\
\times 242 \\
\end{array}
$$
Step 5: Multiply the bottom digit in the tens' place times each top digit.

\[
\begin{array}{c}
321 \\
\times 242 \\
\hline
642 \\
12840
\end{array}
\]

Step 6: Place zeros under the ones' and tens' places.

\[
\begin{array}{c}
321 \\
\times 242 \\
\hline
642 \\
12840 \\
00
\end{array}
\]

Step 7: Multiply the bottom digit in the hundreds' place times each top digit.

\[
\begin{array}{c}
321 \\
\times 242 \\
\hline
642 \\
12840 \\
64200 \\
\hline
64200
\end{array}
\]

Step 8: Add the partial products.

\[
\begin{array}{c}
321 \\
\times 242 \\
\hline
642 \\
12840 \\
64200 \\
\hline
77682
\end{array}
\]
UNIT 1: WHOLE NUMBERS

Multiplication

Concept: Multiplication With Regrouping

How do you multiply whole numbers with regrouping?

Example: Multiply: 123 x 234

Step 1: Write the problem in vertical form.

\[
\begin{array}{c}
123 \\
\times 234
\end{array}
\]

Step 2: Draw grid. (See prior concept.)

\[
\begin{array}{c}
123 \\
\times 234
\end{array}
\]

Step 3: Multiply by ones' place. (See prior concept.)

\[
\begin{array}{c}
123 \\
\times 234
\end{array}
\]

Step 4: When the partial product is a two-digit number, write the digit on the right in the ones' place and carry the number on the left to the tens' place.

\[
\begin{array}{c}
123 \\
\times 234
\end{array}
\]

Student's Guide
Step 5: Multiply the bottom digit in the ones' place by the top digit in the tens' place. Add the number carried to the partial product. Write the partial product in the tens' place. Cross out carried number.

\[
\begin{array}{c}
123 \\
\times 234 \\
\hline
\end{array}
\begin{array}{c}
2 \times 4 = 8 \\
8 + 1 = 9 \\
\hline
92
\end{array}
\]

Step 6: Continue as in previous example until product is obtained.
UNIT 1: WHOLE NUMBERS

Multiplication

Concept: Work Real-World Word Problems

What steps do you use to work real-world word problems?

Step 1: Read the problem.
John's average reading rate is 195 words per minute. How many words can he read in 30 minutes?

Step 2: Circle key words and phrases for multiplication.

- per
- average
- rate

John's average reading rate is 195 words per minute. How many words can he read in 30 minutes?

Step 3: Underline the objective statement or question (what is being asked).
John's average reading rate is 195 words per minute. How many words can John read in 30 minutes?

Step 4: Determine the operation.
 multiplication

Step 5: Write a number sentence. (Draw pictures if needed.)

195 \times 30 = 

Step 6: Compute the answer.

\[
\begin{array}{c}
195 \\
\times 30 \\
\hline
5850
\end{array}
\]
UNIT 1: WHOLE NUMBERS

Multiplication

Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

200 \times 30 = 6000

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer.

Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 5,850.
Directions: You will be given three minutes to answer correctly as many facts as you can. Do not begin until you are instructed to do so. Write the answer under the problem.

Quiz

6 x 9
9 x 9
4 x 9
7 x 9
8 x 4
5 x 8
8 x 9
3 x 3

2 x 5
3 x 9
5 x 9
3 x 4
3 x 8
4 x 8
7 x 9
2 x 9

6 x 8
8 x 3
2 x 4
9 x 8
8 x 7
5 x 7
3 x 8
8 x 8

6 x 7
8 x 7
5 x 6
4 x 7
6 x 6
9 x 7
6 x 9
2 x 8

9 x 5
5 x 5
7 x 3
2 x 3
6 x 6
7 x 7
4 x 6
2 x 6

7 x 9
9 x 3
6 x 7
7 x 8
4 x 5
8 x 7
3 x 5
6 x 5

7 x 4
5 x 4
2 x 2
8 x 2
9 x 7
3 x 2
9 x 6
2 x 6

0 x 8
6 x 9
8 x 0
5 x 3
9 x 8
6 x 4
4 x 4
9 x 0

9 x 6
9 x 2
6 x 0
4 x 3
9 x 5
5 x 2
8 x 5
6 x 2

0 x 6
4 x 2
7 x 5
6 x 7
6 x 3
x 7
8 x 7
9 x 4
Directions: Multiply.

1. \( \frac{457 \times 83}{\phantom{0000}} \)
2. \( \frac{833 \times 26}{\phantom{0000}} \)
3. \( \frac{726 \times 45}{\phantom{0000}} \)
4. \( \frac{635 \times 82}{\phantom{0000}} \)
5. \( \frac{837 \times 426}{\phantom{0000}} \)
6. \( \frac{903 \times 757}{\phantom{0000}} \)
7. \( \frac{744 \times 883}{\phantom{0000}} \)
8. \( \frac{900 \times 541}{\phantom{0000}} \)
Directions: Study the following words and definitions.

factors — the numbers being multiplied

\[
\begin{array}{c}
9 \\
\times 8 \\
\hline
72
\end{array}
\]

multiplication — repeated addition; short form of addition

\[
\begin{array}{c}
4 \\
+ 4 \\
\hline
12
\end{array}
\]

partial product — product obtained by multiplying a number times part of another number

\[
\begin{array}{c}
4 \\
36 \\
x 18 \\
\hline
288
\end{array}
\]

product — the result of multiplication

\[
\begin{array}{c}
4 \\
x 6 \\
\hline
24
\end{array}
\]
Directions: Label the parts of the following problems. Use F for Factor; use P for product; and use PP for partial product. Put the correct letters in the blanks.

1. \(2 \times 3 = 6\)
   (a) \hspace{0.5cm} (b) \hspace{0.5cm} (c)
a. 

b. 

c. 

2. \(4 \times 5 = 20\)
   (d) \hspace{0.5cm} (e) \hspace{0.5cm} (f)
d. 

e. 

f. 

3. \(547 \times 936 = 511,992\)
   (g) \hspace{0.5cm} (h) \hspace{0.5cm} (i)
g. 

h. 

i. 

4. \(931 \times 22 = 20,482\)
   (j) \hspace{0.5cm} (k) \hspace{0.5cm} (l) \hspace{0.5cm} (m) \hspace{0.5cm} (n)
j. 

k. 

l. 

m. 

n. 

Unit 1: Section 3
<table>
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<th>5</th>
<th>6</th>
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<th>9</th>
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</tbody>
</table>
Directions: Multiply.

1. \[
\begin{array}{c}
213 \\
\times 321
\end{array}
\]

2. \[
\begin{array}{c}
221 \\
\times 422
\end{array}
\]

3. \[
\begin{array}{c}
332 \\
\times 132
\end{array}
\]

4. \[
\begin{array}{c}
121 \\
\times 212
\end{array}
\]

5. \[
\begin{array}{c}
222 \\
\times 333
\end{array}
\]

6. \[
\begin{array}{c}
212 \\
\times 214
\end{array}
\]
Directions: Multiply.

1. \[343 \times 221\]

2. \[422 \times 21\]

3. \[202 \times 211\]

4. \[501 \times 22\]

5. \[611 \times 202 = \]

6. \[301 \times 33 = \]

7. \[401 \times 111 = \]

8. \[205 \times 44 = \]
Activity Sheet

Directions: Multiply.

1. \[343 \times 321\]
2. \[241 \times 624\]
3. \[293 \times 372\]
4. \[329 \times 221\]
5. \[253 \times 231\]
6. \[310 \times 408\]
7. \[305 \times 215\]
8. \[251 \times 434\]
9. \[102 \times 612\]
10. \[126 \times 612\]
### Directions: Multiply

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<tr>
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<tr>
<td></td>
<td>×25</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td>537</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>×35</td>
<td></td>
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<td>3.</td>
<td>982</td>
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<td>×15</td>
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<td>4.</td>
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<td>×50</td>
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<td>5.</td>
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<td>20.</td>
<td>800</td>
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<td></td>
<td>×50</td>
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</tr>
</tbody>
</table>
Activity Sheet

Directions: Multiply.

1. \( \begin{array}{c} 645 \\ \times 78 \end{array} \)
2. \( \begin{array}{c} 284 \\ \times 83 \end{array} \)
3. \( \begin{array}{c} 347 \\ \times 67 \end{array} \)
4. \( \begin{array}{c} 904 \\ \times 58 \end{array} \)

5. \( \begin{array}{c} 873 \\ \times 46 \end{array} \)
6. \( \begin{array}{c} 437 \\ \times 68 \end{array} \)
7. \( \begin{array}{c} 948 \\ \times 87 \end{array} \)
8. \( \begin{array}{c} 690 \\ \times 70 \end{array} \)

9. \( \begin{array}{c} 974 \\ \times 38 \end{array} \)
10. \( \begin{array}{c} 406 \\ \times 273 \end{array} \)
11. \( \begin{array}{c} 805 \\ \times 86 \end{array} \)
12. \( \begin{array}{c} 780 \\ \times 84 \end{array} \)

13. \( \begin{array}{c} 18 \\ \times 70 \end{array} \)
14. \( \begin{array}{c} 56 \\ \times 20 \end{array} \)
15. \( \begin{array}{c} 49 \\ \times 30 \end{array} \)
16. \( \begin{array}{c} 28 \\ \times 40 \end{array} \)

17. \( \begin{array}{c} 37 \\ \times 50 \end{array} \)
18. \( \begin{array}{c} 25 \\ \times 10 \end{array} \)
19. \( \begin{array}{c} 497 \\ \times 18 \end{array} \)
20. \( \begin{array}{c} 936 \\ \times 37 \end{array} \)
**Word Problems**

**Directions:** Use the eight steps below to solve the multiplication word problems.

Step 1. Read the problem.

Step 2. Circle key words and phrases.

- product
- times
- at
- per each
- total

Step 3. Underline the objective statement or question (what is being asked).

Step 4. Determine the operation.

Step 5. Write a number sentence. (Draw pictures if needed.)

Step 6. Compute the answer.

Step 7. Reread, and ask: "Is the answer reasonable?"

Step 8. If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. **Caution:** your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.
Directions: Use the steps on page 18 and 53 to solve the problems.

1. Carl earns $25 each Saturday by raking yards. How much money can he earn at this rate if he works for 52 Saturdays?

2. It costs $1,846 per day to run the linen factory. How much does it cost to run it for two full weeks?

3. The owners of a fruit stand sold 128 bushels of apples at $8 per bushel and 75 bushels of okra at $15 per bushel. How much money did they make?

4. A truck weighing 5,695 pounds carried a load of 12 cars, each weighing 3,185 pounds. What was the total weight of the cars and the truck?

5. Susan works 40 hours per week. She makes $6 per hour. How much will she make in 3 weeks?
Section 4

What This Section is About...

In this section you will practice dividing whole numbers. Whole numbers are natural numbers or integers such as 0, 1, 2, 3,... You will divide a four- or five-digit number by a two- or three-digit number.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✏ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✏ See examples on the following pages.</td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>✏ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✏ See Vocabulary.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>✏ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>✏ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✏ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>
Concept: Dividing Whole Numbers

How do you divide whole numbers?

Example: 46,298 ÷ 37

Step 1: Rewrite the problem.

37 ) 46,298

Step 2: Round the divisor to the nearest ten.

37 ) 46,298  40 ) 46,298

37 rounds to 40

Step 3: Estimate how many times the divisor (37) will go into the first two digits of the dividend (46). The estimate has to be between 0 and 9. (If the estimate is 0, start over and guess how many times the divisor will go into the first three digits of the dividend.)

37 ) 46,298  40 ) 46,298

40 will go into 46 one time

Step 4: Write the estimate (1) over the "6" of 46. Multiply: 37 X 1. Write the answer underneath the 46, then subtract. If the estimate is too large, you won't be able to subtract and should try a smaller number.

1
37 ) 46,298
   - 37
   9

After subtracting, make sure that the answer (9) is less than the divisor (37). If not, the estimate was too small and a larger number should be tried.
Step 5: Bring the next digit in the dividend down.

\[
\begin{array}{c}
1 \\
37 \phantom{0} \overline{46298} \\
-37 \\
\hline
92 \\
\end{array}
\]

Step 6: Repeat the process. Estimate how many times 37 will go into 92 (or 40 into 90). Multiply that estimate (2) times 37. Write the answer underneath the 92, then subtract.

\[
\begin{array}{c}
12 \\
37 \phantom{0} \overline{46298} \\
-37 \\
\hline
92 \\
-74 \\
\hline
18 \\
\end{array}
\]

Step 7: Continue, repeating the process, until all the digits in the dividend have been brought down.

\[
\begin{array}{c}
1251 \\
37 \phantom{0} \overline{46298} \\
-37 \\
\hline
92 \\
-74 \\
\hline
189 \\
-185 \\
\hline
48 \\
-37 \\
\hline
11 \\
\end{array}
\]
UNIT 1: WHOLE NUMBERS

Division

Step 8: The remainder may be written one of two ways.

\[
\begin{align*}
1251 & \quad \text{Remainder 11 or } \quad & \frac{1251}{37} \quad \text{or} \quad & \frac{11}{37}
\end{align*}
\]

To put the remainder in fractional form, write the number remaining after the last subtraction (11) over the divisor (37) or \( \frac{11}{37} \).
Step 1: Read the problem.

Mrs. Murphy earns an annual salary of $18,468. How much does she earn each month?

Step 2: Circle key words.

- annual
- month
- each

Mrs. Murphy earns an annual salary of $18,468. How much does Mrs. Murphy earn each month?

Step 3: Underline the question or what is being asked.

Mrs. Murphy earns an annual salary of $18,468. How much does Mrs. Murphy earn each month?

Step 4: Determine the operation.

This problem requires division.

Step 5: Write a number sentence. (Draw pictures if needed.)

18,468 ÷ 12

Step 6: Compute the answer.

\[
\begin{array}{c}
1539 \\
12 \overline{) 18,468} \\
12 \\
64 \\
60 \\
46 \\
36 \\
108 \\
108 \\
0
\end{array}
\]
Step 7: Reread and ask: "Is the answer reasonable?"

Round to whole numbers and estimate:

\[ 20,000 \div 10 = 2000 \]

Step 8: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

The answer is 1,539 each month.
Directions: Round the following numbers to the nearest ten. Write each rounded number on the line.

1. 83  =  ________
2. 65  =  ________
3. 23  =  ________
4. 59  =  ________
5. 78  =  ________
6. 32  =  ________
7. 76  =  ________
8. 85  =  ________
9. 93  =  ________
10. 35 =  ________

Directions: Subtract.

11.  789  12.  5434
     -191      -675
Quiz

Directions: Subtract.

1. \[78,567 - 40,529\]

2. \[4567 - 1418\]

3. \[51,678 - 10,297\]

4. \[4713 - 2192\]

Directions: Multiply.

5. \[43 \times 2\]

6. \[39 \times 4\]

7. \[43 \times 12\]

8. \[583 \times 27\]
Quiz

Directions: Divide.

1. \[ \frac{75}{25} \]
2. \[ \frac{7500}{25} \]
3. \[ \frac{2560}{19} \]
4. \[ \frac{4033}{30} \]
5. \[ \frac{73326}{66} \]
6. \[ \frac{21400}{50} \]
7. \[ \frac{96974}{18} \]
8. \[ \frac{32754}{14} \]
9. \[ \frac{1224}{27} \]
10. \[ \frac{27648}{24} \]
Direction: Study the vocabulary words below.

**Divide** — to separate into two or more parts

**Dividend** — the number to be divided

**Divisor** — the number by which you divide

**Quotient** — the result of division

**Remainder** — the number (amount) left when the division is not exact

**Symbols for division** — \( \div \) and \( ) \) and \( \frac{12}{4} \)
Vocabulary Activity

Directions: Label the parts of the following problems. Use D for Divisor, Q for Quotient, R for Remainder, DV for Dividend. Write the correct letters in the blanks.

1. \[ \begin{array}{ccc} 6 & + & 2 \\ (a) & (b) & = \ 3 \\ (c) \end{array} \]
   a. _____
   b. _____
   c. _____

2. \[ \begin{array}{ccc} 16 & + & 4 \\ (d) & (e) & = \ 4 \\ (f) \end{array} \]
   d. _____
   e. _____
   f. _____

3. \[ \begin{array}{ccc} 2 ) \ 8 \ 4 \\ (g) & (h) \end{array} \]
   g. _____
   h. _____

4. \[ \begin{array}{ccc} 251 & \div & 5 \\ (j) & (k) \end{array} \]
   j. _____
   k. _____

   \[ \begin{array}{ccc} 50 & 1 \\ (l) & (m) \end{array} \]
   l. _____
   m. _____

   \[ \begin{array}{ccc} 5 & \\ (n) \end{array} \]
   n. _____
Activity Sheet

Directions: Divide.

1. 31) 72
2. 20) 620

3. 32) 4046
4. 43) 43,876

5. 25) 54
6. 50) 540

7. 30) 5400
8. 70) 59,070

9. 24) 87
10. 23) 184
Directions: Divide.

1. \[21 \div 1491\]
2. \[38 \div 21,584\]

3. \[5 \div 94\]
4. \[24 \div 369\]

5. \[25 \div 6000\]
6. \[13 \div 91\]

7. \[10 \div 3757\]
8. \[50 \div 5772\]

9. \[82 \div 11,730\]
10. \[60 \div 10,420\]
Directions: Divide.

1. $43 \overline{26,856}$  
2. $71 \overline{42,849}$

3. $27 \overline{22,833}$  
4. $35 \overline{25,011}$

5. $84 \overline{58,520}$  
6. $68 \overline{56,084}$

7. $56 \overline{16,716}$  
8. $92 \overline{32,640}$

9. $17 \overline{15,329}$  
10. $51 \overline{19,202}$
Activity Sheet

Directions: Divide.

1. \[ \frac{45,120}{47} = \] 2. \[ \frac{12,420}{18} = \]

3. \[ \frac{16,016}{52} = \] 4. \[ \frac{86,700}{67} = \]

5. \[ 46 \overline{1000} \] 6. \[ 59 \overline{6075} \]

7. \[ 29 \overline{74704} \] 8. \[ 47 \overline{97932} \]

9. \[ 15 \overline{48165} \] 10. \[ 31 \overline{94843} \]
Directions: Divide.

1. \(37)154\)  
2. \(45)4158\)  
3. \(25)9201\)

4. \(54)548\)  
5. \(28)73\)  
6. \(36)4357\)

7. \(42)1890\)  
8. \(65)3844\)  
9. \(15)2182\)

10. \(32)4640\)  
11. \(42)2491\)  
12. \(90)7812\)
Directions: Use the steps below to solve the division word problems.

Step 1. Read the problem.

Step 2. Circle key words and phrases for division.

- quotient
- divided by
- cost per inch
- share
- how many... each
- average

Step 3. Underline the objective statement or question (what is being asked).

Step 4. Determine the operation.

Step 5. Write a number sentence. (Draw pictures if needed.)

Step 6. Compute the answer.

Step 7. Reread, and ask: "Is the answer reasonable?"

Step 8. If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.
Directions: Use multiplication or division to solve. Follow the steps on page 71.

1. Mr. Simpson had 38 pupils in his class. He gave each pupil six sheets of paper. How many sheets of paper did he use?

2. If four baseballs are put in each box, how many boxes are needed to package 273 baseballs? How many baseballs would be left?

3. There are 19 builders working for a construction company. Each worked 47 hours last week. What is the total number of hours they worked last week?

4. Pat's mother bought a video machine for $285.00. If she paid $45.00 down and arranged to pay off the balance in eight equal payments, what was the amount of each payment?

5. Miss March earns an annual salary of $14,853. What is her monthly salary? (Round to hundreds.)

6. How far can a car travel if it averages 24 miles per gallon and the tank holds 19 gallons?

7. There are 365 days in a year except leap year which has 366 days. How many days are there in three years, if there is no leap year included?
UNIT 2: FRACTIONS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
UNIT 2: FRACTIONS

Section 1

What This Section is About...

In this section you will practice addition of fractions. The operations of simplifying, finding common denominators, finding equivalent fractions, and the renaming as mixed numbers are included to enable you to add like and unlike fractions. Sums include both proper and improper fractions.

Suggested Plan

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<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✺ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✺ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Simplifying fractions</td>
<td>✺ Take Quiz as pretest.</td>
</tr>
<tr>
<td>2. Adding like fractions</td>
<td>✺ See Vocabulary.</td>
</tr>
<tr>
<td>3. Finding common denominators</td>
<td>✺ Do Activity Sheets.</td>
</tr>
<tr>
<td>4. Adding fractions with unlike denominators</td>
<td>✺ Refer to examples in this section.</td>
</tr>
<tr>
<td>5. Renaming improper fractions as mixed numbers</td>
<td>✺ Take Quiz as posttest.</td>
</tr>
<tr>
<td>6. Adding fractions with unlike denominators whose sum is an improper fraction</td>
<td></td>
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</tbody>
</table>

What vocabulary words are introduced? | ✺ See Vocabulary. |
| What practice is provided? | ✺ Do Activity Sheets. |
| What if I need extra help? | ✺ Refer to examples in this section. |
| Have I mastered these concepts? | ✺ Take Quiz as posttest. |
**Concept:** Simplifying Fractions

**Example:** Rename $\frac{6}{8}$ in simplest form.

**Step 1:** Determine all the factors of the numerator (6) by numbering from 1 to 6 and circling the numbers that are factors. A factor is a number that will divide into the number evenly with no remainder.

$6 \rightarrow 1 \ 2 \ 3 \ 4 \ 5 \ 6$

The circled numbers are factors of 6.

**Step 2:** Determine all the factors of the denominator (8) using the same method.

$8 \rightarrow 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8$

**Step 3:** Compare the two rows of numbers and find the largest factor that is circled in both rows.

$6 \rightarrow 1 \ 2 \ 3 \ 4 \ 5 \ 6$

$8 \rightarrow 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8$

Two (2) is the largest factor that is circled in both rows.

**Step 4:** Go back to the original fraction $\frac{6}{8}$.

Divide both the numerator and denominator by the greatest common factor (2).

**Solution:**

$$\frac{6}{8} + \frac{2}{2} = \frac{3}{4}$$
Concept: Adding Like Fractions

How do you add like fractions?

Example: Add and rename in simplest form. \( \frac{25}{10} + \frac{16}{10} \)

Step 1: Rewrite in vertical form.

\[
\begin{array}{c}
25 \\
10 \\
+ 16 \\
10 \\
\end{array}
\]

Step 2: Add the fractions by adding the numerators; write the new numerator over the denominator.

\[
\begin{array}{c}
25 \\
10 \\
+ 16 \\
10 \\
\hline
5 \\
10 \\
\end{array}
\]

Step 3: Add the whole numbers.

\[
\begin{array}{c}
25 \\
10 \\
+ 16 \\
10 \\
\hline
41 \\
10 \\
\end{array}
\]
UNIT 2: FRACTIONS

Addition

Step 4: Reduce the fraction, if necessary.

\[
\begin{align*}
2 \frac{5}{10} + 1 \frac{6}{10} &= 4 \frac{1}{10} \\
&= 4 \frac{1}{2}
\end{align*}
\]

Concept: Finding Common Denominators

What steps do you use to find a common denominator?

Example 1: Find a common denominator for \( \frac{2}{3} \) and \( \frac{5}{6} \).

Step 1: Check to see if the smaller denominator (3) is a factor of the larger denominator (6) by dividing 6 by 3. If it is, the larger denominator is the common denominator.

\( \frac{2}{3} \) and \( \frac{5}{6} \)

Yes, 6 is divisible by 3, so 6 is a common denominator.

Step 2: Multiply both the numerator and the denominator of \( \frac{2}{3} \) by 2.

\[
\begin{align*}
\frac{2 \times 2}{3 \times 2} &= \frac{4}{6} \\
Solution: \quad \frac{2}{3} &= \frac{3}{6} \\
\frac{5}{6} &= \frac{5}{6}
\end{align*}
\]
Example 2: Find a common denominator for $\frac{3}{5}$ and $\frac{5}{8}$.

Step 1: Check to see if the smaller denominator (5) is a factor of the larger denominator (8). No, 5 cannot be multiplied by any whole number to become 8, so 8 will not be a common denominator.

Step 2: Multiply the numerator and the denominator of $\frac{3}{5}$ by the denominator of $\frac{5}{8}$.

$$\frac{3 \times 8}{5 \times 8} = \frac{24}{40}$$

Step 3: Multiply the numerator and denominator of $\frac{5}{8}$ by the denominator of $\frac{3}{5}$.

$$\frac{5 \times 5}{8 \times 5} = \frac{25}{40}$$

Solution: $\frac{3}{5} = \frac{24}{40}$, $\frac{5}{8} = \frac{25}{40}$.

Note: It is not necessary for accurate computation to use the least common denominator; however, it makes reducing easier.
Concept: Adding Fractions with Unlike Denominators

What steps do you use to add fractions with unlike denominators?

Example: Add \( \frac{1}{4} + \frac{1}{2} \)

Step 1: Rewrite vertically.

\[
\frac{1}{4} + \frac{1}{2}
\]

Step 2: Find the least common denominator. The least common denominator of \( \frac{1}{2} \) and \( \frac{4}{4} \) is 4.

Step 3: Rename the equivalent fractions as needed with the least common denominator.

\[
\frac{1}{2} = \frac{2}{4}
\]

Step 4: Add the numerators and place the results over the common denominator. Simplify, if needed.

\[
\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{3}{4}
\]
Concept: Renaming Improper Fractions as Mixed Numbers

What steps do you use to rename an improper fraction as a mixed number?

Example: $\frac{11}{5}$ is the same as what mixed number?

Step 1: Write the improper fraction as a division problem by writing the denominator (5) as the divisor and the numerator (11) as the dividend.

$$\frac{11}{5} \rightarrow 5 \div 11$$

Step 2: Divide. Put the remainder over the divisor to form a fraction.

$$\begin{array}{c|cc}
2 & 1 \\
\hline
5 & 11 \\
& -10 \\
\hline
& 1
\end{array}$$

Step 3: Check to make sure the denominator of the improper fraction is the same as the denominator of the mixed number.

$$\frac{11}{5} = 2 \frac{1}{5}$$

Solution: $\frac{11}{5} = 2 \frac{1}{5}$
UNIT 2: FRACTIONS

Addition

Concept: Adding Fractions with Unlike Denominators Whose Sum is an Improper Fraction

What steps do you use to add fractions with unlike denominators whose sum is an improper fraction?

Example: Add and rename in simplest form.

\[
\begin{align*}
3 \frac{0}{5} + 1 \frac{5}{7}
\end{align*}
\]

Step 1: Change the fractions to equivalent fractions with common denominators.

\[
\begin{align*}
&3 \frac{4}{5} = 3 \frac{8}{10} \\
&+ 1 \frac{7}{10} = 1 \frac{7}{10}
\end{align*}
\]

Step 2: Add the fractions.

\[
\begin{align*}
&3 \frac{4}{5} = 3 \frac{8}{10} \\
&+ 1 \frac{7}{10} = 1 \frac{7}{10}
\end{align*}
\]

Step 3: Add the whole numbers.

\[
\begin{align*}
&3 \frac{4}{5} = 3 \frac{8}{10} \\
&+ 1 \frac{7}{10} = 1 \frac{7}{10}
\end{align*}
\]

Student's Guide

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Step 4: Write the improper fraction $\frac{15}{10}$ as a mixed number and reduce:

$$\frac{15}{10} = 1 \frac{5}{10} = 1 \frac{1}{2}$$

Step 5: Add the resulting mixed number ($1 \frac{1}{2}$) to the whole number (45):

$$\begin{align*}
45 \\
+ 1 \frac{1}{2} \\
\hline
46 \frac{1}{2}
\end{align*}$$

Solution: $46 \frac{1}{2}$
Directions: Write a fraction for the shaded area of each picture.

1. __________  

2. __________  

3. __________  

4. __________
Directions: Write a fraction for the shaded part of each picture.

5. 

6. 

7. 

8. 


Directions: Simplify the fractions.

1. $\frac{8}{3} = \quad \quad \quad 2. \quad \frac{47}{5} = \quad \quad \quad 3. \quad \frac{3}{9} = \quad \quad \quad

4. $\frac{4}{8} = \quad \quad \quad 5. \quad \frac{16}{2} = \quad \quad \quad 6. \quad \frac{6}{8} = \quad \quad \quad

Directions: Add and simplify.

1. $\frac{3}{7} + \frac{1}{7} = \quad \quad \quad 2. \quad \frac{5}{8} + \frac{1}{8} = \quad \quad \quad

3. $\frac{2}{3} + \frac{4}{6} = \quad \quad \quad 4. \quad \frac{4}{5} + \frac{1}{10} = \quad \quad \quad

5. $1\frac{1}{4} + 2\frac{2}{4} = \quad \quad \quad 6. \quad 6\frac{2}{3} + 5\frac{5}{6} = \quad \quad \quad
**Vocabulary**

**Directions:** Study the following words.

- **common factor** — one number that is a factor for two different given numbers is a common factor of those two numbers.

- **denominator** — (bottom number), indicates the number of even parts that the whole is divided into.
  
  *Example:* \( \frac{1}{2} \)

- **factor (verb)** — to find factors of a given number, to *break down* into factors.

- **factors (noun)** — numbers that are multiplied.

- **fraction** — a part of the whole when the whole is divided into even portions (parts).
  
  *Examples:* \( \frac{1}{2} ; \frac{3}{4} \)

- **greatest common factor (GCF)** — greatest number that is a factor for two or more numbers.

- **improper fraction** — the numerator (top number) is larger or the same as the denominator (bottom number); a fraction whose value is greater than or equal to one.
  
  *Example:* \( \frac{8}{4} \)

- **least common denominator (LCD)** — the least common multiple of two given denominators; used when adding or subtracting fractions.

- **lowest term** — numerator (top number) is smaller than the denominator (bottom number) and there is not a number that will divide into both the top and the bottom.
  
  *Example:* \( \frac{4}{8} = \frac{1}{2} \) — lowest terms.
Directions: Study the following words.

like fractions — two or more fractions which have common denominators

mixed number — a combination of a whole number and a fraction

Example: \[ \frac{1}{4} \]

multiple(s) — the product of a given number by another

Example: 35 is a multiple of 7; the multiples of 6 are 0, 6, 12, 18, 24, and so on.

numerator — (top number), represents the number of even parts out of the denominator that are being counted

Example: \[ \frac{1}{2} \]

proper fraction — the numerator (top number) is smaller than the denominator (bottom number)

Example: \[ \frac{4}{8} \]

simplify — to write in lowest terms; reduce

Example: \[ \frac{3}{6} = \frac{1}{2} \]

unlike fractions — two or more fractions which do not have common denominators
Vocabulary

Directions: Use the vocabulary list to identify the following expressions. Write the correct word in each blank.

1. The 3 in $\frac{2}{3}$ is the _____
2. The 2 in $\frac{2}{3}$ is the _____

3. $\frac{7}{5}$ is a(n) _________
4. $\frac{3}{5}$ is a(n) _________

5. $\frac{3}{8}$ is in _________
6. $\frac{1}{3}$ is a(n) _________

7. When $5$ is renamed as $1\frac{2}{3}$ it is _________

8. Renaming $\frac{10}{4}$ as $2\frac{2}{4}$ as $2\frac{1}{2}$ is called _________
### Directions:
Rename in simplest form by finding the greatest common factor. Underline all the factors of each numeral. Then, circle the GCF for each problem.

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<tr>
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<td>( \frac{6}{8} )</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>2.</td>
<td>( \frac{4}{6} )</td>
<td>1</td>
<td>2</td>
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<tr>
<td>3.</td>
<td>( \frac{3}{9} )</td>
<td>1</td>
<td>2</td>
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<tr>
<td>4.</td>
<td>( \frac{9}{12} )</td>
<td>1</td>
<td>2</td>
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<td>5.</td>
<td>( \frac{5}{10} )</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Activity Sheet

Directions: Circle the fraction in each row that is in simplest form.

1. a) $\frac{2}{6}$ b) $\frac{3}{6}$ c) $\frac{2}{3}$ d) $\frac{6}{8}$

2. a) $\frac{4}{5}$ b) $\frac{3}{9}$ c) $\frac{4}{12}$ d) $\frac{2}{4}$

3. a) $\frac{8}{10}$ b) $\frac{5}{9}$ c) $\frac{10}{12}$ d) $\frac{6}{9}$

4. a) $\frac{2}{9}$ b) $\frac{12}{24}$ c) $\frac{4}{8}$ d) $\frac{12}{15}$

5. a) $\frac{3}{12}$ b) $\frac{5}{10}$ c) $\frac{2}{4}$ d) $\frac{9}{10}$
Directions: Reduce to lowest terms. (Simplify.)

1. \( \frac{8}{10} = \) __________
2. \( \frac{3}{9} = \) __________

3. \( \frac{4}{8} = \) __________
4. \( \frac{6}{9} = \) __________

5. \( \frac{2}{12} = \) __________
6. \( \frac{5}{15} = \) __________

7. \( \frac{6}{21} = \) __________
8. \( \frac{4}{6} = \) __________

9. \( \frac{7}{14} = \) __________
10. \( \frac{10}{18} = \) __________

11. \( \frac{8}{4} = \) __________
12. \( \frac{10}{10} = \) __________
Directions: Add the following fractions.

1. $\frac{3}{5} + \frac{1}{5} = \underline{\quad}$

2. $\frac{4}{8} + \frac{3}{8} = \underline{\quad}$

3. $\frac{1}{7} + \frac{3}{7} = \underline{\quad}$

4. $\frac{5}{11} + \frac{4}{11} = \underline{\quad}$

5. $\frac{2}{15} + \frac{2}{15} + \frac{7}{15} = \underline{\quad}$

6. $\frac{2}{12} + \frac{9}{12} = \underline{\quad}$

7. $\frac{4}{10} + \frac{5}{10} = \underline{\quad}$

8. $\frac{4}{13} + \frac{6}{13} = \underline{\quad}$

9. $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \underline{\quad}$

10. $\frac{3}{8} + \frac{4}{8} = \underline{\quad}$
Activity Sheet

Directions: Add. Rename in simplest form when necessary.

1. \(\frac{16}{5} + \frac{24}{5}\)
2. \(\frac{34}{8} + \frac{25}{8}\)
3. \(\frac{53}{3} + \frac{1}{3}\)
4. \(\frac{17}{10} + \frac{64}{10}\)
5. \(\frac{27}{6} + \frac{34}{6}\)
6. \(\frac{93}{8} + \frac{21}{8}\)
7. \(\frac{35}{5} + \frac{42}{5}\)
8. \(\frac{23}{4} + \frac{65}{4}\)
9. \(\frac{21}{8} + \frac{56}{8}\)
10. \(\frac{36}{5} + \frac{49}{5}\)
11. \(\frac{14}{4} + \frac{12}{4}\)
12. \(\frac{21}{5} + \frac{10}{5}\)

Unit 2: Section 1
**Activity Sheet**

**Directions:** Find the least common denominator and rename each pair of fractions.

1. \( \frac{1}{3} = \) _________
   \( \frac{1}{6} = \) _________
2. \( \frac{2}{5} = \) _________
   \( \frac{1}{10} = \) _________
3. \( \frac{3}{7} = \) _________
   \( \frac{5}{14} = \) _________
4. \( \frac{7}{9} = \) _________
   \( \frac{7}{18} = \) _________
5. \( \frac{5}{12} = \) _________
   \( \frac{3}{4} = \) _________
6. \( \frac{3}{16} = \) _________
   \( \frac{1}{4} = \) _________
7. \( \frac{2}{3} = \) _________
   \( \frac{5}{24} = \) _________
8. \( \frac{4}{5} = \) _________
   \( \frac{9}{20} = \) _________
9. \( \frac{7}{9} = \) _________
   \( \frac{4}{27} = \) _________
10. \( \frac{4}{15} = \) _________
    \( \frac{1}{3} = \) _________
### Directions:
Find the least common denominator and rename each pair of fractions.

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<table>
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<tbody>
<tr>
<td>1. $\frac{2}{5} = $</td>
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<td>2. $\frac{1}{9} = $</td>
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<td>3. $\frac{1}{4} = $</td>
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<td>4. $\frac{3}{8} = $</td>
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<td>5. $\frac{5}{6} = $</td>
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<td>7. $\frac{2}{15} = $</td>
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<td>8. $\frac{5}{12} = $</td>
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<td>9. $\frac{5}{13} = $</td>
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</table>
Activity Sheet

Directions: Add. Simplify if necessary.

1. \( \frac{2}{3} + \frac{1}{4} = \frac{11}{12} \)
2. \( \frac{1}{2} + \frac{1}{4} = \frac{3}{4} \)
3. \( \frac{1}{3} + \frac{3}{6} = \frac{1}{2} \)
4. \( \frac{1}{4} + \frac{5}{8} = \frac{7}{8} \)

5. \( \frac{3}{4} + \frac{1}{6} = \frac{11}{12} \)
6. \( \frac{3}{5} + \frac{1}{10} = \frac{7}{10} \)
7. \( \frac{1}{4} + \frac{2}{5} = \frac{13}{20} \)
8. \( \frac{3}{10} + \frac{2}{5} = \frac{1}{2} \)

9. \( \frac{1}{8} + \frac{2}{10} = \frac{3}{8} \)
10. \( \frac{3}{8} + \frac{3}{2} = \frac{5}{4} \)
11. \( \frac{1}{10} + \frac{2}{5} = \frac{7}{10} \)
12. \( \frac{3}{9} + \frac{1}{4} = \frac{7}{12} \)
Directions: Add.

1. $\frac{1}{2} + \frac{3}{5} = \underline{6.5}$

2. $\frac{3}{4} + \frac{1}{2} = \underline{2.5}$

3. $\frac{7}{10} + \frac{7}{8} = \underline{1.07}$

4. $\frac{1}{2} + \frac{2}{5} = \underline{1.2}$

5. $\frac{1}{3} + \frac{3}{4} = \underline{1.08}$

6. $\frac{5}{6} + \frac{1}{5} = \underline{1.833}$

7. $\frac{1}{2} + \frac{2}{3} = \underline{1.333}$

8. $\frac{3}{10} + \frac{1}{3} = \underline{0.766}$

9. $\frac{7}{8} + \frac{1}{3} = \underline{1.0}$

10. $\frac{2}{5} + \frac{3}{4} = \underline{1.35}$
Activity Sheet

Directions: Add and rename in simplest form.

1. \( \frac{16}{2} \)  
   + \( \frac{1}{4} \)  

2. \( \frac{23}{3} \)  
   + \( \frac{2}{5} \)  

3. \( \frac{51}{4} \)  
   + \( \frac{3}{8} \)  

4. \( \frac{16}{5} \)  
   + \( \frac{3}{10} \)  

5. \( \frac{31}{8} \)  
   + \( \frac{1}{6} \)  

6. \( \frac{54}{2} \)  
   + \( \frac{1}{5} \)  

7. \( \frac{34}{6} \)  
   + \( \frac{3}{4} \)  

8. \( \frac{61}{8} \)  
   + \( \frac{1}{10} \)  

9. \( \frac{38}{5} \)  
   + \( \frac{1}{4} \)  

10. \( \frac{87}{6} \)  
    + \( \frac{1}{3} \)  

11. \( \frac{42}{5} \)  
    + \( \frac{1}{3} \)  

12. \( \frac{21}{4} \)  
    + \( \frac{1}{3} \)
Activity Sheet

Directions: Rename the following improper fractions as mixed numbers.

1. \( \frac{7}{2} = \)
   
   think 2 \( ) 7 \)

2. \( \frac{8}{3} = \)
   
   think 3 \( ) 8 \)

3. \( \frac{11}{6} = \)

4. \( \frac{12}{5} = \)

5. \( \frac{15}{8} = \)

6. \( \frac{33}{10} = \)

7. \( \frac{71}{25} = \)

8. \( \frac{15}{4} = \)

9. \( \frac{171}{50} = \)

10. \( \frac{73}{20} = \)
Directions: Simplify. Hint: The answer will be a mixed numeral.

1. \( \frac{25}{4} = \)  
2. \( \frac{13}{12} = \)  
3. \( \frac{25}{7} = \)  
4. \( \frac{19}{9} = \)  
5. \( \frac{27}{5} = \)  
6. \( \frac{576}{31} = \)  
7. \( \frac{29}{5} = \)  
8. \( \frac{30}{14} = \)  
9. \( \frac{273}{20} = \)  
10. \( \frac{209}{15} = \)
Activity Sheet

Directions: Add. Simplify if necessary.

1. \( \frac{3}{7} + \frac{1}{7} = \)  

6. \( \frac{4}{7} + \frac{2}{7} = \)  

2. \( \frac{4}{9} + \frac{2}{9} = \) 

7. \( \frac{3}{8} + \frac{5}{8} = \) 

3. \( \frac{2}{3} + \frac{1}{3} = \) 

8. \( \frac{3}{4} + \frac{1}{4} = \) 

4. \( \frac{5}{12} + \frac{7}{12} = \) 

9. \( \frac{4}{15} + \frac{14}{15} = \) 

5. \( \frac{1}{5} + \frac{2}{5} = \) 

10. \( \frac{8}{21} + \frac{19}{21} = \)
Directions: Add. Reduce to lowest terms.

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<td>$\frac{5}{6}$</td>
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<td>$\frac{11}{16}$</td>
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Activity Sheet

Directions: Add, and rename in simplest form.

1. \[
\frac{16}{3} + \frac{46}{3} \]
2. \[
\frac{43}{5} + \frac{58}{5} \]
3. \[
\frac{28}{6} + \frac{65}{6} \]

4. \[
\frac{42}{8} + \frac{13}{8} \]
5. \[
\frac{21}{10} + \frac{18}{10} \]
6. \[
\frac{25}{2} + \frac{36}{2} \]

7. \[
\frac{94}{6} + \frac{36}{6} \]
8. \[
\frac{74}{8} + \frac{38}{8} \]
9. \[
\frac{64}{10} + \frac{53}{10} \]

10. \[
\frac{21}{5} + \frac{46}{5} \]
11. \[
\frac{50}{7} + \frac{25}{7} \]
12. \[
\frac{44}{4} + \frac{21}{4} \]
Directions: Add, and rename in simplest form.

1. \[ \frac{16}{3} + \frac{41}{7} + \frac{8}{8} = \frac{25}{8} \]

2. \[ \frac{57}{6} + \frac{86}{3} + \frac{32}{4} = \frac{85}{4} \]

3. \[ \frac{25}{1} + \frac{1}{2} + \frac{3}{2} = \frac{32}{2} \]

4. \[ \frac{63}{10} + \frac{41}{7} + \frac{13}{4} = \frac{127}{10} \]

5. \[ \frac{27}{3} + \frac{3}{4} + \frac{12}{10} = \frac{53}{10} \]

6. \[ \frac{53}{5} + \frac{3}{5} + \frac{7}{10} = \frac{53}{10} \]

7. \[ \frac{18}{6} + \frac{36}{8} + \frac{13}{5} = \frac{65}{8} \]

8. \[ \frac{81}{6} + \frac{13}{5} + \frac{48}{6} = \frac{65}{5} \]

9. \[ \frac{21}{2} + \frac{1}{2} + \frac{13}{1} = \frac{45}{2} \]

10. \[ \frac{15}{4} + \frac{75}{8} + \frac{19}{1} + \frac{13}{6} = \frac{101}{6} \]
Word Problems

Directions: Use the steps on page 18 to solve the word problems. Reduce when possible.

1. Pete worked 2 1/5 hours on Monday and 3 1/2 hours on Tuesday. How many hours did he work in all?

2. Rickey baked 1 1/4 dozen cookies yesterday and 2 1/2 dozen today. How many dozen cookies did he bake?

3. Ann worked 15 2/3 hours last week and 14 1/2 hours this week. How many hours did she work altogether?

4. Mrs. Jones bought 5/8 yards of gold cloth and 1 3/4 yards of blue cloth. How many yards of cloth did she buy in all?

5. One wall in our classroom is 9 3/8 feet long. Another wall is 9 5/16 long. How long are both walls together?
UNIT 2: FRACTIONS

Section 2

What This Section is About...

In this section you will practice subtracting fractions. Some of the skills you learned in the addition of fractions section will also be applied here.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
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</thead>
<tbody>
<tr>
<td>✔ Do I have the necessary prerequisite skills?</td>
<td>✔ Take Quiz.</td>
</tr>
<tr>
<td>✔ What concepts will be presented?</td>
<td>✔ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Subtracting proper fractions</td>
<td></td>
</tr>
<tr>
<td>2. Subtracting whole numbers from mixed numbers</td>
<td></td>
</tr>
<tr>
<td>3. Subtracting mixed numbers from whole numbers</td>
<td></td>
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<tr>
<td>4. Subtracting mixed numbers from mixed numbers</td>
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</tr>
<tr>
<td>✔ How much do I already know?</td>
<td>✔ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✔ What vocabulary words are introduced?</td>
<td>✔ See Vocabulary.</td>
</tr>
<tr>
<td>✔ What practice is provided?</td>
<td>✔ Do Activity Sheets.</td>
</tr>
<tr>
<td>✔ What if I need extra help?</td>
<td>✔ Refer to examples in this section.</td>
</tr>
<tr>
<td>✔ Have I mastered these concepts?</td>
<td>✔ Take Quiz as posttest.</td>
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Student's Guide
UNIT 2: FRACTIONS

Subtraction

Concept: Subtracting Proper Fractions

? How do you subtract proper fractions?

Example: Subtract like fractions: \( \frac{6}{10} - \frac{2}{10} \)

Step 1: Rename as fractions with like denominators, as necessary.

Step 2: Subtract numerators.

\[
\frac{6}{10} - \frac{2}{10} = \frac{4}{10}
\]

Step 3: Write the difference over the denominator.

\[
\frac{4}{10}
\]

Step 4: Simplify.

\[
\frac{4}{10} = \frac{2}{5}
\]

Example: Subtract unlike fractions: \( \frac{5}{10} - \frac{1}{5} \)

Step 1: Find the LCD.

The LCD of \( \frac{5}{10} \) and \( \frac{1}{5} \) is 10.

Step 2: Write as fractions with like denominators, as necessary.

\[
\frac{5}{10} = \frac{5}{10} \quad \frac{1}{5} = \frac{2}{10}
\]
UNIT 2: FRACTIONS

Subtraction

Step 3: Subtract numerators, and write the difference over the denominator.

$$\frac{5}{10} - \frac{2}{10} = \frac{3}{10}$$

Step 4: Simplify, when possible.

Concept:

Subtracting Whole Numbers From Mixed Numbers

Example: Subtract

$$7 \frac{1}{4} - 5$$

Step 1: Begin subtraction on the right. There is nothing to subtract from $$\frac{1}{4}$$.

$$\frac{1}{4}$$ take away nothing (or 0) is $$\frac{1}{4}$$

$$\frac{7}{4} \quad \frac{1}{4} \quad 5 \quad \frac{1}{4}$$

Step 2: Subtract the whole numbers.

Solution:

$$\frac{7}{4} - 5 - \frac{5}{4}$$

$$\frac{2}{4} - \frac{1}{4} - \frac{1}{4}$$
Concept: Subtracting Mixed Numbers From Whole Numbers

Example: Subtract and simplify.

\[
\begin{align*}
7 & \quad - \quad 5 \frac{1}{4} \\
\hline & \quad \quad \frac{3}{4}
\end{align*}
\]

Step 1: Begin subtraction on the right. Seven (7) is a whole number with no fraction. You cannot subtract \( \frac{1}{4} \) from nothing or (0).

Step 2: The whole number 7 can be written as a mixed number by taking 1 from the 7 and then writing the 1 as a fraction with a denominator of 4. (Use 4 to have a common denominator with the \( \frac{1}{4} \) in the subtrahend).

\[
1 = \frac{4}{4}, \text{ so } 7 = 6 \frac{4}{4}
\]

Step 3: Subtract the fractions.

\[
\begin{align*}
7 & \quad = \quad 6 \frac{4}{4} \\
- \quad 5 \frac{1}{4} & \quad = \quad 5 \frac{1}{4} \\
\hline & \quad \quad \frac{3}{4}
\end{align*}
\]

Step 4: Subtract the whole numbers, regrouping as necessary.

\[
\begin{align*}
7 & \quad = \quad 6 \frac{4}{4} \\
- \quad 5 \frac{1}{4} & \quad = \quad 5 \frac{1}{4} \\
\hline & \quad \quad 1 \frac{3}{4}
\end{align*}
\]

Step 5: Simplify, when possible.
Concept: Subtracting Mixed Numbers From Mixed Numbers

**Example 1:** Common denominator with no regrouping involving fractions

\[
\begin{align*}
3 \frac{8}{3} - 2 \frac{8}{3} &= 3 - 2 - \frac{8}{3} + \frac{8}{3} \\
&= 1 - \frac{8}{3} + \frac{8}{3} \\
&= 1
\end{align*}
\]

Step 1: Draw a dotted line to separate the fraction and the whole number.

\[
\begin{align*}
3 & \quad \frac{8}{3} \\
- & \quad \frac{8}{3} \\
\hline
& \quad 1
\end{align*}
\]

Step 2: Check to see if the fractions have common denominators.

\[
\begin{align*}
3 & \quad \frac{8}{3} \\
3 & \quad \frac{8}{3} \\
\hline
& \quad 1
\end{align*}
\]

(Yes)

Step 3: Subtract the fractions.

\[
\begin{align*}
3 & \quad \frac{2}{3} \\
- & \quad \frac{1}{3} \\
\hline
& \quad \frac{1}{3}
\end{align*}
\]
Step 4: Subtract the whole numbers.

\[
\begin{array}{c}
38 \quad 2 \\
- \quad 28 \quad 1 \\
\hline
10 \quad 1
\end{array}
\]

Step 5: Simplify, when necessary.

Solution: \(10 \frac{1}{3}\)

Example 2: Unlike denominator with no regrouping involving fractions

\[
\begin{array}{c}
26 \quad 2 \\
- \quad 15 \quad 1 \\
\hline
\end{array}
\]

Step 1: Check to see if the fractions have common denominators.

\[
\begin{array}{c}
26 \quad 2 \\
4 \\
- \quad 15 \quad 1 \\
8
\end{array}
\]

Step 2: Rename with common denominators.

\[
\begin{array}{c}
26 \quad 2 \times 2 = 4 \\
4 \times 2 = 8 \\
- \quad 15 \quad 1 \\
8
\end{array}
\]

\[= \frac{1}{8}\]
Step 3: Subtract as before. Simplify.

\[
\begin{array}{c}
26 \frac{4}{8} \\
8 \\
-15 \frac{1}{8} \\
3 \frac{3}{8}
\end{array}
\]

Example 3: Common denominator with regrouping

\[
\begin{array}{c}
32 \frac{1}{4} \\
-21 \frac{3}{4} \\
1 \frac{4}{4}
\end{array}
\]

Step 1: Subtract the fractions. Notice that you must regroup because 3 cannot be subtracted from 1.

Step 2: Borrow 1 from 32 and change it to a fraction equal to 1 with a denominator of 4.

\[
1 = \frac{4}{4}
\]

Step 3: Add the \[\frac{4}{4}\] to \[\frac{1}{4}\].

\[
\begin{array}{c}
32 \frac{1}{4} + \frac{4}{4} = 32 \frac{5}{4} \\
-21 \frac{3}{4} \\
-21 \frac{3}{4}
\end{array}
\]
Step 4: Subtract the fractions.

\[
\begin{align*}
\frac{1}{3} & \quad \frac{5}{4} \\
- \quad 2 \quad \frac{3}{4} \\
\hline \\
\frac{2}{4}
\end{align*}
\]

Step 5: Subtract the whole numbers.

\[
\begin{align*}
\frac{1}{3} & \quad \frac{5}{4} \\
- \quad 2 \quad \frac{3}{4} \\
\hline \\
10 \quad \frac{2}{4}
\end{align*}
\]

Step 6: Simplify the fraction.

\[
\frac{2 + 2}{4 + 2} = \frac{1}{2}
\]

Solution: \(10\frac{1}{2}\)

Example 4: Unlike denominators with regrouping

\[
\begin{align*}
\frac{32}{9} & \quad \frac{1}{3} \\
- \quad 21 \quad \frac{1}{3} \\
\hline
\end{align*}
\]

Step 1: Check to see if denominators are common (no). Find a common denominator, and rename appropriately.

\[
\begin{align*}
\frac{32}{9} & = \frac{32}{9} \\
- \quad 21 \quad \frac{1 \times 3}{3 \times 9} \\
\hline
\frac{1}{9}
\end{align*}
\]
UNIT 2: FRACTIONS

Subtraction

Step 2: Regroup the fractions using either option from Example 3 and subtract.

Option 1:

\[
\begin{align*}
3 \frac{2}{9} - 2 \frac{1}{9} & = 3 \frac{2}{9} + \frac{9}{9} = 3 \frac{10}{9} \\
- 2 \frac{1}{9} & = - 2 \frac{3}{9} \\
\hline
& = 1 \frac{7}{9}
\end{align*}
\]

Option 2:

\[
\begin{align*}
3 \frac{2}{9} - 2 \frac{1}{9} & = 3 \frac{2}{9} + \frac{10}{9} = 3 \frac{10}{9} \\
- 2 \frac{1}{9} & = - 2 \frac{3}{9} \\
\hline
& = 1 \frac{7}{9}
\end{align*}
\]

Step 3: Subtract the whole numbers.

\[
\begin{align*}
1 \frac{1}{9} & \quad 1 \frac{7}{9} \\
- 2 \frac{1}{9} & \quad - 2 \frac{3}{9} \\
\hline
& = 10 \frac{7}{9}
\end{align*}
\]

Step 4: Simplify, when necessary.

Solution: \(10 \frac{7}{9}\)
Quiz

Directions: Subtract. Show answers in reduced form.

1. \[ \frac{2}{3} - \frac{1}{3} = \frac{1}{3} \]

2. \[ \frac{8}{5} - \frac{2}{3} = \frac{14}{15} \]

3. \[ \frac{5}{8} - \frac{3}{8} = \frac{1}{8} \]

4. \[ \frac{3}{4} - \frac{7}{10} = \frac{1}{10} \]

5. \[ \frac{6}{5} - \frac{1}{8} = \frac{43}{40} \]

6. \[ \frac{6}{3} - \frac{4}{6} = \frac{1}{2} \]

7. \[ \frac{45}{3} - \frac{23}{3} = \frac{22}{3} \]

8. \[ \frac{14}{4} - \frac{5}{3} = \frac{31}{12} \]

9. \[ \frac{1}{4} - \frac{9}{10} = \frac{1}{20} \]

10. \[ \frac{6}{5} - \frac{5}{6} = \frac{11}{30} \]

11. \[ \frac{12}{3} - \frac{1}{3} = 4 \]

12. \[ \frac{5}{3} - \frac{2}{8} = \frac{31}{24} \]
Directions: Subtract.

1. \( \frac{3}{4} - \frac{1}{6} = \) ___  
2. \( \frac{9}{10} - \frac{1}{2} = \) ___  
3. \( \frac{5}{6} - \frac{2}{3} = \) ___  
4. \( \frac{1}{4} - \frac{1}{6} = \) ___  
5. \( \frac{5}{6} - \frac{1}{6} = \) ___  
6. \( \frac{5}{8} - \frac{1}{4} = \) ___  
7. \( \frac{7}{8} - \frac{5}{8} = \) ___  
8. \( \frac{7}{8} - \frac{1}{2} = \) ___  
9. \( \frac{7}{8} - \frac{4}{5} = \) ___  
10. \( \frac{7}{10} - \frac{2}{10} = \) ___
Directions: Subtract.

1. \(14 \frac{1}{2}\) \(- 3\) 
2. \(29 \frac{2}{3}\) \(- 15\) 
3. \(9 \frac{2}{5}\) \(- 3\) 

4. \(15 \frac{3}{4}\) \(- 8\) 
5. \(68 \frac{5}{6}\) \(- 14\) 
6. \(42 \frac{3}{5}\) \(- 18\) 

7. \(8 \frac{7}{8}\) \(- 3\) 
8. \(16 \frac{1}{5}\) \(- 8\) 
9. \(75 \frac{3}{10}\) \(- 15\) 

10. \(56 \frac{4}{5}\) \(- 29\) 
11. \(45 \frac{3}{4}\) \(- 15\) 
12. \(21 \frac{2}{3}\) \(- 14\)
Activity Sheet

Directions: Subtract.

1. \[ \begin{array}{c}
38 \\
- 4 1 \\
\hline
2
\end{array} \]

2. \[ \begin{array}{c}
42 \\
- 1 3 2 \\
\hline
3
\end{array} \]

3. \[ \begin{array}{c}
1 5 \\
- 2 3 \\
\hline
4
\end{array} \]

4. \[ \begin{array}{c}
1 3 \\
- 2 4 \\
\hline
5
\end{array} \]

5. \[ \begin{array}{c}
9 3 \\
- 1 \\
\hline
3
\end{array} \]

6. \[ \begin{array}{c}
2 8 \\
- 1 4 3 \\
\hline
5
\end{array} \]

7. \[ \begin{array}{c}
3 6 \\
- 1 3 1 \\
\hline
1 0
\end{array} \]

8. \[ \begin{array}{c}
9 8 \\
- 7 2 3 \\
\hline
8
\end{array} \]

9. \[ \begin{array}{c}
3 2 \\
- 1 0 4 \\
\hline
5
\end{array} \]

10. \[ \begin{array}{c}
8 6 \\
- 1 9 1 \\
\hline
6
\end{array} \]

11. \[ \begin{array}{c}
5 7 \\
- 4 \\
\hline
5
\end{array} \]

12. \[ \begin{array}{c}
2 5 \\
- 1 4 3 \\
\hline
4
\end{array} \]
Directions: Subtract.

1. \(14 \frac{1}{2}\) - 10
2. \(29 \frac{1}{5}\) - 13
3. \(39 - 12 \frac{1}{2}\)

4. 46 - 31 \(\frac{3}{8}\)
5. 21 \(\frac{4}{5}\) - 15
6. 92 \(\frac{9}{10}\) - 86

7. 78 - 15 \(\frac{2}{3}\)
8. 42 \(\frac{5}{8}\) - 28
9. 59 \(\frac{1}{3}\) - 20

10. 67 \(\frac{7}{10}\) - 12
11. 24 \(\frac{2}{4}\) - 14
12. 40 - 10 \(\frac{5}{6}\)

Unit 2: Section 2
Directions: Subtract. Express in simplest terms.

1. \[ \frac{42}{3} \quad \frac{57}{8} \quad \frac{69}{10} \]
   \[ \frac{-21}{3} \quad \frac{-26}{8} \quad \frac{-46}{10} \]

2. \[ \frac{31}{6} \quad \frac{73}{5} \quad \frac{64}{4} \]
   \[ \frac{-16}{6} \quad \frac{-26}{5} \quad \frac{-27}{4} \]

3. \[ \frac{51}{3} \quad \frac{83}{10} \quad \frac{34}{8} \]
   \[ \frac{-17}{3} \quad \frac{-28}{10} \quad \frac{-16}{8} \]

4. \[ \frac{90}{8} \quad \frac{79}{5} \quad \frac{21}{2} \]
   \[ \frac{-5}{8} \quad \frac{-43}{5} \quad \frac{-14}{2} \]
Activity Sheet

Directions: Subtract. Express in simplest terms.

1. \[\frac{42}{7} - \frac{21}{4}\]
2. \[\frac{63}{2} - \frac{49}{6}\]
3. \[\frac{35}{7} - \frac{16}{5}\]
4. \[\frac{65}{8} - \frac{5}{6}\]
5. \[\frac{89}{2} - \frac{36}{1}\]
6. \[\frac{57}{4} - \frac{57}{6}\]
7. \[\frac{86}{2} - \frac{59}{8}\]
8. \[\frac{94}{3} - \frac{41}{5}\]
9. \[\frac{65}{8} - \frac{39}{3}\]
10. \[\frac{48}{10} - \frac{1}{3}\]
11. \[\frac{43}{3} - \frac{35}{5}\]
12. \[\frac{55}{6} - \frac{23}{3}\]
Directions: Subtract. Express in simplest terms.

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<tr>
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<td>6.</td>
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<tr>
<td>7.</td>
<td>[ \frac{30}{5} ]</td>
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<td>[ \frac{73}{5} ]</td>
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<td>12.</td>
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<td>[ \frac{1}{2} ]</td>
<td>[ \frac{1}{6} ]</td>
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</table>
Directions: Subtract. Express in simplest terms.

1. \( \frac{45}{3} - \frac{14}{8} \)
2. \( \frac{58}{4} - \frac{16}{3} \)
3. \( \frac{97}{6} - \frac{43}{8} \)

4. \( \frac{57}{10} - \frac{22}{5} \)
5. \( \frac{64}{4} - \frac{27}{8} \)
6. \( \frac{70}{5} - \frac{25}{4} \)

7. \( \frac{31}{8} - \frac{14}{10} \)
8. \( \frac{24}{2} - \frac{23}{10} \)
9. \( \frac{67}{5} - \frac{42}{6} \)

10. \( \frac{53}{3} - \frac{52}{8} \)
11. \( \frac{86}{4} - \frac{42}{8} \)
12. \( \frac{95}{5} - \frac{45}{3} \)
Directions: Use the steps on page 18 or 33 to solve. Reduce, as necessary.

1. Find the total thickness of two pieces of wood that Jim has glued together if one is 5/8 in. thick and the other 13 3/4 in. thick.

2. Two months ago Karen weighed 123 1/4 lb. Now she weighs 116 3/4 lb. How many pounds did she lose?

3. During the week after school, Mary worked 3 3/4 hours on Monday, 2 1/2 hours on Wednesday, and 3 hours on Friday. How many hours did she work that week?

4. Coach Davis had three weight lifters make the following lifts on the bench press: 324 1/2 lb, 350 3/4 lb, and 299 1/4 lb. What was the total weight the three lifted?

5. What is the length of a machine part consisting of three joined pieces measuring 2 1/4 in., 1 3/8 in., and 1/2 in.?

6. If normal body temperature is 98 3/5 degrees, how many degrees above normal is a temperature of 101 degrees?

7. A full tray of seedlings has 6 small pots. A nursery ended the day with 14 full trays and 5/6 of another tray, after having begun the day with 36 2/3 trays. How many trays were sold?

8. The Taylor High School Wildcats gained 315 3/5 yd in their first game and 327 3/4 yd in the second. What was the difference in the yardage gained?
UNIT 2: FRACTIONS

Section 3

What This Section is About...

In this section you will practice multiplying fractions using various combinations of fractions and mixed numbers. You will use skills practiced earlier, such as simplifying.

Suggested Plan

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<th>Activities</th>
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<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✼ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✼ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Renaming a mixed number as an improper fraction</td>
<td></td>
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<tr>
<td>2. Multiplying two fractions</td>
<td></td>
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<tr>
<td>3. Multiplying two fractions, using cross cancelling</td>
<td></td>
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<tr>
<td>4. Multiplying fractions, mixed numbers, and whole numbers</td>
<td></td>
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<tr>
<td>✓ How much do I already know?</td>
<td>✼ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✼ See Vocabulary.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>✼ See Activity Sheets.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>✼ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✼ Take Quiz as posttest.</td>
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Student’s Guide
UNIT 2: FRACTIONS

Multiplication

Concept: Renaming a Mixed Number as an Improper Fraction

How do you rename a mixed number as an improper fraction?

Example: $6 \frac{1}{2}$ means the same as ____.

Step 1: $6$ is the whole number, $2$ is the denominator, and $1$ is the numerator.

Step 2: Multiply the whole number times the denominator.

$6 \times 2 = 12$

Step 3: Add the product from Step 2 to the numerator.

$12 + 1 = 13$

Step 4: Put the sum from Step 3 over the original denominator.

Solution: $6 \frac{1}{2} = \frac{13}{2}$

Concept: Multiplying Two Fractions

How do you multiply two fractions?

Example: Multiply $\frac{2}{3} \times \frac{3}{8}$

Step 1: Multiply numerators.

$\frac{2}{3} \times \frac{3}{8} = \frac{6}{24}$

Note: The fraction $\frac{6}{24}$ can be simplified further to $\frac{1}{4}$.
UNIT 2: FRACTIONS

Step 2: Multiply denominators.

\[ \frac{2}{3} \times \frac{3}{8} = \frac{6}{24} \]

Step 3: Simplify.

\[ \frac{6}{24} = \frac{1}{4} \]

Concept: Multiplying Two Fractions, Using Cross Canceling

How do you multiply two fractions, using cross canceling?

Example 1: \[ \frac{8}{9} \times \frac{3}{4} \]

Step 1: Look at the numerator of the first fraction and the denominator of the second fraction. Determine if they have a common factor other than 1.

\[ \frac{8}{9} \times \frac{3}{4} \]

Four (4) is the common factor.

Step 2: Divide the numerator of the first fraction by 4 \((8 \div 4 = 2)\). Cross out the 8 and write a 2 above it. Divide the denominator of the second fraction by the same number. \((4 \div 4 = 1)\). Cross out the 4 and write a 1 below it.

\[ \frac{2}{9} \times \frac{3}{1} \]
UNIT 2: FRACTIONS

Multiplication

Step 3: Now do the same for the denominator of the first fraction and the numerator of the second fraction. Determine if they have a common factor.

\[
\frac{8}{9} \times \frac{3}{4}
\]

Three (3) is the common factor. Divide the denominator of the first fraction by 9 (9 ÷ 3 = 3). Cross out the 9 and write a 3 below it. Divide the numerator of the second fraction by 3 (3 ÷ 3 = 1). Cross out the 3 and write a 1 above it.

\[
\frac{2}{3} \times \frac{1}{1}
\]

Step 4: Multiply the new numerators (2 x 1 = 2) and the new denominators (3 x 1 = 3). Simplify, when possible.

\[
\frac{2}{3} \times \frac{2}{1} = \frac{2}{3}
\]

Example 2: \[\frac{4}{9} \times \frac{6}{7} = \]

Step 1: Look at the numerator of the first fraction and the denominator of the second fraction. Determine if they have a common factor.

\[
\frac{4}{9} \times \frac{6}{7}
\]
UNIT 2: FRACTIONS

Step 1: In this case, 4 and 7 do not have a common factor other than 1. There is nothing to cancel.

Step 2: Look at the denominator of the first fraction and the numerator of the second fraction. Determine if they have a common factor.

\[
\frac{4}{9} \times \frac{6}{7}
\]

Three (3) is a common denominator.

Step 3: Continue as in Example 1. Simplify, as necessary.

\[
Solution: \quad \frac{4}{9} \times \frac{6}{7} = \frac{8}{21}
\]

Concept: Multiplying Fractions, Mixed Numbers, and Whole Numbers

How do you multiply fractions, mixed numbers, and whole numbers?

Example 1: Multiply: \(\frac{2}{3} \times 8\)

Step 1: Rename the whole number as a fraction by using the whole number as the numerator and the value 1 as the denominator.

\[
\frac{2}{3} \times \frac{8}{1} = \frac{16}{3}
\]

Step 2: Check to see if you can cross-cancel.

Step 3: Multiply the fractions as before.

\[
\frac{2}{3} \times \frac{8}{1} = \frac{16}{3} = 5\frac{1}{3}
\]
UNIT 2: FRACTIONS

Multiplication

Example 2: \( \frac{4}{2} \times \frac{5}{3} \)

Step 1: Rename the mixed numbers to improper fractions.

\( \frac{4}{2} \times \frac{5}{3} = \frac{9}{2} \times \frac{11}{2} \)

Step 2: Cross-cancel, if possible.

\( \frac{9}{2} \times \frac{11}{2} = \)

Step 3: Multiply the fractions. Simplify, if possible.

\( \frac{9}{2} \times \frac{11}{2} = \frac{99}{4} = 29 \frac{3}{4} \)

Example 3: Multiply and rename in simplest form.

\[ \frac{4}{3} \times \frac{2}{6} \]

Step 1: If the problem is written vertically,

\[ \frac{4}{3} \times \frac{2}{6} \]

rewrite it horizontally.

\[ \frac{4}{3} \times 6 = \]
UNIT 2: FRACTIONS

Multiplication

Step 2: Multiply as before.

\[
\frac{14}{7} \times \frac{2}{1} = \frac{28}{1} = 28
\]

Step 3: Rewrite the answer in simplest form.

\[
\frac{14}{7} \times \frac{2}{1} = \frac{28}{1} = 28
\]

Solution:

\[
\frac{4}{3} \times \frac{2}{6} = \frac{14}{1} \times \frac{2}{1} = 28 = 28
\]
Quiz

Directions: Multiply, show answers in simplified form.

1. \( \frac{3}{7} \times \frac{2}{5} = \) 
2. \( \frac{3}{4} \times \frac{7}{8} = \) 
3. \( \frac{4}{5} \times \frac{4}{5} = \) 
4. \( \frac{2}{3} \times \frac{7}{8} = \) 
5. \( \frac{7}{9} \times \frac{5}{10} = \)

6. \( 4 \times \frac{2}{3} = \)
7. \( 3 \times \frac{5}{6} = \)
8. \( \frac{2}{4} \times 8 = \)
9. \( \frac{2}{4} \times 1 \frac{1}{5} = \)
10. \( 1 \frac{1}{8} \times 3 \frac{1}{3} = \)

Unit 2: Section 3
Directions: Study the words and definitions below.

**cross cancellation** — a method used before multiplying to make computing easier. Cancel numerator to denominator.

Example: \( \frac{7}{8} \times \frac{5}{7} \)  
the 7's can be canceled

\[
\frac{1}{8} \times \frac{5}{1} = \frac{1}{8} \times \frac{5}{1}
\]

Example: \( \frac{3}{4} \times \frac{8}{9} \)  
cancel with 3 and 9 and with 4 and 8

\[
\frac{3}{4} \times \frac{8}{9} = \frac{1}{1} \times \frac{2}{3}
\]

**property of one** — any number multiplied by 1 (one) is equal to itself.

Example: \( 3 \times 1 = 3 \)

\[
\frac{2}{5} \times 1 = \frac{2}{5}
\]

This property is useful when finding equivalent fractions.
Directions: Rename the following mixed numbers as improper fractions.

Example: \( \frac{4}{5} + \frac{1}{5} \) means the same as _________

\[
\begin{align*}
4 \times 5 &= 20 \\
20 + 1 &= 21 \\
\frac{4}{5} + \frac{1}{5} &= \frac{21}{5}
\end{align*}
\]

1. \( \frac{3}{5} + \frac{2}{5} = \) ________
2. \( \frac{12}{2} + \frac{1}{2} = \) ________
3. \( \frac{5}{10} + \frac{3}{10} = \) ________

4. \( \frac{25}{8} + \frac{7}{8} = \) ________
5. \( \frac{8}{3} + \frac{2}{3} = \) ________
6. \( \frac{15}{4} + \frac{3}{4} = \) ________

7. \( \frac{6}{10} + \frac{7}{10} = \) ________
8. \( \frac{42}{3} + \frac{1}{3} = \) ________
9. \( \frac{16}{5} + \frac{4}{5} = \) ________

10. \( \frac{4}{8} + \frac{3}{8} = \) ________
11. \( \frac{10}{8} + \frac{3}{8} = \) ________
12. \( \frac{14}{5} + \frac{2}{5} = \) ________
Activity Sheet

Directions: Rename as mixed numerals or whole numbers.

1. \( \frac{9}{4} = \)  
2. \( \frac{7}{4} = \)

3. \( \frac{9}{5} = \)  
4. \( \frac{19}{2} = \)

5. \( \frac{14}{3} = \)  
6. \( \frac{22}{7} = \)

7. \( \frac{16}{2} = \)  
8. \( \frac{43}{7} = \)

9. \( \frac{27}{5} = \)  
10. \( \frac{54}{6} = \)
Activity Sheet

Directions: Rename each mixed numeral as a fraction.

1. $3 \frac{3}{8} = \underline{\hspace{2cm}}$
2. $4 \frac{3}{4} = \underline{\hspace{2cm}}$
3. $2 \frac{5}{9} = \underline{\hspace{2cm}}$

4. $5 \frac{3}{7} = \underline{\hspace{2cm}}$
5. $2 \frac{1}{5} = \underline{\hspace{2cm}}$
6. $8 \frac{5}{6} = \underline{\hspace{2cm}}$

7. $7 \frac{3}{10} = \underline{\hspace{2cm}}$
8. $6 \frac{1}{2} = \underline{\hspace{2cm}}$
9. $6 \frac{4}{5} = \underline{\hspace{2cm}}$

10. $9 \frac{2}{3} = \underline{\hspace{2cm}}$
11. $1 \frac{3}{5} = \underline{\hspace{2cm}}$
12. $5 \frac{3}{9} = \underline{\hspace{2cm}}$
Activity Sheet

Directions: Multiply. Show answers in reduced form.

1. \( \frac{1}{4} \times \frac{3}{5} = \) 

2. \( \frac{1}{6} \times \frac{5}{8} = \) 

3. \( \frac{5}{9} \times \frac{1}{2} = \) 

4. \( \frac{4}{5} \times \frac{2}{3} = \) 

5. \( \frac{7}{8} \times \frac{1}{6} = \) 

6. \( \frac{5}{8} \times \frac{3}{4} = \) 

7. \( \frac{4}{7} \times \frac{3}{8} = \) 

8. \( \frac{4}{9} \times \frac{7}{8} = \) 

9. \( \frac{7}{8} \times \frac{2}{3} = \) 

10. \( \frac{5}{8} \times \frac{6}{9} = \)
Directions: Multiply. Write answer in simplest terms.

1. \( \frac{3}{7} \times \frac{2}{5} = \)  
2. \( \frac{7}{8} \times \frac{1}{7} = \)  
3. \( \frac{5}{11} \times \frac{11}{21} = \)  
4. \( \frac{4}{5} \times \frac{3}{4} = \)  
5. \( \frac{3}{4} \times \frac{6}{7} = \)  
6. \( \frac{2}{3} \times \frac{1}{3} = \)  
7. \( \frac{2}{3} \times \frac{1}{2} = \)  
8. \( \frac{5}{6} \times \frac{2}{4} = \)  
9. \( \frac{5}{9} \times \frac{3}{4} = \)  
10. \( \frac{7}{8} \times \frac{1}{6} = \)
Directions: Multiply. Write answer in simplest terms.

1. $\frac{2}{3} \times \frac{1}{5} = \underline{\quad} \\
2. $\frac{5}{7} \times \frac{1}{4} = \underline{\quad} \\
3. $\frac{1}{2} \times \frac{1}{2} = \underline{\quad} \\
4. $\frac{9}{10} \times \frac{2}{5} = \underline{\quad} \\
5. $\frac{3}{4} \times \frac{7}{8} = \underline{\quad} \\
6. \frac{3}{2} \times \frac{2}{3} = \underline{\quad} \\
7. \frac{5}{6} \times \frac{2}{7} = \underline{\quad} \\
8. $\frac{1}{2} \times \frac{1}{2} = \underline{\quad} \\
9. \frac{3}{5} \times \frac{1}{3} = \underline{\quad} \\
10. \frac{6}{8} \times \frac{1}{4} = \underline{\quad}
Directions: Multiply. Cross cancel and simplify, if possible.

1. \( \frac{2}{3} \times \frac{9}{6} = \)  
2. \( \frac{4}{5} \times \frac{15}{2} = \)  

3. \( \frac{5}{6} \times \frac{12}{5} = \)  
4. \( \frac{8}{9} \times \frac{15}{6} = \)  

5. \( \frac{8}{3} \times \frac{25}{3} = \)  
6. \( \frac{7}{8} \times \frac{12}{3} = \)  

7. \( \frac{12}{5} \times \frac{15}{1} = \)  
8. \( \frac{4}{7} \times \frac{18}{5} = \)  

9. \( \frac{26}{7} \times \frac{3}{4} = \)  
10. \( \frac{4}{7} \times \frac{21}{8} = \)
Activity Sheet

Directions: Multiply. Simplify, as needed.

1. $\frac{3}{8} \times \frac{2}{5} = \_\_\_\_\_\_\_\_\_\_

2. $\frac{1}{6} \times \frac{3}{5} = \_\_\_\_\_\_\_\_\_

3. $\frac{2}{5} \times \frac{7}{8} = \_\_\_\_\_\_\_\_\_

4. $\frac{5}{7} \times \frac{3}{8} = \_\_\_\_\_\_\_\_\_

5. $\frac{6}{7} \times \frac{5}{6} = \_\_\_\_\_\_\_\_\_

6. $\frac{8}{9} \times \frac{3}{5} = \_\_\_\_\_\_\_\_\_

7. $\frac{2}{3} \times \frac{5}{8} = \_\_\_\_\_\_\_\_\_

8. $\frac{1}{4} \times \frac{8}{9} = \_\_\_\_\_\_\_\_\_

9. $\frac{8}{3} \times \frac{3}{8} = \_\_\_\_\_\_\_\_\_

10. $\frac{5}{6} \times \frac{1}{10} = \_\_\_\_\_\_\_\_\_

Unit 2: Section 3
### Activity Sheet

#### Directions: Write as a mixed number.

1. \( \frac{109}{5} \)  
2. \( \frac{52}{8} \)

#### Directions: Write as a fraction.

3. \( 6 \frac{1}{6} \)  
4. \( 39 \frac{5}{8} \)

#### Directions: Show answers in lowest terms.

5. \( \frac{2}{3} \times 8 = \)  
6. \( \frac{5}{8} \times 3 \frac{1}{5} = \)

7. \( 15 \frac{5}{6} \times 1 \frac{1}{2} = \)  
8. \( 1 \frac{4}{5} \times 2 \frac{7}{9} = \)

9. \( 21 \frac{1}{3} \times \frac{3}{8} = \)  
10. \( \frac{5}{8} \times 1 \frac{7}{9} = \)
Activity Sheet

Directions: Multiply. Show answers in simplest terms.

1. $3 \frac{1}{5} \times 15 = \underline{\hspace{2cm}}$
2. $6 \times 2 \frac{1}{9} = \underline{\hspace{2cm}}$

3. $2 \times 6 \frac{1}{8} = \underline{\hspace{2cm}}$
4. $5 \frac{1}{2} \times 8 = \underline{\hspace{2cm}}$

5. $3 \frac{3}{4} \times 8 = \underline{\hspace{2cm}}$
6. $4 \frac{3}{4} \times 2 = \underline{\hspace{2cm}}$

7. $7 \frac{1}{5} \times 10 = \underline{\hspace{2cm}}$
8. $8 \times 2 \frac{1}{4} = \underline{\hspace{2cm}}$

9. $5 \times 4 \frac{1}{10} = \underline{\hspace{2cm}}$
10. $9 \times 3 \frac{1}{8} = \underline{\hspace{2cm}}$
Directions: Multiply. Show answers in reduced form.

1. \( \frac{8}{9} \times \frac{1}{4} = \)  
2. \( 3 \frac{1}{3} \times 2 = \)  
3. \( \frac{5}{8} \times 40 = \)  
4. \( 2 \frac{1}{2} \times \frac{1}{10} = \)  
5. \( \frac{7}{10} \times \frac{5}{6} = \)  
6. \( \frac{3}{4} \times \frac{5}{8} = \)  
7. \( 3 \frac{1}{2} \times 2 \frac{1}{3} = \)  
8. \( 5 \times \frac{7}{8} = \)  
9. \( 2 \frac{1}{3} \times 12 = \)  
10. \( 5 \frac{1}{3} \times 8 \frac{1}{2} = \)
Activity Sheet

Directions: Multiply. Show answers in reduced form.

1. $3 \frac{2}{3} \times 15 \frac{1}{3} = \underline{\phantom{0000}}$
2. $14 \times 5 \frac{7}{9} = \underline{\phantom{0000}}$
3. $\frac{7}{8} \times 15 = \underline{\phantom{0000}}$
4. $5 \frac{6}{8} \times 9 \frac{1}{2} = \underline{\phantom{0000}}$
5. $\frac{9}{10} \times 2 \frac{1}{2} = \underline{\phantom{0000}}$
6. $13 \times 3 \frac{4}{5} = \underline{\phantom{0000}}$
7. $22 \frac{1}{2} \times \frac{5}{6} = \underline{\phantom{0000}}$
8. $2 \frac{3}{4} \times \frac{3}{5} = \underline{\phantom{0000}}$
9. $7 \frac{3}{5} \times 4 \frac{2}{3} = \underline{\phantom{0000}}$
10. $\frac{3}{8} \times 4 \frac{1}{6} = \underline{\phantom{0000}}$
Activity Sheet

Directions: Multiply. Rename in simplest form.

1. \[ \frac{3 \frac{2}{5}}{4} \]

2. \[ \frac{12}{3 \frac{1}{4}} \]

3. \[ \frac{7 \frac{2}{3}}{4} \]

4. \[ \frac{5 \frac{2}{7}}{6} \]

5. \[ \frac{8 \frac{1}{3}}{4} \]

6. \[ \frac{5 \frac{1}{2}}{2} \]
Directions: Multiply. Simplify answers.

1. \( \frac{2}{3} \times 8\frac{2}{5} = \)

2. \( 7\frac{1}{2} \times \frac{1}{3} = \)

3. \( \frac{1}{6} \times 32 = \)

4. \( \frac{9}{10} \times 1\frac{1}{9} = \)

5. \( 5\frac{1}{4} \times 2\frac{2}{7} = \)

6. \( 7\frac{5}{8} \times 3\frac{1}{5} = \)

7. \( 9\frac{1}{3} \times 1\frac{3}{7} = \)

8. \( 2 \times \frac{5}{6} = \)

9. \( 24 \times \frac{1}{8} = \)

10. \( \frac{3}{8} \times 9\frac{1}{2} = \)
Activity Sheet

Directions: Multiply. Simplify answers.

1. \(2 \frac{7}{8} \times 32 = \)
2. \(2 \frac{2}{3} \times 5 \frac{1}{3} = \)
3. \(9 \frac{8}{9} \times 5 \frac{2}{3} = \)
4. \(6 \frac{7}{8} \times 3 \frac{2}{3} = \)
5. \(5 \frac{7}{9} \times 2 \frac{1}{2} = \)
6. \(9 \times \frac{1}{2} = \)
7. \(12 \frac{1}{8} \times 9 \frac{2}{9} = \)
8. \(\frac{8}{9} \times 7 \frac{5}{6} = \)
9. \(\frac{2}{3} \times 6 \frac{7}{8} = \)
10. \(2 \frac{2}{5} \times 7 \frac{5}{6} = \)
Word Problems

Directions: Use the steps on page 53 to solve the problems. Reduce, if possible.

1. Mrs. Jones had $\frac{3}{8}$ of a pie. She gave Jack $\frac{2}{3}$ of what she had. What part of the whole pie did Jack get?

   

2. A piece of shelving is $\frac{27}{36}$ yards long. Curtis used $\frac{1}{3}$ of it. How much of a yard did he use?

   

3. Diane sold $\frac{3}{4}$ dozen doughnuts to one customer. How many doughnuts did the customer buy?

   

4. A $\frac{3}{4}$ majority is $\frac{3}{4}$ of the total number of votes. A club at school must have a $\frac{3}{4}$ majority vote to pass a new bylaw. There are 32 members. How many votes are needed to pass a new bylaw?

   

5. You want to increase a recipe from 2 servings to 6 servings. The recipe calls for $1 \frac{3}{4}$ cups of sugar. How many cups will be needed to increase the servings to 6?
UNIT 2: FRACTIONS

Division

Section 4

What This Section is About...

In this section you will practice dividing fractions. Skills learned earlier, such as multiplication, cross-cancellation, and reducing will be helpful in dividing fractions.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
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</thead>
<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✢ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✢ See examples on the following pages.</td>
</tr>
<tr>
<td>✓ 1. Dividing two fractions</td>
<td>✢ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ 2. Dividing a fraction and a whole number</td>
<td>✢ See Vocabulary.</td>
</tr>
<tr>
<td>✓ 3. Dividing two mixed numbers</td>
<td>✢ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>✢ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✢ Take Quiz as posttest.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td></td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
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<tr>
<td>✓ Have I mastered these concepts?</td>
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Student's Guide

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UNIT 2: FRACTIONS

Division

Concept: Dividing Two Fractions

How do you divide two fractions?

Example: Divide and simplify.

\[
\frac{2}{3} + \frac{4}{9} =
\]

Step 1: Identify the divisor by reading the problem.

\[
\frac{2}{3} + \frac{4}{9} \text{ is } \frac{2}{3} \text{ divided by } \frac{4}{9}
\]

so \( \frac{4}{9} \) is the divisor

Step 2: Invert the divisor, and change the division sign to a multiplication sign.

\[
\frac{2}{3} + \frac{4}{9} = \frac{2}{3} \times \frac{9}{4} =
\]

Step 3: Multiply, and simplify, when necessary. (Use cross-cancellation, if possible.)

\[
\frac{18}{12} = \frac{3}{2} = 1 \frac{1}{2}
\]
Concept: Dividing a Fraction and a Whole Number

Example: Divide and simplify.

\[ \frac{3 + \frac{5}{6}}{1} = \frac{3}{1} + \frac{5}{6} \]

Step 1: Write the whole number as a fraction by using the number one (1) as the denominator.

\[ \frac{3 + \frac{5}{6}}{1} = \frac{3}{1} + \frac{5}{6} \]

Step 2: Invert the divisor (after reading the problem) and change the division sign to a multiplication sign.

\[ \frac{3}{1} + \frac{5}{6} \text{ is } \frac{3}{1} \text{ divided by } \frac{5}{6} \]

\[ \frac{3}{1} + \frac{5}{6} \text{ is } \frac{3}{1} \times \frac{6}{5} \]

Step 3: Multiply and simplify, if possible.

\[ \frac{3}{1} \times \frac{6}{5} = \frac{18}{5} = 3 \frac{3}{5} \]
Concept: Dividing Two Mixed Numbers

How do you divide two mixed numbers?

Example: Divide. Show answer in simplest form.

\[
\frac{2}{4} + \frac{3}{2} =
\]

Step 1: Rename mixed numbers as improper fractions.

\[
\frac{2}{4} + \frac{3}{2} = \frac{9}{4} + \frac{7}{2}
\]

Step 2: Divide, as before. Invert the divisor; change the division sign to multiplication and multiply.

\[
\frac{9}{4} \times \frac{7}{2} = \frac{9}{14}
\]

Step 3: Simplify, if possible.

\[
\frac{9}{14} \text{ is in simplest form.}
\]
Quiz

Directions: Divide. Show answers in reduced form.

1. \( \frac{1}{3} + \frac{3}{4} = \) 
2. \( \frac{7}{8} + 2 = \) 
3. \( 2 \frac{5}{6} + \frac{3}{5} = \) 
4. \( 8 + \frac{1}{2} = \) 
5. \( 4 + 5 \frac{1}{3} = \)

6. \( \frac{5}{6} + \frac{7}{8} = \)
7. \( 11 \frac{1}{3} + 2 \frac{5}{6} = \)
8. \( 4 \frac{2}{3} + 2 = \)
9. \( 3 \frac{3}{10} + 2 \frac{1}{8} = \)
10. \( 1 \frac{1}{6} + 9 \frac{1}{3} = \)
Vocabulary

Directions: Study words and definitions.

Invert — to make the numerator the denominator, and the denominator the numerator; to turn upside down

(Example: to turn $\frac{3}{4}$ into $\frac{4}{3}$.)

reciprocal — two numbers whose product is equal to one. Any number when multiplied by its reciprocal will equal one

Examples:

The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$; $\frac{2}{3} \times \frac{3}{2} = 1$

The reciprocal of $\frac{5}{5}$ is $\frac{1}{5}$; $\frac{5}{5} \times \frac{1}{5} = 1$

The reciprocal of $\frac{1}{7}$ is $\frac{7}{1}$; $\frac{1}{7} \times 7 = 1$
Activity Sheet

Directions: Write the reciprocals for each of the following numbers.

1. $\frac{2}{3} = ___$
2. $\frac{1}{2} = ___$
3. $\frac{3}{4} = ___$

4. $\frac{7}{8} = ___$
5. $\frac{1}{2} = ___$
6. $\frac{3}{2} = ___$

7. $8 = ___$
8. $\frac{1}{9} = ___$
9. $\frac{7}{16} = ___$

10. $15 = ___$
11. $\frac{10}{100} = ___$
12. $\frac{2 \frac{3}{2}}{2} = ___$
Directions: Divide and reduce.

1. \( \frac{1}{2} + \frac{5}{6} = \) 
2. \( \frac{8}{9} + \frac{1}{3} = \) 
3. \( \frac{7}{8} + \frac{1}{6} = \) 
4. \( \frac{9}{10} + \frac{3}{5} = \) 
5. \( \frac{5}{9} + \frac{2}{3} = \) 
6. \( \frac{5}{6} + \frac{1}{4} = \) 
7. \( \frac{5}{6} + \frac{3}{4} = \) 
8. \( \frac{3}{4} + \frac{7}{10} = \) 
9. \( \frac{5}{6} + \frac{5}{7} = \) 
10. \( \frac{5}{9} + \frac{4}{5} = \)
Directions: Divide. Reduce answers to lowest terms.

1. \( \frac{3}{5} + \frac{1}{2} = \) 
6. \( \frac{3}{4} + \frac{1}{4} = \) 

2. \( \frac{7}{6} + \frac{2}{3} = \) 
7. \( \frac{4}{9} + \frac{3}{8} = \) 

3. \( \frac{2}{5} + \frac{1}{6} = \) 
8. \( \frac{5}{9} + \frac{20}{3} = \) 

4. \( \frac{3}{4} + \frac{3}{4} = \) 
9. \( \frac{7}{8} + \frac{7}{8} = \) 

5. \( \frac{5}{8} + \frac{3}{4} = \) 
10. \( \frac{2}{3} + \frac{1}{3} = \)
Directions: Divide and simplify.

1. $2 + \frac{3}{4} = \underline{\phantom{0000}}$

2. $\frac{1}{2} + 2 = \underline{\phantom{0000}}$

3. $3 + \frac{4}{5} = \underline{\phantom{0000}}$

4. $7 + \frac{8}{9} = \underline{\phantom{0000}}$

5. $\frac{8}{9} + 7 = \underline{\phantom{0000}}$
Activity Sheet

Directions: Divide and simplify.

1. $6 + 4\frac{1}{2} = \underline{\phantom{0000}}$  
2. $9 + 2\frac{1}{4} = \underline{\phantom{0000}}$

3. $18 + 2\frac{1}{4} = \underline{\phantom{0000}}$  
4. $2\frac{7}{8} + 3 = \underline{\phantom{0000}}$

5. $3\frac{1}{3} + 5 = \underline{\phantom{0000}}$  
6. $2\frac{1}{2} + 2 = \underline{\phantom{0000}}$

7. $5 + 2\frac{1}{2} = \underline{\phantom{0000}}$  
8. $4\frac{3}{8} + 2 = \underline{\phantom{0000}}$

9. $\frac{5}{6} + 3 = \underline{\phantom{0000}}$  
10. $8\frac{2}{5} + 7 = \underline{\phantom{0000}}$
Activity Sheet

Directions: Divide. Show answers in reduced form.

1. \( \frac{4 \frac{1}{2}}{2} + \frac{3}{5} = \)  
2. \( 14 \frac{3}{8} + 2 \frac{7}{8} = \)

3. \( \frac{2}{3} + \frac{9}{16} = \)  
4. \( 6 \frac{13}{16} + 6 \frac{13}{16} = \)

5. \( 3 \frac{3}{8} + 3 \frac{1}{5} = \)  
6. \( 2 \frac{1}{8} + \frac{9}{10} = \)

7. \( 3 \frac{3}{4} + 4 \frac{2}{5} = \)  
8. \( 1 \frac{7}{8} + 1 \frac{1}{3} = \)

9. \( 6 \frac{2}{3} + 1 \frac{3}{5} = \)  
10. \( 11 \frac{1}{4} + 2 \frac{1}{2} = \)
Directions: Divide. Reduce answers to lowest terms.

1. \( \frac{1}{3} + \frac{1}{4} = \)  

2. \( \frac{2}{5} + \frac{9}{10} = \)  

3. \( \frac{1}{2} + \frac{3}{5} = \)  

4. \( \frac{4}{5} + \frac{7}{10} = \)  

5. \( \frac{2}{3} + \frac{3}{5} = \)  

6. \( \frac{2}{5} + \frac{3}{10} = \)  

7. \( 7 + \frac{1}{8} = \)  

8. \( 10 + \frac{5}{8} = \)  

9. \( \frac{9}{10} + 6 = \)  

10. \( 8 + \frac{22}{5} = \)
Directions: Divide the following problems, and show answers in reduced form.

1. \( \frac{4}{5} + \frac{4}{5} = \)  
2. \( \frac{5}{8} + \frac{5}{8} = \)  

3. \( 6 + \frac{1}{2} + \frac{2}{3} = \)  
4. \( \frac{11}{8} + \frac{3}{4} = \)  

5. \( \frac{13}{5} + \frac{2}{3} = \)  
6. \( \frac{23}{5} + \frac{5}{8} = \)  

7. \( \frac{8}{3} + \frac{1}{5} + \frac{5}{6} = \)  
8. \( \frac{21}{2} + \frac{3}{3} + \frac{3}{4} = \)  

9. \( \frac{4}{4} + \frac{2}{4} + \frac{4}{8} = \)  
10. \( \frac{11}{6} + \frac{11}{4} = \)
**Word Problems**

**Directions:** Use the steps on page 71 to solve. Reduce, if possible.

1. Mr. Rogers earns $5.00 per hour. If he gets time and one-half for overtime, what is his hourly rate for overtime work?

2. If a skirt requires 3 1/3 yards of material, how many skirts can be made from a bolt of 30 yards of material?

3. Each class lasts 5/6 of an hour. How many hours are there in seven class periods?

4. Riding her bicycle, Maria averages 9 1/2 miles per hour. At that speed, how far could she go in 2 2/3 hours?

5. How much would a pound of peas cost if 2 1/2 lb of peas cost 72¢ (round to nearest whole number)?

6. Three-fourths of a gallon of milk is poured into twelve glasses. How much milk is in each glass, if they all have the same amount?

7. Miss Smith worked at the Family Fitness Center 41 3/4 hours over a five day period. What was her average number of hours worked per day?

8. If an airplane flies 252 miles in 3/4 hours, what is the average speed in miles per hour?

9. Find the cost of 2 1/4 pounds of bananas at 32¢ per pound?

10. A house worth $52,800 is assessed at 2/3 of its value. What is the assessed value?
UNIT 3: DECIMALS

Section 1: Addition
Section 2: Subtraction
Section 3: Multiplication
Section 4: Division
Section 5: Rounding
UNIT 3: DECIMALS

Addition

Section 1

What This Section is About...

In this section you will practice adding four- or five-digit decimal numbers, each having no more than three decimal numbers.

Suggested Plan

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<td>✒ See examples on the following pages.</td>
</tr>
<tr>
<td>• Adding decimal numbers</td>
<td>✒ Take Quiz as pretest.</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
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</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td></td>
</tr>
</tbody>
</table>

Student's Guide

1738
Concept: Adding Decimal Numbers

How do you add decimal numbers?

Step 1: Write in vertical form aligning decimal points. (Note: decimal point added to 3569.)

15.95
3569.
+ .3

Step 2: Put zeros in blank spaces to right of decimal points.

15.95
3569.00
+ .30

Step 3: Add each column and place the decimal point in the sum directly under the decimals in the problem.

15.95
3569.00
+ .30
3585.25

Student's Guide
Quiz

Directions: Add.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>.3</td>
<td></td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.2</td>
<td></td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>.4</td>
<td></td>
<td>.26</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.7</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.12</td>
<td></td>
</tr>
</tbody>
</table>

| 5. | .9 |   | 3.60 |   |
|   | .10 |   | 4.90 |   |
| + | 3 |   | 5.80 |   |
|   |   |   | 3.452 |   |

| 9. | 1.5 |   | 48.50 |   |
| 2.1 |   | 23.95 |   |
| + | 4.1 | + | 49.99 |   |
|   |   |   | 661.38 | + |
|   |   |   | 9.10 |   |

| 13. | 42.87 |   | 19.47 |   |
| .05 |   | 8.46 |   |
| + | 5.02 |   | 592.31 | + |
|   |   |   | 6.11 |   |
| 15. | $1.43 + $5.09 + $.89 + $.05 =   |

| 16. | .976 + .287 =   |

| 17. | .08 + 80 =   |

| 18. | $1.50 + .05 =   |

| 19. | $2.75 + $3.35 + $93.75 =   |

| 20. | 8.41 + 241.09 =   |

Unit 3: Section 1

175

440
Directions: Study the vocabulary words below.

decimal — a decimal fraction, meaning a fraction whose denominator is a ten or a power of ten, expressed by placing a decimal point to the left of the numerator.

(Example: $0.2 = \frac{2}{10}$)

decimal point — a period placed before a fraction expressed in decimal figures and read as "and"

(Example: 2.03; 0.25)
mixed decimal — a decimal numeral with a value greater than one, that is, having a whole number part as well as a decimal part.

(Example: 37.15)

Directions: Box all mixed decimals. Circle all decimal numbers.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4,569</td>
<td>4.569</td>
<td>.4569</td>
<td>0.45</td>
</tr>
<tr>
<td>2</td>
<td>.354</td>
<td>3,548</td>
<td>068</td>
<td>.068</td>
</tr>
<tr>
<td>3</td>
<td>39,487</td>
<td>.394</td>
<td>3.9487</td>
<td>.395</td>
</tr>
<tr>
<td>4</td>
<td>94.268</td>
<td>94,268</td>
<td>.94268</td>
<td>9.4268</td>
</tr>
</tbody>
</table>
Activity Sheet

Directions: Add.

1. .6  
   + .2  
   \[ .8 \]

2. .04  
   + .05  
   \[ .09 \]

3. .2  
   \[ .3 \]

4. .86  
   + .26  
   \[ 1.12 \]

5. .98  
   + .89  
   \[ 1.87 \]

6. .08 + 1.5 = \[ 1.58 \]

7. .62 + .573 = \[ 1.193 \]

8. .8 + .5 = \[ 1.3 \]

9. .05 + .10 = \[ .15 \]

10. 5.01 + 2.999 = \[ 7.009 \]

11. 20.65 + 27.14 = \[ 47.79 \]

12. .6 + 4. = \[ 4.6 \]

13. 8.3407 + 2.1156 = \[ 10.4563 \]

14. .7 + .83 + .53 = \[ 2.06 \]

15. 1.6 + 8.62 + .30 = \[ 10.52 \]

16. .036 + .1 = \[ .136 \]

17. .15 + .1785 = \[ .3285 \]

18. 1.4 + 26 = \[ 27.4 \]

19. 335.48 + .94 = \[ 336.42 \]

20. .9 + 5.0 + .019 = \[ 6.919 \]
Directions: Add.

1. .09
   .08
   .07
   .05
   +.06

2. .31
   .71
   .17
   .18
   +.29

3. .9
   +2.1

4. 7.053
   .96
   +1.8

5. .52 + .38 + .53 =

6. $.23 + $.75 =

7. $100 + $.05 + $.98 =

8. .07 + 8 + 19.3 =

9. .1692 + .1894 + 3 =

10. .08 + 9 + 100 =
Activity Sheet

Directions: Add.

1. 4.2 + 3.7 =
2. 2.4 + 5.9 =
3. 13.8 + 9.1 =
4. 5.847 + 4.396 =
5. 81 + .57 =
6. .062 + .814 =
7. 1.098 + 8.635 + 2.174 =
8. .32 + 1.68 + 21.74 =
9. 1.039 + 3.684 + .1 =
10. 17.5 + 2.46 + 8.3 =
11. 29.387 + 13.04 + 2.1 =
12. .942 + .7 + .48 =
13. 85 + .002 =
14. 5.37 + 60.01 + .23 =
15. 8.277 + 9.811 + 93.2 =
16. 65.93 + 712.01 =
17. $.05 + $.95 =
18. $21.05 + $216.76 + $.09 =
19. $500.02 + $36.88 + $.05 =
20. $999.01 + $.99 =
Activity Sheet

Directions: Add. Write each answer in the blank provided.

1. 6.3 + 7.4 = 
2. 68.2 + 4.91 = 

3. .63 + .57 = 
4. .64 + 2.5 = 

5. .62 + 4.308 + 5.5 = 
6. 4.723 + .023 + 6.4 = 

7. 14 + 7 + .28 = 
8. 5 + .023 + 12.63 = 

9. 6.14 + 20.1 = 
10. 31 + .662 + 12.55 = 

11. 7.43 + 6.078 = 
12. 14.67 + .99 + 1.20 = 

13. 16.89 + .001 = 
14. 49.2 + .9062 = 

15. 1.8 + 2.63 + .79 = 
16. 8.725 + 3.25 + .99 = 

17. .684 + .703 + .9 + 19 = 
18. 1.039 + 63.885 + .15 = 

19. $175.86 + $42.65 = 
20. $140.50 + $15.28 = 

Unit 3: Section 1
Word Problems

Directions: Follow the steps on page 18 to solve the problems. Show your work. Write each answer on the line.

1. John Jones owns a small clothing store. At the end of the day, he had charge slips of $86.50, $43.20, $19.95, $12.09, and $17.59. What was the total amount of charges for the day?

2. Mr. Adams works for a gas station. During one hour, he pumped 15.7 gallons, 7.5 gallons, 10.2 gallons, and 12 gallons of gas. How much did he pump that hour?

3. Rhonda wanted to add baseboard to three sides of her bedroom. The sides measured 2.64 meters, 3.025 meters, and 3.2 meters. How much baseboard does she need?

4. George is a jogger. Yesterday he jogged 38.643 minutes. Today he jogged 93.2 minutes. How many minutes did he jog in the two days?
UNIT 3: DECIMALS

Subtraction

Section 2

What This Section is About...

In this section you will practice subtracting decimal numbers with or without regrouping, of five-digit mixed decimal numbers, having no more than three decimal places.

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</tr>
<tr>
<td>• Subtracting decimal numbers</td>
<td></td>
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</tbody>
</table>
UNIT 3: DECIMALS

Subtraction

Concepts: Subtracting Decimal Numbers

How do you subtract decimal numbers?

Step 1: Rewrite problem in vertical form.

\[ \begin{array}{c}
2964.000 \\
- \ 3.985 \\
\hline
2960.015 \\
\end{array} \]

Step 2: Put zeros in blank spaces, so all numerals have same number of digits to right of decimal.

\[ \begin{array}{c}
2964.000 \\
- \ 3.985 \\
\hline
2960.015 \\
\end{array} \]

Step 3: Subtract each column. Place decimal point in the difference directly below decimal point in problem. Borrow to left, if necessary.

\[ \begin{array}{c}
31 \ 10 \\
296.480 \\
- \ 3.985 \\
\hline
2960.015 \\
\end{array} \]
Quiz

Directions: Subtract. Show your work.

1. .8
   - .2

2. .38
   - .24

3. 67
   - .47

4. .05
   - .02

5. 4.6
   - 3.1

6. .6593
   - .4978

7. 83.452
   - 49.596

8. 5
   - 1.43

9. $176.27
   - 93.48

10. 3.56
    - 0.8

11. 0.9
    - 0.735

12. $16
    - 1.50

13. 0.15
    - 0.08

14. 0.7
    - 0.625

15. 4.2
    - 0.83

16. 9
    - 0.05

17. $16
    - $1.50

18. 0.3
    - 0.08

19. 0.375
    - 0.2

20. $5
    - $0.05

Unit 3: Section 2
Directions: Subtract.

1. .9 - .5
2. .7 - .2
3. .58 - .29
4. .44 - .09

5. .36 - .16
6. .835 - .214
7. 7.64 - 3.53
8. 18.5 - 6.2

9. 5.724 - 3.856
10. .749 - .729
11. 8 - 7.3
12. .07 - .0628

13. 6 - 4.605
14. 4.9 - .807

15. $193.45 - $108.91 =
16. $85.75 - $47.13 =

17. $10 - $0.09 =
18. $250 - $133.62 =

19. $2.84 - $1.75 =
20. $0.50 - $0.27 =
Activity Sheet

Directions: Subtract.

1. $8 - .5 = \underline{}$
2. $12 - 8.2003 = \underline{}$

3. $2 - 1.7 = \underline{}$
4. $6.03 - 1.054 = \underline{}$

5. $23.4 - .004 = \underline{}$
6. $10 - .12 = \underline{}$

7. $18.01 - .002 = \underline{}$
8. $27 - .0067 = \underline{}$

9. $.685 - .5903 = \underline{}$
10. $.5842 - .034 = \underline{}$
Directions: Subtract.

1. $4.4 - 2.531 = \underline{1.869}$  
2. $82.45 - 3.783 = \underline{78.667}$

3. $92.405 - 3.008 = \underline{89.397}$  
4. $6.3 - 3.4 = \underline{2.9}$

5. $26.3 - 2.45 = \underline{23.85}$  
6. $16.92 - .631 = \underline{16.289}$

7. $35 - .09 = \underline{34.91}$  
8. $153 - 2.19 = \underline{150.81}$

9. $515.2 - .9 = \underline{514.3}$  
10. $2.611 - 1.091 = \underline{1.519}$

11. $3.33 - 3.31 = \underline{0.02}$  
12. $94.45 - 43.4 = \underline{51.05}$

13. $.007 - .001 = \underline{.006}$  
14. $.191 - .019 = \underline{.172}$
Activity Sheet

Directions: Subtract.

1. 19.005 - 14.5 = __________ 2. 94.78 - 15 = __________

3. 92.15 - 84.7 = __________ 4. 75.16 - 52.8 = __________

5. 8.14 - 6.1 = __________ 6. 1.354 - .265 = __________

7. 1.52 - .408 = __________ 8. 1.9 - .0674 = __________

9. 8.09 - 4.256 = __________ 10. 6.2 - 4.5775 = __________

11. 12.5 - 7.75 = __________ 12. 7.05 - 3.135 = __________

13. 15.065 - 9.466 = __________ 14. 7.74 - 6.63 = __________

15. 5.489 - 2.631 = __________ 16. 824.9 - 416.9 = __________

17. 527.2 - 404.8 = __________ 18. 487.9 - 126.5 = __________

19. 921.1 - .301 = __________ 20. 12 - 1.98 = __________
Directions: Use the steps on page 18 or 33 to solve the problems. Show your work. Write each answer on the line.

1. In ticket sales, the basketball team sold $128.57 to teachers and $459.63 to students. What was the total amount of ticket sales?

2. When Dan's father went to the store and bought meat it cost him $5.76. Vegetables cost him $1.59, fruit $.89, and dairy items $7.88. How much was his bill?

3. Mike had a checkbook balance of $1,359.00. He deposited $599.33. What is his new balance?

4. The Daycare Center in Pierson took in the following amounts: $324.12 on Monday; $412.15 on Tuesday; $222.13 on Wednesday; $516.17 on Thursday; and $325.75 on Friday. What was the total income for the week?

5. Kenny had $25.00. He spent $2.50 on a pair of socks, and $14.00 on a shirt. How much did he have left?

6. After two days driving Steve had only 1169.3 miles remaining of a 3,425 mile trip. How many miles has he already traveled?

7. Larry had a checkbook balance of $356.89, before writing checks for $6.10 and $37.77. What is his new balance?

8. Jeff's gas tank in his car holds 26 gallons of gas. On one occasion he filled it with 14.2 gallons of gas. How much gas was in the tank before filling it?
Section 3

What This Section is About...

In this section you will practice multiplying decimal numbers. Decimal numbers are natural numbers or integers such as 0, 1, 2, 3.... You will also multiply decimals by powers of ten.

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<tr>
<td>1. Multiplying decimal numbers</td>
<td>✔ Take Quiz as pretest.</td>
</tr>
<tr>
<td>2. Multiplying decimal numbers by powers of ten</td>
<td>✔ See Vocabulary.</td>
</tr>
<tr>
<td>✔ How much do I already know?</td>
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<td>✔ Have I mastered these concepts?</td>
<td></td>
</tr>
</tbody>
</table>
Concepts: Multiplying Decimal Numbers

Example 1: Multiply: 3.25 x 4.5 =

Step 1: Rewrite the problem in vertical form.

```
  3.25
x 4.5
```

Step 2: Multiply. Disregard decimal points.

```
  3.25
x 4.5
  1625
 1300
 14625
```

Step 3: Count the number of decimal places in both numbers.

```
  3.25  ← 2 places
x 4.5  ← 1 place
  1625  ← 3 places
 1300
 14.625
```

Step 4: Count, starting from the ones' place (right), the same number of decimal places in the product. Place the decimal point.

```
  3.25
x 4.5
  1625
 1300
 14.625  3 places
```
Example 2: 

\[
\begin{align*}
0.5 \\
\times 0.9 \\
\hline
4.5 \\
0.0 \\
\hline
0.45
\end{align*}
\]

Step 1: Write in vertical form, if necessary.

Step 2: Multiply. Disregard decimal points.

Step 3: Count the number of decimals in both numbers.

\[
\begin{align*}
0.5 & \quad 2 \text{ places} \\
\times 0.9 & \quad 2 \text{ places} \\
\hline
0.45 & \quad 4 \text{ places}
\end{align*}
\]

Step 4: Count starting from the right or ones' place, the same number of decimal places in the product. Place the decimal point. Annex zeroes to left, if needed.

Solution: \[0.0045\] 4 places
UNIT 3: DECIMALS

Multiplication

Concepts: Multiplying Decimal Numbers by Powers of Ten

How do you multiply decimal numbers by powers of ten?

Example 1: Multiply: 5.45 x 10

Step 1: When multiplying a decimal number by ten, move the decimal point one place to the right.

5.45 x 10 = 54.5

Example 2: Multiply: 3.7 x 100 =

Step 1: When multiplying a decimal number by one hundred, move the decimal two places to the right. (When multiplying by powers of ten, annex zeroes as needed for place holders.)

3.7 x 100 = 370

(Note that the decimal point does not need to be printed since you now have a whole number.)

Example 3: Multiply: 1000 x 43.5972

Step 1: When multiplying a decimal by one thousand, move the decimal point three places to the right.

1000 x 43.5972 = 43,597.2
Quiz

Directions: Multiply.

1. \( \frac{.3}{8} \)  
2. \( \frac{.03}{2} \)  
3. \( \frac{.58}{.6} \)  

4. \( \frac{1.47}{.03} \)  
5. \( \frac{3.351}{86} \)  
6. \( \frac{16.2}{.05} \)  

7. \( .12 \times .05 = \) 

8. \( .25 \times 8 = \) 

9. \( 3.68 \times .06 = \) 

10. \( 15.38 \times 2.00 = \)
### Directions:
Count the number of digits to the right of the decimal point. Write the number and name on each line.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>36.5</td>
<td>1 tenth</td>
</tr>
<tr>
<td>2.</td>
<td>89.48</td>
<td>2 hundredths</td>
</tr>
<tr>
<td>3.</td>
<td>398.06</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>950.5</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>429.62</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>522.33</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>619.58</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>49.99</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>526.09</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>88.8</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>16.24</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>896.3</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>14.6</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>196.84</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>999.52</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>428.12</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>192.6</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>14.89</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>222.51</td>
<td></td>
</tr>
</tbody>
</table>
Activity Sheet

Directions: Multiply.

1. \[ \begin{align*} 4 & \times \ 0.1 \\ \end{align*} \]

2. \[ \begin{align*} 12 & \times \ 0.8 \\ \end{align*} \]

3. \[ \begin{align*} 0.9 & \times \ 0.6 \\ \end{align*} \]

4. \[ \begin{align*} 0.23 & \times \ 9 \\ \end{align*} \]

5. \[ \begin{align*} 84 & \times \ 0.42 \\ \end{align*} \]

6. \[ \begin{align*} 0.98 & \times \ 18 \\ \end{align*} \]

7. \[ \begin{align*} 39 & \times \ 0.61 \\ \end{align*} \]

8. \[ \begin{align*} 4.56 & \times \ 34 \\ \end{align*} \]

9. \[ \begin{align*} 7 & \times \ 0.56 \\ \end{align*} \]

10. \[ \begin{align*} 18 & \times \ 0.2 \\ \end{align*} \]

11. \[ \begin{align*} 0.06 & \times \ 3 \\ \end{align*} \]

12. \[ \begin{align*} 0.05 & \times \ 17 \\ \end{align*} \]

13. \[ \begin{align*} 0.07 & \times \ 38 \\ \end{align*} \]

14. \[ \begin{align*} 25 & \times \ 0.4 \\ \end{align*} \]

15. \[ \begin{align*} 6 & \times \ 0.35 \\ \end{align*} \]
Directions: Multiply.

1. 361.5
   x 2.3

2. 59.6 x 42.8 =

3. 96.5
   x 2.43

4. 1.3 x 498.5 =

5. 98.6
   x 3.49

6. 3.98 x 8.52 =

7. 42.5
   x 34.9

8. 89.3 x 29.5 =

9. 98.3
   x 21.1

10. 5.6 x 91.34 =
Directions: Multiply.

1. \(3.6 \times 7 = \) 

2. \(460 \times 4.8 = 4.320\)

3. \(56.17 \times 75 = 4212.75\)

4. \(5 \times .71 = .355\)

5. \(6 \times .005 = .030\)

6. \(.01 \times .005 = .00005\)

7. \(2.14 \times .03 = .0642\)

8. \(.09 \times 3.1 = .279\)

9. \(12.52 \times .06 = .7512\)

10. \(1.15 \times .52 = .5980\)

11. \$.42 \times 4 = 1.68\)

12. \$.80 \times 7 = 5.6\)

13. \$4.25 \times 14 = 59.5\)

14. \(.75 \times .06 = .045\)

15. \$10.50 \times 60 = 630\)

16. \(8.1 \times .18 = 1.458\)
Activity Sheet

Directions: Find the products.

1. $8.6 \times 10 = \underline{___}$
2. $6.07 \times 2 = \underline{___}$

3. $4.8 \times 6.3 = \underline{___}$
4. $0.04 \times 5.1 = \underline{___}$

5. $3.141 \times 0.92 = \underline{___}$

6. $66.9 \times 4.7 = \underline{___}$

7. $27.18 \times 0.96 = \underline{___}$
8. $65.9 \times 4.7 = \underline{___}$

9. $8.28 \times 11.82 = \underline{___}$
10. $18.33 \times 4.6 = \underline{___}$
Section 4

What This Section is About...

In this section you will practice dividing decimal numbers with no more than two decimal places by divisors less than 100. You will also divide decimal numbers by powers of ten.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✓ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✓ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Dividing decimal numbers</td>
<td>✓ Take Quiz as pretest.</td>
</tr>
<tr>
<td>2. Dividing decimal numbers by powers of ten</td>
<td>✓ See Vocabulary.</td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>✓ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✓ Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>✓ Take Quiz as posttest.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>✓</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✓</td>
</tr>
</tbody>
</table>

Student's Guide
UNIT 3: DECIMALS

Concept: Dividing Decimal Numbers

How do you divide decimal numbers?

Example 1: Divide 2.1 \( \div \) 0.63

Step 1: Make the divisor a whole number by moving the decimal point as many places to the right as needed.

Step 2: The decimal in the dividend must be moved the same number of places to the right. Place the decimal point in the quotient directly above its new placement in the dividend.

\[
2.1 \div 0.63
\]

Step 3: Divide:

\[
\begin{array}{c}
2.1 \div 0.63 \\
\hline
6.3 \\
6.3 \\
0
\end{array}
\]

Solution: 3

Concept: Dividing Decimals by Powers of Ten

How do you divide decimals by powers of ten?

Example: 10 \( \div \) 3.46, 100 \( \div \) 104.3, 1000 \( \div \) 20.34

Step 1: When dividing a decimal number by ten, move the decimal point one place to the left.

(Example: 3.46 \( \div \) 10 = 0.346)

Step 2: When dividing a decimal number by one hundred, move the decimal point two places to the left.

(Example: 104.3 \( \div \) 100 = 1.043)

Step 3: When dividing a decimal number by one thousand, move the decimal point three places to the left.

(Example: 20.34 \( \div \) 1000 = 0.02034)
Quiz

Directions: Find the quotient.

1. \(4 \) \( \overline{) 9.2} \)
2. \(7 \) \( \overline{) 8.96} \)
3. \(20 \) \( \overline{) 4} \)
4. \(36 \) \( \overline{) 91.44} \)
5. \(0.6 \) \( \overline{) 12} \)
6. \(0.8 \) \( \overline{) 0.896} \)
7. \(0.16 \) \( \overline{) 48} \)
8. \(0.014 \) \( \overline{) 112} \)
9. \(1.5 + 0.30 = \)
10. \(0.39 \) \( \overline{) 265.2} \)
Directions: Study the vocabulary words below.

bar — a repeating decimal may be written using a bar over the portion which repeats

Example: \( .3333 = 0.\overline{3} \)  \( 7.5212121 = 7.\overline{521} \)

non-repeating — a decimal which continues without end and has no pattern of repetition

Example: \( 3.1415927359... \)

quotient — the result of division; the answer

repeating decimal — a decimal numeral which has a repeating pattern of digits without end

Example: \( 0.3333..., \ 7.5212121..., \ 0.543254325432... \)

terminating decimal — a decimal numeral which ends or does not repeat

Example: \( 3.14, \ 0.5963 \) and \( 5.2 \)
Activity Sheet

Directions: Find the quotients.

1. 2 ) 64.8
2. 7 ) 92.4

3. 0.4 ) 42.8
4. 10 ) 10.24

5. 0.08 ) 3.60
6. 0.6 ) 45.0

7. 43 ) 150.5
8. 23 ) 7.89

9. 92 ) 3.404
10. .25 ) 15.625
Directions: Find the quotients.

1. \( .05 \div 1.9 \)
2. \( .21 \div 12.6 \)

3. \( 8 \div 564 \)
4. \( 3.7 \div 925 \)

5. \( .9 \div 7029 \)
6. \( 6.1 \div 244 \)

7. \( 7 \div 2.9 + .81 = \)
8. \( \div 1.33 + 1.9 = \)

9. \( .8 + .02 = \)
10. \( 81 + 1.5 = \)
Activity Sheet

Directions: Divide.

1. 4) 72  
2. .7) 357  
3. .3) 111  
4. .03) 54  

5. .05) 85  
6. .022) 6  
7. .08) 296  
8. .04) 9.6  

9. .4) 7.2  
10. .07) 2.52  
11. .04) 0.68  
12. .09) 6.3  

13. .6) 4.2  
14. .002) .4  
15. .3) 7.5  
16. .03) 4.2  

17. .07) 1.4  
18. .18) 0.828  
19. .53) 0.636  
20. .37) 0.1739
Directions: Divide using the shortcut method.

1. $305.1 \div 10 = \underline{\hspace{2cm}}$

2. $35.64 \div 100 = \underline{\hspace{2cm}}$

3. $385.4 \div 1000 = \underline{\hspace{2cm}}$

4. $4981.2 \div 1000 = \underline{\hspace{2cm}}$

5. $4111.33 \div 100 = \underline{\hspace{2cm}}$

6. $85 \div 100 = \underline{\hspace{2cm}}$

7. $85 \div 1000 = \underline{\hspace{2cm}}$

8. $2.46 \div 1000 = \underline{\hspace{2cm}}$

9. $39.929 \div 10 = \underline{\hspace{2cm}}$

10. $543.21 \div 10 = \underline{\hspace{2cm}}$
Directions: Find the quotients.

1. $621.1 \div 100 = \_\_\_\_\_\_\_\_\_\_

2. $84.6 \div 1000 = \_\_\_\_\_\_\_\_\_

3. $63.4 \div 10 = \_\_\_\_\_\_\_\_\_

4. $395.2 \div 100 = \_\_\_\_\_\_\_\_\_

5. $35.64 \div 1000 = \_\_\_\_\_\_\_\_\_

6. $1082.9 \div 10 = \_\_\_\_\_\_\_\_\_

7. $54.25 \div 100 = \_\_\_\_\_\_\_\_\_

8. $810.29 \div 100 = \_\_\_\_\_\_\_\_\_

9. $8.41 \div 1000 = \_\_\_\_\_\_\_\_\_

10. $1.67 \div 10 = \_\_\_\_\_\_\_\_\_
Directions: Use the steps on page 53 or 71 to solve the problems below.

1. Find the cost of the following:
   a. 5 lb of onions at 26¢ per pound
   b. 3 dozen eggs at $.89 a dozen

2. What would the cost per year be if the phone service costs $26.92 per month?

3. A plane on a flight used 43.8 gal per hour. If the flight lasted 4.5 hours, how many gallons of gasoline were used?

4. Allen bought 3 lb of candy at 29¢ per pound; Darrell bought 2 lb of candy at 79¢ per pound; Cara bought 5 lb at 39¢ per pound. What was the total cost of the candy?

5. At 33¢ per pound, how many pounds of peaches can you buy for $1.65?

6. If a dozen pencils costs $4.32, what will one pencil cost?

7. An airplane flies 858.2 miles in 2.8 hours. What is the average speed?

8. If a wire that is .75 of an inch long is to be cut into sections that are each .04 inch long, how many sections can it be cut into? (Round to the nearest whole number.)
Section 5

What This Section is About...

In this section you will practice rounding decimal numbers less than 100 with no more than three decimal places.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔  Do I have the necessary prerequisite skills?</td>
<td>✔  Take Quiz.</td>
</tr>
<tr>
<td>✔  What concepts will be presented?</td>
<td>✔  See examples on the following pages.</td>
</tr>
<tr>
<td>•  Rounding decimal numbers</td>
<td>✔  Take Quiz as pretest.</td>
</tr>
<tr>
<td>✔  How much do I already know?</td>
<td>✔  See Vocabulary.</td>
</tr>
<tr>
<td>✔  What vocabulary words are introduced?</td>
<td>✔  Do Activity Sheets.</td>
</tr>
<tr>
<td>✔  What practice is provided?</td>
<td>✔  Refer to examples in this section.</td>
</tr>
<tr>
<td>✔  What if I need extra help?</td>
<td>✔  Take Quiz as posttest.</td>
</tr>
<tr>
<td>✔  Have I mastered these concepts?</td>
<td></td>
</tr>
</tbody>
</table>
Concept: Rounding Decimal Numbers

**Question:** How do you round decimal numbers?

**Example 1:** Round 25.864 to the nearest tenth.

**Step 1:** Locate place to be rounded—tenths'. Draw a line under the digit in the tenths' place.

25.864

**Step 2:** Circle the digit to the right of the digit that was underlined in Step 1.

25.864

If this digit is 5 or larger, increase the number in the tenths' place by 1. If the digit is 4 or less, leave the digit in the tenths' place the same.

**Step 3:** In this problem, the digit that is circled is a 6. Six (6) is larger than 5, so the digit in the tenths' place is increased by one.

25.864

\[ + \quad 1 \]

25.964

25.864

**Step 4:** Discard all digits to the right of the tenths' place.

25.964 \[ \rightarrow \]

25.9

**Solution:** 25.864 rounded to the nearest tenth is 25.9.
Example 2: Round 79.637 to the nearest whole number.

Step 1: Draw a line under the digit in the whole number place. (This is the units' or ones' place.)

\[ 79.637 \]

Step 2: Circle the digit to the right of the digit underlined in Step 1.

\[ 79(6)37 \]

Step 3: In this problem, the digit circled is a 6. Six is larger than 5, so you add 1 to the whole number place.

\[
\begin{align*}
79.637 + 1 \\
\hline
80.637
\end{align*}
\]

Step 4: Drop all the digits to the right of the whole number place.

\[ \rightarrow 80.637 \]

Solution: 79.637 rounded to the nearest whole number is 80.
Quiz

Directions: Round to the designated place.

1. Round 3.722 to the nearest hundredth.

2. Round 4.38 to the nearest tenth.

3. Round 36.5 to the nearest whole number.

4. Round 398.4 to the nearest tenth.

5. Round 23.75 to the nearest whole number.
Activity Sheet

Directions: Round to the designated place.

1. Round 16.46 to the nearest tenth.

2. Round 146.984 to the nearest hundredth.

3. Round 6.842 to the nearest tenth.

4. Round 72.697 to the nearest tenth.

5. Round 2.478 to the nearest hundredth.

6. Round 367.87 to the nearest hundredth.

7. Round 34.57 to the nearest tenth.

8. Round 54.078 to the nearest hundredth.

9. Round 6.428 to the nearest tenth.

10. Round 84.412 to the nearest hundredth.
Activity Sheet

Directions: Round.

1. Round 6.84 to the nearest tenths.

2. Round 47.26 to the nearest whole number.

3. Round 68.353 to the nearest tenths.

4. Round 8.463 to the nearest hundredths.

5. Round 69.437 to the nearest tenths.

6. Round 52.473 to the nearest tenths.

7. Round 68.473 to the nearest hundredths.

8. Round 2.783 to the nearest whole number.

9. Round 36.427 to the nearest tenths.

10. Round 75.423 to the nearest whole number.
UNIT 4: PERCENT

Section 1: Equivalent Forms
Section 2: Percents of Whole Numbers
Section 3: Percents of Decimal Numbers
## UNIT 4: PERCENT

### Equivalent Forms

#### Section 1

**What This Section is About...**

In this section you will practice skills needed for mathematical operations with percents.

#### Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
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<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
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</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✅ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Write a fraction as an equivalent decimal</td>
<td></td>
</tr>
<tr>
<td>2. Write a decimal as a percent</td>
<td></td>
</tr>
<tr>
<td>3. Write a decimal as an equivalent fraction</td>
<td></td>
</tr>
<tr>
<td>4. Write a percent as a fraction</td>
<td></td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✅ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>
Concept: Write a Fraction as an Equivalent Decimal

How do you write a fraction as an equivalent decimal?

Example: Write \( \frac{5}{3} \) in decimal form.

When you wish to rename a mixed fraction as a decimal, compute only the fractional part.

Step 1: Divide the numerator by the denominator. (Set aside the whole number part.)

\[
\begin{array}{c}
5 & 2 \\
3 & 3
\end{array}
\quad \frac{5}{3} = \frac{2.0}{1.8}
\begin{array}{c}
20 \\
18
\end{array}
\begin{array}{c}
20 \\
18
\end{array}
\]

Step 2: Round the quotient to the nearest thousandth.

.6666 is a repeating decimal.

.6666 rounds to .667

Step 3: Remember to write the decimal part and the whole number. The decimal equivalent is 5.667.

Concept: Write a Decimal as a Percent

How do you write a decimal as a percent?

Example: Write 2.667 as a percent.

Step 1: Move the decimal two places to the right.

2.667 \rightarrow 266.7
Step 2: Write the percent symbol (%) to the right of the number.

Solution: 266.7%

Concept: Write a Decimal as an Equivalent Fraction

How do you write a decimal as an equivalent fraction?

Example: Write .75 as a fraction.

Step 1: Determine the place value of the last digit in the decimal. This will determine the fraction's denominator.

.75 5 is in the hundredths' place

Step 2: Write the numbers to the right of the decimal as the numerator. Write the place value of the last digit as denominator.

\[
\begin{array}{c}
100 \\
\end{array} \rightarrow \frac{75}{100}
\]

Step 3: Simplify.

\[
\frac{75}{100} = \frac{3}{4}
\]
Unit 4: Percent
Equivalent Forms

Concept: Write a Percent as a Fraction

How do you write a percent as a fraction?

Example: Write 47% as a fraction.

Step 1: Determine the decimal by moving the decimal point 2 places to the left.

\[ 47\% = 0.47 \]

Step 2: Determine place value of last digit to right of decimal.

\[ 0.47 \] 7 is in the hundredths' place, so the denominator will be 100.

Step 3: Write the numbers to the right of the decimal point as the numerator of the fraction and the place value of the last digit as the denominator.

\[ 0.47 = \frac{47}{100} \]

Step 4: Simplify.

\[ \frac{47}{100} \] is in lowest terms.
Directions: Complete the following chart by writing equivalent forms.

<table>
<thead>
<tr>
<th></th>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(\frac{1}{2})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(\frac{1}{5})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(\frac{2}{3})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(\frac{3}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(\frac{1}{3})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(2 \frac{1}{10})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(2 \frac{2}{3})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(1 \frac{1}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(\frac{4}{5})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(\frac{5}{8})</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Vocabulary**

**Directions:** Study the words and the chart below.

**percent** — per hundred; symbol: %

**decimal** — a fraction whose denominator is ten or a multiple of ten; expressed as a decimal by placing a decimal point to the left of the numerator

Examples: \( \frac{2}{10} = .2 \), \( \frac{15}{100} = .15 \)

**decimal point** — a period placed before a fraction expressed in decimal figures

Examples: 2.03; .25

**is** — equal to

**ratio** — a comparison of two numbers, frequently expressed as a fraction

**Common Equivalents**

<table>
<thead>
<tr>
<th>Common</th>
<th>Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{4} )</td>
<td>25%</td>
</tr>
<tr>
<td>( \frac{1}{2} )</td>
<td>50%</td>
</tr>
<tr>
<td>( \frac{3}{4} )</td>
<td>75%</td>
</tr>
<tr>
<td>( \frac{1}{3} )</td>
<td>33 ( \frac{1}{3} )%</td>
</tr>
<tr>
<td>( \frac{2}{3} )</td>
<td>66 ( \frac{2}{3} )%</td>
</tr>
</tbody>
</table>
Directions: Match the fraction to its equivalent percent. Put the correct letter in each blank.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$\frac{2}{5}$</td>
<td>A.</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>$\frac{1}{2}$</td>
<td>B.</td>
<td>$33\frac{1}{3}$%</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>$\frac{3}{4}$</td>
<td>C.</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>$\frac{1}{5}$</td>
<td>D.</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>$\frac{1}{3}$</td>
<td>E.</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>$\frac{4}{5}$</td>
<td>F.</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>$\frac{3}{5}$</td>
<td>G.</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>$\frac{1}{4}$</td>
<td>H.</td>
<td>$66\frac{2}{3}$%</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>$\frac{2}{3}$</td>
<td>I.</td>
<td>60%</td>
<td></td>
</tr>
</tbody>
</table>
Activity Sheet

Directions: Write each fraction as a decimal.

1. $\frac{1}{2} = \underline{\quad} \quad 2. \frac{1}{5} = \underline{\quad}$

3. $\frac{2}{5} = \underline{\quad} \quad 4. \frac{3}{5} = \underline{\quad}$

5. $\frac{4}{5} = \underline{\quad} \quad 6. \frac{3}{20} = \underline{\quad}$

7. $\frac{7}{20} = \underline{\quad} \quad 8. \frac{1}{4} = \underline{\quad}$

9. $\frac{7}{50} = \underline{\quad} \quad 10. \frac{1}{25} = \underline{\quad}$
Directions: Write each fraction with a denominator of 10 or 100; then, write as a decimal.

1. \( \frac{2}{5} = \_ \_ \_ = \_ \_ \_ \_ \)
2. \( \frac{1}{10} = \_ \_ \_ = \_ \_ \_ \_ \)
3. \( \frac{2}{4} = \_ \_ \_ = \_ \_ \_ \_ \)
4. \( \frac{1}{25} = \_ \_ \_ = \_ \_ \_ \_ \)
5. \( \frac{3}{5} = \_ \_ \_ = \_ \_ \_ \_ \)
6. \( \frac{4}{5} = \_ \_ \_ = \_ \_ \_ \_ \)
7. \( \frac{3}{4} = \_ \_ \_ = \_ \_ \_ \_ \)
8. \( \frac{1}{20} = \_ \_ \_ = \_ \_ \_ \_ \)
9. \( \frac{13}{20} = \_ \_ \_ = \_ \_ \_ \_ \)
10. \( \frac{6}{20} = \_ \_ \_ = \_ \_ \_ \_ \)
Directions: Write each fraction as a decimal and then as a percent.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (\frac{1}{2})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. (\frac{1}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. (\frac{3}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. (\frac{89}{100})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. (\frac{80}{100})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. (\frac{2}{5})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. (\frac{1}{3})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. (\frac{3}{25})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. (\frac{7}{20})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. (\frac{23}{50})</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: Write each fraction or mixed number as a decimal and then as a percent.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (\frac{5}{20})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(\frac{1}{5})</td>
<td></td>
</tr>
<tr>
<td>3. (\frac{5}{25})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. (\frac{3}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. (\frac{5}{8})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. (\frac{3}{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. (\frac{1}{50})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. (\frac{1}{10})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. (\frac{1}{5})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. (\frac{2}{3})</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: Complete the chart.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\frac{1}{4}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3.75</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>45%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>.20</td>
</tr>
<tr>
<td>5. $\frac{2}{3}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>$33 \frac{1}{3}$%</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>6.25</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>.25</td>
</tr>
<tr>
<td>9. $\frac{3}{4}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>60%</td>
</tr>
</tbody>
</table>
**Section 2**

**What This Section is About...**

In this section you will practice mathematical operations with percents of whole numbers.

---

**Suggested Plan**

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>✈ Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>✈ See example on the following pages.</td>
</tr>
<tr>
<td>• Find a percent of a whole number</td>
<td></td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>✈ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>✈ See Vocabulary.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>✈ Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>✈ Refer to example in this section.</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>✈ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>

---

**Student's Guide**

233 494
Finding a Percent of a Whole Number

Example: Find 35% of 27

Step 1: Change the percent to a decimal.

35% = .35

Step 2: Replace of with a multiplication sign.

.35 \times 27 =

Step 3: Rewrite in vertical form.

\[
\begin{array}{c}
.35 \\
\times 2.7
\end{array}
\]

Step 4: Multiply and write decimal product.

\[
\begin{array}{c}
.35 \\
\times 2.7 \\
24.5 \\
7.0 \\
9.45
\end{array}
\]
Directions: Find the following percents.

1. 18% of 46 =
2. 6% of 24 =

3. 25% of 36 =
4. 78% of 300 =

5. 5% of 29 =
6. 23% of 64 =

7. 60% of 175 =
8. 3% of 40 =

9. 45% of 650 =
10. 150% of 8 =
Directions: Find the following percents.

1. 24% of 52 =
2. 2% of 18 =
3. 2% of 36 =
4. 14% of 80 =
5. 5% of 84 =
6. 16% of 240 =
7. 9% of 50 =
8. 6% of 325 =
9. 45% of 819 =
10. 10% of 30 =

Unit 4: Section 2
Activity Sheet

Directions: Find the following percents.

1. 4% of 50 =
2. 2% of 94 =

3. 10% of 90 =
4. 4% of 39.8 =

5. 8% of 84 =
6. 25% of 16 =

7. 12% of 48 =
8. 6% of 7.5 =

9. 3% of 1.26 =
10. 10% of 12 =
Activity Sheet

Directions: Solve the problems.

1. 10% of 30 = ________  2. 50% of 62 = ________

3. 40% of 65 = ________  4. 75% of 92 = ________

5. 12% of 800 = ________  6. 16% of 804 = ________

7. 60% of 200 = ________  8. 25% of 328 = ________

9. 20% of 735 = ________  10. 18% of 800 = ________
Directions: Solve, using the steps on page 20.

1. Amanda had 90% of her test questions correct. There were 40 questions in all. How many did she have correct?

2. Of 45 seats on the bus, 60% are filled. How many seats are filled?

3. Mr. Jones' car gets 15.6 miles per gallon. With a tune-up his mileage will increase 15%. How many miles per gallon will he get after a tune-up?

4. Last season a Wildcat baseball player hit 48 home runs. This season he has hit 30. What percent is the number of home runs he has hit this season to the number he hit last season? (Round to the nearest whole number.)

5. Judy can throw a baseball 240 feet. This is 80% as far as her brother can throw. How far can her brother throw the ball?

6. A mailman delivered 171 of 180 letters to houses on his mail route. He delivered mail to what percent of the houses?

7. If Thongkham received 3/5 of all the votes in an election, what percent of the votes did he get?

8. If the sales tax is 5%, what would be the sales tax on a purchase of $8.50?

9. Mr. Walker bought a camera at a 15% discount. The regular price was $156.00. What was the total amount that he paid, using the discount?

10. Martha put furniture in storage. The charge was 3% of the furniture's value. If the furniture was valued at $750.00, how much did she pay?

11. How much interest will Joe earn in 5 years on a $2400 investment paying 7% simple interest per year? (Note: Interest = Principal x Rate x Time.)

12. Tom borrowed $1800 from the bank to buy a car. He took a loan at 8% simple interest for 3 years. Find the total amount of interest.
UNIT 4: PERCENT

Section 3

What This Section is About...

In this section you will practice mathematical operations with percents. You will find percents of decimal numbers using skills you learned in previous lessons.

Suggested Plan

Checkpoints

✓ Do I have the necessary prerequisite skills?
✓ What concepts will be presented?
  • Find a percent of two-place decimal numbers
✓ How much do I already know?
✓ What vocabulary words are introduced?
✓ What practice is provided?
✓ What if I need extra help?
✓ Have I mastered these concepts?

Activities

✓ Take Quiz.
✓ See example on the following pages.
✓ Take Quiz as pretest.
✓ See Vocabulary.
✓ Do Activity Sheets.
✓ Refer to examples in this section.
✓ Take Quiz as posttest.

Student’s Guide
Concept: Percents of Decimal Numbers

How do you write a percent as a decimal number?

Example: 73% of 52.25 is _________.

Step 1: Write the percent as either a fractional or decimal equivalent.

73% = .73

Step 2: Replace the word of with a multiplication sign and is with an equals sign.

.73 x 52.25 =

Step 3: Multiply. (Place number with more digits on top.)

\[
\begin{array}{c}
52.25 \\
\times \ 0.73 \\
\hline
15675 \\
36575 \\
381425 \\
\end{array}
\]

Step 4: Place the decimal point correctly. 3814.25
Directions: Solve the problems.

1. 45% of 2.36 = __________

2. 90% of .75 = __________

3. 5% of 27.95 = __________

4. 36% of .25 = __________

5. 4% of 3.2 = __________
### Activity Sheet

**Directions:** Find the given percentage of the following decimal numbers.

1. 23% of 0.80 = _____
2. 59% of 0.8 = _____
3. 78% of 5.5 = _____
4. 75% of 0.84 = _____
5. 17% of 8.2 = _____
6. 62% of 0.19 = _____
7. 8% of 2.4 = _____
8. 33% of 0.14 = _____
9. 25% of 0.96 = _____
10. 28% of 5.9 = _____

---

Unit 4: Section 3

244
Directions: Find the given percentage of the following decimal numbers.

1. 7% of 3.68 =

2. 22% of 12.24 =

3. 67% of 81.6 =

4. 60% of 2.39 =

5. 9% of 64.2 =

6. 10% of 25.50 =

7. 20% of 50.25 =

8. 5% of 19.99 =

9. 30% of 4.07 =

10. 6% of 8.6 =
UNIT 5: GEOMETRY

Section 1: Basic Figures
Section 2: Angles and Triangles
Section 3: Polygons
UNIT 5: GEOMETRY

Basic Figures

Section 1

What This Section is About...

In this section you will learn how to identify basic geometric figures called points, rays, lines, line segments, and angles. You will identify both parallel and perpendicular lines.

Suggested Plan

Checkpoints | Activities
---|---
✓ Do I have the necessary prerequisite skills? | Take Quiz.
✓ What concepts will be presented? | See examples on the following pages.
• Identify basic geometric figures—points, rays, line segments, lines, angles, parallel lines and perpendicular lines
✓ How much do I already know? | Take Quiz as pretest.
✓ What vocabulary words are introduced? | See Vocabulary.
✓ What practice is provided? | Do Activity Sheets.
✓ What if I need extra help? | Refer to examples in this section.
✓ Have I mastered these concepts? | Take Quiz as posttest.
UNIT 5: GEOMETRY

Basic Figures

Concept: Identify Points

What is a point?

Example: This dot stands for point A

- A point is not a dot.
- A dot stands for an exact location in space.
- A point has no dimensions, that is, no size, height, width, or length.
- A point cannot be measured.
- The purpose of a point is to determine a place.
- A point is designated by a capital letter.

Concept: Identify Lines

What is a line?

Example: Line

\[ \text{A} \quad \text{B} \quad \text{AB} \]

- A line is a concept.
- A line is a collection of points. Between any two points is an infinite number of points.
- A line extends indefinitely in opposite directions.
- A line is named by identifying any two of its points.
- A line is represented with arrows on both ends.
- A name of a line is written using two points of the line with a "line" drawn above.
UNIT 5: GEOMETRY

Basic Figures

Concept: Identify Line Segments

What is a line segment?

Example: Line Segment

This line segment is marked by endpoints C and D.

a. A line segment is the measurable part of a line.
b. Line segments have endpoints that show where they begin and end.
c. Line segments are named by identifying the endpoints.
d. A line segment has one dimension—length.
e. A line segment is named by writing the endpoints with a short segment above them.

Concept: Identify Rays

What is a ray?

Example: Ray

a. A ray is a part of a line.
b. A ray has only one endpoint.
c. A ray starts at the endpoint and goes on indefinitely in one direction.
d. A ray is named by identifying its endpoint and a second point to show direction, and a short ray drawn with its endpoint over the letter representing the endpoint.

EF is not the same as EF
Concept: Identify Angles

What is an angle?

Example: Angle

A. An angle is formed by two different rays that share a common endpoint.
B. The endpoint is called the vertex.
C. An angle's two rays go on indefinitely.
D. An angle is identified by identifying a point on one ray, the vertex, and a point on the other ray. The middle letter is always the vertex.

Angle \( \angle DEF \); \( \angle DEF \)
UNIT 5: GEOMETRY

Concept: Identify Perpendicular Lines

What is a perpendicular line?

Example: Perpendicular Lines

![Diagram showing perpendicular lines AB and CD with point C and point D.]

- a. Perpendicular lines intersect in exactly one point.
- b. The angles formed each measure 90°.
- c. AB is perpendicular to CD.

Concept: Identify Parallel Lines

What is a parallel line?

Example: Parallel Line

![Diagram showing parallel lines GH and IJ with point G and point H.]

- a. Parallel lines never intersect.
- b. The perpendicular distance between the lines will always be the same.
- c. GH is parallel to IJ.
Directions: Write the name of each figure in the blank beside the figure.

1. B C

2. A

3. A

4. D E

5. A B
Directions: Identify the type of lines by name. Choose either parallel or perpendicular. Write the name on the blank provided.

1. 

2. 

3. 

4. 

11
Vocabulary

Directions: Study the terms below.

angle — two rays that share a common endpoint

concept — an idea

dimensions — the size of the parts of a figure

horizontal lines — lines that go across or side to side

intersecting lines — lines that have a common point

line — a collection of points that extend to infinity in opposite directions

symbol:  

line segment — part of a line between and including its end points

symbol:  

parallel lines — lines that are always the same distance apart and never meet

perpendicular lines — lines that intersect at right angles

point — smallest particle of space, having no size and too small to see. A dot (.) is used to represent a point.

protractor — a tool for measuring and drawing the angles

ray — begins at a point (.) and extends to infinity in one direction

symbol:  

vertical lines — lines that go up and down
Vocabulary Activity

Directions: Name each of the following, using a vocabulary word.

1. A B

2. B C E

3. A B

4. C D

5. E F
Directions: Name each of the following, using a vocabulary word.

1. \[\uparrow \downarrow\] __________

2. \[\theta = 90\] __________

3. \[\uparrow\downarrow\] __________

4. \[\rightarrow\leftarrow\] __________

5. \[\rightarrow\] __________
Activity Sheet

Directions: Study the figures below and identify them using symbols.

1. horizontal line segment
2. vertical line segment
3. perpendicular lines
4. parallel line segments
5. ray
6. line

Directions: Draw and label.

1. A B parallel to C D
2. horizontal G H
3. vertical E F
4. I J perpendicular to L M
Directions: Name the following figures in words, and write the symbols.

<table>
<thead>
<tr>
<th></th>
<th>In Words</th>
<th>In Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( F )</td>
<td>( G )</td>
</tr>
<tr>
<td>2.</td>
<td>( F )</td>
<td>( G )</td>
</tr>
<tr>
<td>3.</td>
<td>( A )</td>
<td>( B )</td>
</tr>
<tr>
<td>4.</td>
<td>( A )</td>
<td>( C )</td>
</tr>
<tr>
<td>5.</td>
<td>( Z )</td>
<td>( F )</td>
</tr>
</tbody>
</table>
Activity Sheet

Directions: Study the figures drawn and identify them on the lines below using symbols.

1. line segments
2. lines
3. rays
4. angles

Directions: Draw and label the following:

5. AB
6. CD
7. FG
8. \( \angle ABC \)
Directions: Draw lines connecting the given points, and write the names of the resulting figures.

1. A  D  __________ is parallel to __________.

2. E  G  __________ and __________
   are horizontal line segments.

3. K  J  I  L  __________ is perpendicular to __________.

4. O  M  __________ and __________
   are vertical lines.

5. R  S  __________ is a ray.
UNIT 5: GEOMETRY

Angles and Triangles

Section 2

What This Section is About...

In this section you will learn to identify angles by their measure and by their relationship to other angles and will learn to use a protractor. You will also learn to classify triangles by angles or sides.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Do I have the necessary prerequisite skills?</td>
<td>Take Quiz.</td>
</tr>
<tr>
<td>✓ What concepts will be presented?</td>
<td>See examples on the following pages.</td>
</tr>
<tr>
<td>1. Identify types of angles—acute, obtuse, right, straight, complementary, and supplementary</td>
<td></td>
</tr>
<tr>
<td>2. Measure angles using a protractor</td>
<td></td>
</tr>
<tr>
<td>3. Identify triangles by angles</td>
<td></td>
</tr>
<tr>
<td>4. Identify triangles by sides</td>
<td></td>
</tr>
<tr>
<td>✓ How much do I already know?</td>
<td>Take Quiz as pretest.</td>
</tr>
<tr>
<td>✓ What vocabulary words are introduced?</td>
<td>See Vocabulary.</td>
</tr>
<tr>
<td>✓ What practice is provided?</td>
<td>Do Activity Sheets.</td>
</tr>
<tr>
<td>✓ What if I need extra help?</td>
<td>Refer to examples in this section.</td>
</tr>
<tr>
<td>✓ Have I mastered these concepts?</td>
<td>Take Quiz as posttest.</td>
</tr>
</tbody>
</table>

Student's Guide
UNIT 5: GEOMETRY

Angles and Triangles

Concept: Identify Types of Angles

Example: What is an acute angle?

**Acute angle** — an angle having a measure greater than 0° but less than 90°

Example: What is an obtuse angle?

**Obtuse angle** — an angle having a measure greater than 90° but less than 180°
Concept: Identify Types of Angles

Example: What is a right angle?

**right angle** — the measure of a right angle is 90°

Example: What is a straight angle?

**straight angle** — the measure of a straight angle is 180°
How do you identify complementary angles?

**Example:** What are complementary angles?

**complementary angles** — two angles whose measures have a sum of 90°

< RST and < TSV are complementary.

<ABC and <DEF are complementary.
How do you identify supplementary angles?

**Example:** What are supplementary angles?

**supplementary angles** — two angles whose measures have a sum of 180°

< BCD and < DCE are supplementary.

< JKL and < PQR are supplementary.
Concept: Measure Angles Using a Protractor

How do you measure an angle using a protractor?

Example: Measure of $\angle RST$ is $125^\circ$.

1. Align one ray of the angle with the zero degree mark on the protractor.

2. Count the number of degrees on the protractor from the zero point around to the point where the other ray intersects the protractor.

Note: Some protractors have a double scale—one going clockwise and the other counterclockwise. Be sure to follow the correct scale.
Concept: Identify Triangles by Angles

Example: A triangle is a closed, three-sided figure having three angles.

1. A right triangle has exactly one 90° angle. The other two angles measure less than 90°.
   
   ![Right Angle](image)

2. An acute angle triangle has three angles measuring less than 90°.
   
   ![Acute Angle](image)

3. An obtuse angle triangle has one angle measuring more than 90°
   
   ![Obtuse Angle](image)
**Concept:** Identify Triangles by Sides

**Example:** A triangle has three (3) sides.

1. An **equilateral** triangle has **three equal** sides.
   
   ![Equilateral Triangle](image)

2. An **isosceles** triangle has **two equal** sides.
   
   ![Isosceles Triangle](image)

3. A **scalene** triangle has **no equal** sides.
   
   ![Scalene Triangle](image)
Directions: Identify each angle or pair of angles by name.

1.

2.

3.

4.

5.

6.
Directions: Measure the following angles, using a protractor.
Write the measurement on the line.

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
Directions: Study the words below.

< Angles >

acute angle — an angle measuring greater than 0° but less than 90°
complementary angle — either of two angles which together form an angle of 90°

degree — a unit of measure for angles, 1/90 of a right angle; symbol: °
obtuse angle — an angle measuring greater than 90° but less than 180°
protractor — an instrument for measuring the number of degrees (°) in an angle

right angle — an angle that measures 90°
straight angle — an angle that measures 180°
supplementary angle — either of two angles which together form an angle of 180° (a straight line)

vertex — a point that two rays of an angle have in common
vertices — plural of vertex

△ Triangles △

acute triangle — a triangle with each angle measuring less than 90°
equilateral triangle — a triangle with all three sides having the same length
obtuse triangle — a triangle with one obtuse angle
isosceles triangle — a triangle with two sides having the same length
right triangle — a triangle with a right angle
scalene triangle — a triangle with three sides, each having a different length

triangle — a three-sided polygon
# Vocabulary

**Directions:** Match the definition with the word. Write the letter in the blank.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. acute triangle</td>
<td>a. one angle measures 90°</td>
<td></td>
</tr>
<tr>
<td>2. obtuse triangle</td>
<td>b. angles measure less than 90°</td>
<td></td>
</tr>
<tr>
<td>3. right triangle</td>
<td>c. one angle measures greater than 90° but less than 180°</td>
<td></td>
</tr>
<tr>
<td>4. scalene triangle</td>
<td>d. two sides have the same length</td>
<td></td>
</tr>
<tr>
<td>5. equilateral triangle</td>
<td>e. each side has a different length</td>
<td></td>
</tr>
<tr>
<td>6. isosceles triangle</td>
<td>f. all three sides have the same length</td>
<td></td>
</tr>
</tbody>
</table>
Vocabulary

Directions: Fill in the blank with the correct vocabulary word.

1. The measure of a(n) _________ angle is greater than 0° and less than 90°.
2. The measure of a(n) _________ angle is 90°.
3. The measure of a(n) _________ angle is 180°.
4. The measure of a(n) _________ angle is greater than 90° and less than 180°.
5. The sum of the measures of two _________ angles is 180°.
6. The sum of the measures of two _________ angles is 90°.

Directions: Match the items below. Write the letter of the best answer in each blank.

1. ______ acute a. never cross
2. ______ obtuse b. sum of two angles is 90°
3. ______ right c. greater than 90°
4. ______ straight d. meet at right angles
5. ______ complementary e. 90°
6. ______ supplementary f. sum of two angles is 180°
g. 180°
h. less than 90°
Directions: Label the following angles as acute, obtuse, right or straight. Write the correct word on the line.

1. 

2. 

3. 

4. 

Unit 5: Section 2
Directions: Find the measure of the missing supplementary angle.

1. \(150^\circ\)  
2. \(100^\circ\)  
3. \(? 80^\circ\)  
4. \(45^\circ\)  
5. \(? 30^\circ\)  
6. \(? 110^\circ\)  
7. \(? 90^\circ\)  
8. \(? 160^\circ\)
Directions: Find the complements.

a. __________
b. __________
c. __________
d. __________
e. __________
f. __________
g. __________
h. __________
i. __________
Activity Sheet

Directions: Find the measure of the missing supplementary angle.

a. __________

b. __________

c. __________

d. __________

Directions: Draw an example of each angle, or pair of angles.

e. acute

f. obtuse

g. right

h. complementary
Directions: Measure each angle indicated. Write the answer in the blank.

1. a. __________°

2. b. __________°
   c. __________°
   d. __________°

3. \(\angle DEF\) __________°

4. g. __________°
   h. __________°
   i. __________°
   j. __________°

5. k. __________°
Directions: Measure the angles, and write the answers in the blanks.

1. 

2. 

3. 

4. 

5. 

6. 

Unit 5: Section 2
Directions: Measure the angles, and write the answers in the blanks.

7. 

8. 

9. 

10. 

Unit 5: Section 2
Directions: Name the lines. Use P for Parallel, PP for Perpendicular, N for Neither.

1.   
2.   
3.   
4.   
5.   
6.   

Directions: Name the angles. A = Acute, O = Obtuse, or R = Right.

7.   
8.   
9.   
10.  
11.  
12.  

Unit 5: Section 2
Directions: Measure the sides using a ruler to determine if the triangle is equilateral, isosceles, or scalene. Write the name on the line.

1. \[ \triangle ABC = \ldots \]

2. \[ \triangle DEF = \ldots \]

3. \[ \triangle GHI = \ldots \]

4. \[ \triangle JKL = \ldots \]

5. \[ \triangle MNO = \ldots \]
Directions: Measure the angles in each triangle to determine if the angle is right, acute, or obtuse. Write the correct name of the triangle on each line.

1. 

2. 

3. 

4. 

5. 
UNIT 5: GEOMETRY

Section 3

What This Section is About...

In this section you will learn to identify polygons with up to eight sides, and learn to identify congruent and similar polygons.

Suggested Plan

<table>
<thead>
<tr>
<th>Checkpoints</th>
<th>Activities</th>
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</thead>
<tbody>
<tr>
<td>✔ Do I have the necessary prerequisite skills?</td>
<td>✔ Take Quiz.</td>
</tr>
<tr>
<td>✔ What concepts will be presented?</td>
<td>✔ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Identify various quadrilaterals—squares, rectangles, parallelograms, rhombi, trapezoids</td>
<td></td>
</tr>
<tr>
<td>2. Identify pentagons, hexagons, heptagons, and octagons</td>
<td></td>
</tr>
<tr>
<td>3. Identify congruent and similar polygons</td>
<td></td>
</tr>
<tr>
<td>✔ How much do I already know?</td>
<td>✔ Take Quiz as pretest.</td>
</tr>
<tr>
<td>✔ What vocabulary words are introduced?</td>
<td>✔ See Vocabulary.</td>
</tr>
<tr>
<td>✔ What practice is provided?</td>
<td>✔ Do Activity Sheets.</td>
</tr>
<tr>
<td>✔ What if I need extra help?</td>
<td>✔ Refer to examples in this section.</td>
</tr>
<tr>
<td>✔ Have I mastered these concepts?</td>
<td>✔ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>
Concept: Identify Various Quadrilaterals

How do you identify various quadrilaterals?

Example: Quadrilaterals are polygons with four sides.

1. A square is a quadrilateral with four equal sides and four right angles.

\[
\begin{align*}
\text{square} & \\
\angle A &= \angle B = \angle C = \angle D = 90^\circ \\
\overline{AB} &\parallel \overline{CD}, \quad \overline{AC} \parallel \overline{BD} \\
&= \overline{AC} = \overline{CD} = \overline{BD}
\end{align*}
\]

2. A rectangle is a parallelogram with four right angles.

\[
\begin{align*}
\text{rectangle} & \\
\angle A &= \angle B = \angle C = \angle D = 90^\circ \\
\overline{AB} &\parallel \overline{CD} \\
&= \overline{AD} \parallel \overline{BC}
\end{align*}
\]
3. A *trapezoid* is a quadrilateral with exactly one pair of parallel sides.

   *trapezoid*

```
    D  C
   ___
  A    B
```

4. A *parallelogram* is a quadrilateral with two pairs of opposite sides which are parallel and equal.

   *parallelogram*

```
    D  C
   ___
  A    B
```

   - $\overline{AC} \parallel \overline{BD}$
   - $\overline{AB} \parallel \overline{CD}$
5. A **rhombus** is a parallelogram with four equal sides.


![Rhombus Diagram](image)

\[ AB \parallel CD \quad AD \parallel BC \]
\[ AB = AC = CD = BD \]

**Concept:** Identify Pentagons, Hexagons, Heptagons, and Octagons

**Example:** The following are simple closed figures called *polygons*. These figures are made of line segments called *sides*.

1. A **pentagon** is a polygon with *five* sides.


![Pentagon Diagram](image)
2. A hexagon is a polygon with six sides.

hexagons

3. A heptagon is a polygon with seven sides.

heptagons

4. An octagon is a polygon with eight sides.

octagons
UNIT 5: GEOMETRY

Polygons

Concept: Identify Congruent and Similar Polygons

How do you identify congruent polygons?

Example: Congruent polygons are two or more polygons with exactly the same shape and size. Position may vary.

How do you identify similar polygons?

Example: Similar polygons are two or more polygons having the same shape but varying in sizing or position or both.
Directions: Identify the name of each figure pictured below. Write its name beside the figure.

1. 

2. 

3. 

4. 

5. 

Unit 5: Section 3
Quiz

Directions: Name these figures.

1. __________
2. __________
3. __________
4. __________
5. __________
6. __________
Directions: Write an S beside the polygons that are similar. Write a C beside the polygons that are congruent. Write an N beside the polygons that are neither.

1. 

2. 

3. 

4. 

5. 

6.
Directions: Study the words and definitions.

congruent polygons — polygons having the same shape and size; positions may vary

heptagon — seven-sided polygon
hexagon — six-sided polygon
octagon — eight-sided polygon
parallelogram — a quadrilateral with two pairs of opposite sides which are parallel and equal
pentagon — five-sided polygon
plane — flat surface that extends to infinity in all directions
polygon — a closed figure formed by line segments
quadrilateral — a polygon with four closed sides
rectangle — a quadrilateral with four right angles
rhombus — a parallelogram with four equal sides and two pairs of parallel sides
similar polygons — polygons having the same shape but varying in size
square — a quadrilateral with four equal sides
trapezoid — a quadrilateral with one pair of parallel sides
<table>
<thead>
<tr>
<th>The Name of the Polygon</th>
<th>The Shape</th>
<th>Number of Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td>△</td>
<td>3</td>
</tr>
<tr>
<td>Quadrilateral</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Pentagon</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Hexagon</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Heptagon</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Octagon</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Nonagon</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Decagon</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>
Directions: Identify the figures below.
Write: P for polygon 
S for similar polygons 
C for congruent polygons

1. 
2. 
3. 
4. 
5. 
6.
Directions: Fill in the blank with the best vocabulary word.

1. A ___________ is a quadrilateral that has two pairs of sides of the same length and four right angles.

2. A ___________ has four right angles and four sides of the same length.

3. A ___________ has exactly one pair of parallel sides.

4. A ___________ has two pairs of parallel sides and four sides of the same length.

5. A ___________ is any figure with two pairs of opposite sides which are parallel and equal.

6. A ___________ is a polygon with four sides.

7. A ___________ is a closed figure formed by line segments.
Directions: Identify each of the figures below. Write the correct name on each blank.

rhombus    rectangle    trapezoid
square    parallelogram

1. _______

2. _______

3. _______

4. _______

5. _______
Directions: Match the vocabulary word with the correct definition. Write the letter on the line.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>_____ octagon</td>
<td>a. polygon with five sides</td>
</tr>
<tr>
<td>2.</td>
<td>_____ pentagon</td>
<td>b. polygon with six sides</td>
</tr>
<tr>
<td>3.</td>
<td>_____ heptagon</td>
<td>c. polygon with seven sides</td>
</tr>
<tr>
<td>4.</td>
<td>_____ hexagon</td>
<td>d. polygon with eight sides</td>
</tr>
<tr>
<td>5.</td>
<td>_____ triangle</td>
<td>e. polygon with four sides</td>
</tr>
<tr>
<td>6.</td>
<td>_____ quadrilateral</td>
<td>f. polygon with three sides</td>
</tr>
</tbody>
</table>
Directions: Label each of the following polygons as octagon, pentagon, heptagon, or hexagon.

1. 

2. 

3. 

4.
Directions: Look at this figure and answer the following questions.

1. Name any point.

2. Name three line segments starting at Point R.

3. Name two line segments starting at Point D.

4. Name a triangle that contains Point D.

5. Name the quadrilateral.
Activity Sheet

Directions: Match each figure with one at the bottom that is congruent or similar. Write the letter in the blank. Then circle *S* or *C* to indicate similar or congruent.

1. \[
\begin{array}{c}
3 & 3 \\
2 & \quad \text{s or c}
\end{array}
\]

2. \[
\begin{array}{c}
4 & 4 \\
4 & \quad \text{s or c}
\end{array}
\]

3. \[
\begin{array}{c}
3 & 3 \\
3 & \quad \text{s or c}
\end{array}
\]

4. \[
\begin{array}{c}
3 & 5 \\
4 & \quad \text{s or c}
\end{array}
\]

5. \[
\begin{array}{c}
2 & 3 \\
3 & \quad \text{s or c}
\end{array}
\]

A. \[
\begin{array}{c}
2 & 3 \\
3 & \quad \text{a}
\end{array}
\]

B. \[
\begin{array}{c}
4 & 5 \\
3 & \quad \text{b}
\end{array}
\]

C. \[
\begin{array}{c}
3 & 3 \\
3 & \quad \text{c}
\end{array}
\]

D. \[
\begin{array}{c}
2 & 3 \\
3 & \quad \text{d}
\end{array}
\]

E. \[
\begin{array}{c}
\text{sq} & 3 \\
\quad \text{e}
\end{array}
\]

F. \[
\begin{array}{c}
3 & 3 \\
\quad \text{f}
\end{array}
\]
**Activity Sheet**

Directions: Draw three pairs of similar polygons and three pairs of congruent polygons. Circle C for congruent and S for similar.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>S or C</td>
<td></td>
</tr>
</tbody>
</table>
Unit 6

What This Section is About...

In this unit on measurement you will work in four different areas—time, distance, capacity, and weight/mass. Practice exercises will include using a conversion factor to convert smaller units to larger ones and larger units to smaller ones. You will also solve problems relating to these units of measurement.

Suggested Plan

<table>
<thead>
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<th>Activities</th>
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<tr>
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</tr>
<tr>
<td>✔ What concepts will be presented?</td>
<td>☇ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Find elapsed time</td>
<td></td>
</tr>
<tr>
<td>2. Solve problems involving units of distance/length</td>
<td></td>
</tr>
<tr>
<td>3. Solve problems involving units of capacity</td>
<td></td>
</tr>
<tr>
<td>4. Solve problems involving units of weight/mass</td>
<td></td>
</tr>
<tr>
<td>✔ How much do I already know?</td>
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</tr>
<tr>
<td>✔ What if I need extra help?</td>
<td>☇ Use examples in this section.</td>
</tr>
<tr>
<td>✔ Have I mastered these concepts?</td>
<td>☇ Take Quiz as posttest.</td>
</tr>
</tbody>
</table>

Student's Guide

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Converting Units of Measurement...

In order to solve problems containing different units of measurement, it is necessary to convert the items to the same unit of measurement before solving the problem.

To convert from a larger unit to a smaller one, the operation will be multiplication. To convert from a smaller unit to a larger unit, divide. Think: there will be more smaller units than large. Therefore, to increase the number—multiply. Changing a small unit to a larger unit will decrease the number—so, divide to get a smaller number. (See page 326.)

When converting units of measure in the metric system, the conversion factors will always be a power of ten (10, 100, 1000, etc.). Study the conversion charts in the student section on pages 333 (distance/length), 343 (capacity), and 348 (weight/mass). Use these charts when converting metrics units of measurement.

Unlike the metric system, where powers of ten are easily used to make conversions, in the customary system there are many different conversion factors (12, 4, 365, 3, 16, 7, 52, etc.). These are just a few from which to choose. Study the equivalency charts on pages 333 (distance/length), 343 (capacity), and 348 (weight/mass) to determine the conversion factor needed to solve the problem presented.

Concept: Find Elapsed Time

Example 1: Find the elapsed time from 9:45 a.m. to 10:00 a.m.

Step 1: Place in vertical form, making sure each unit is in the proper column. Subtract the beginning time from the ending time.

\[
\begin{align*}
10:00 \text{ a.m.} & \quad - \quad 9:45 \text{ a.m.} \\
5 \quad : \quad 10
\end{align*}
\]

Step 2: Regroup, if necessary, and subtract.

\[
\begin{align*}
10:00 \text{ a.m.} & \quad (\text{regroup}) \quad 9:55 \text{ a.m.} \\
9:45 \text{ a.m.} & \quad - \\
5 \quad : \quad 10
\end{align*}
\]

Solution: 15 minutes
Example 2: Find the elapsed time from 5:45 a.m. to 6:15 p.m.

Step 1: Change the p.m. time to military time by adding 1200 hours to the p.m. time.

\[
\begin{align*}
6:15 \text{ p.m.} & \quad 12:00 \\
\hline
18:15 \text{ military time} &
\end{align*}
\]

Step 3: Subtract the a.m. time from the p.m. time (as expressed by military time). Regroup, if necessary.

\[
\begin{align*}
18:15 \quad \text{(regroup)} & \rightarrow 17:75 \\
- 5:45 & \rightarrow 5:45 \\
\hline
12:30 & \text{Solution: 12 hours and 30 minutes}
\end{align*}
\]

Example 2: Find the elapsed time from Tuesday, 8:30 a.m. to Wednesday, 7:30 p.m.

Step 1: Find the total number of days (full 24 hr units) elapsed.

\[
12
\]

Step 2: Find the elapsed time in minutes and hours from 8:30 a.m. to 7:30 p.m.

\[
\begin{align*}
7:30 \text{ p.m.} & \quad 19:30 \\
+ 12:00 & \quad -8:30 \\
19:30 \text{ military time} & \quad 11:00 \text{ hr}
\end{align*}
\]

Solution: 11 hours
Step 3: Find the total elapsed time.

Solution: 1 day, 11 hours

Concept: Solve Problems Involving Units of Distance/Length

Example 1: Multiply 5 yd 11 in. \( \times 4 \)

Step 1:

\[
\begin{array}{c}
5 \text{ yd} \\
\times 4 \\
\hline
20 \text{ yd} \\
\end{array}
\]


Think: \( \frac{1 \text{ yd} 8 \text{ in.}}{36} \)

\[
\begin{array}{c}
36 \\
8 \\
\end{array}
\]

Step 3: 20 yd 44 in. = 21 yd 8 in.

Example 2: 6 yd 1 ft 6 in. + 3

Step 1: Change 6 yd 1 ft 6 in. to inches.

\[
= (6 \times 36) + (1 \times 12) + 6
\]

\[
= 234 \text{ in.}
\]

Step 2: Now divide: 234 in. + 3 = 78 in.

Step 3: Simplify: 78 in. = 6 ft 6 in.
Concept: Solve Problems Involving Units of Capacity

How do you solve problems involving units of capacity?

Example 1: Add: 1 qt 1 pt 1 c to 2 qt 1 c

Step 1: Write the problem vertically, aligning the common units. Add.

\[
\begin{array}{c}
1 \text{ qt} \\
+ 2 \text{ qt} \\
\hline
3 \text{ qt}
\end{array}
\begin{array}{c}
1 \text{ pt} \\
+ 1 \text{ c} \\
\hline
1 \text{ pt} + 2 \text{ c}
\end{array}
\]

Step 2: Simplify.

\[
3 \text{ qt 1 pt 2 c} = 3 \text{ qt 1 pt} + 1 \text{ pt} = 3 \text{ qt 2 pt} = 4 \text{ qt} = 1 \text{ gal.}
\]

Solution: 1 gal.

Example 2: Multiply 4.03 km x 6

Step 1: Write vertically and multiply.

\[
\begin{array}{c}
4.04 \text{ km} \\
x 6 \\
\hline
24.18 \text{ km}
\end{array}
\]

Solution: 24.18 km
UNIT 6: MEASUREMENT

Concept: Solve Problems Involving Units of Weight/Mass

How do you solve problems involving units of weight/mass?

Example 1: 2 tons - 1325 lb


2 tons = 4000 lb

Step 2: Write the problem vertically. Subtract.

\[
\begin{align*}
4000 \text{ lb} \\
- 1325 \text{ lb} \\
\hline
2675 \text{ lb}
\end{align*}
\]

Step 3: Simplify.

2675 lb = 1 ton 675 lb

Example 2: Add 62 cm + 31.79 m

Step 1: Convert to common unit

31.79 m = 3179 cm

Step 2: Write problem vertically, and add.

\[
\begin{align*}
62 \text{ cm} \\
+ 3179 \text{ cm} \\
\hline
3241 \text{ cm}
\end{align*}
\]

Step 3: Convert back to larger unit. (Simplify.)

3241 cm = 32.41 m
UNIT 6: MEASUREMENT

Concept:

Solve Measurement Word Problems

What steps do you use to solve measurement word problems?

Example: Solve the following real-world problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 1: Read the problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 2: Circle key words and phrases.

rectangular around how much

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 3: Underline the question or what is being asked.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Step 4: Determine the operation(s).

1) Add—around
2) Subtract—by how much

Student’s Guide
UNIT 6: MEASUREMENT

Step 5: Write a number sentence. (Cannot do because units are not alike.)

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Convert using chart. (See p. 326)

2.5 m = 250 cm

Step 6: Compute the problem.

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

a. \( P = 2 \times \text{length} + 2 \times \text{width} \)

b. \[
\begin{align*}
2 \times 70 \text{ cm} &= 140 \text{ cm} \\
+ 2 \times 60 \text{ cm} &= 120 \text{ cm} \\
\hline
\text{perimeter} &= 260 \text{ cm}
\end{align*}
\]

c. \[
\begin{align*}
260 \text{ cm} &= \text{perimeter} \\
- 250 \text{ cm} &= \text{length of tape} \\
10 \text{ cm} &= \text{too short}
\end{align*}
\]

Step 7: Reread, and ask: "Is the answer reasonable?"

Sam is going to put tape around a rectangular table. He has 2.5 m of tape. The table is 60 cm wide and 70 cm long. Will the tape be too long or too short? By how much?

Round to whole numbers and estimate.
UNIT 6: MEASUREMENT

Step 8. Write the answer: If the answer is not reasonable, rework to this point. If it is reasonable, write the answer. Caution: your problem may need more than one step to reach the final answer. If this is the case, repeat steps 4-8 until finished.

Solution: 10 cm
Quiz

Directions: Convert the following (excluding leap year).

1. 4 yr = ________ mo
2. 2 yr 6 mo = _______ mo

3. 2 yr = ________ wk
4. 2 yr 9 wk = ______ wk

5. 4 yr = _______ da
6. 1 yr 200 da = ______ da

7. 6 wk = ________ da
8. 5 da = ______ hr

9. 9 da 8 hr = ______ hr
10. 36 mo = ______ yr

11. 104 wk = ______ yr
12. 59 mo = ______ yr (write remainder in mo)

13. 168 hr = ______ da
14. 12 da 48 hr = ______ da

15. 28 da = ________ wk
16. 16 wk 49 da = ______ wk

17. 12 da 72 hr = ________da
18. 12 wk = ________ hr

19. 5 yr = _______ da
20. 730 da = ________ yr
Quiz

Directions: Fill in the blanks below.

Find the elapsed time:

1. From 8:35 a.m. to 11:30 a.m.
2. From 3:10 p.m. to 10:30 p.m.
3. From 5:45 a.m. to 6:15 p.m.
4. From Monday 7:30 a.m. to Thursday 4:50 p.m.
5. From 9:00 a.m. to 8:00 p.m.
6. From Tuesday 9:00 a.m. to Friday 10:00 a.m.
7. From 8:00 p.m. to 11:45 p.m.
8. From 7:00 a.m. to 7:45 p.m.
9. From Monday 3:00 p.m. to Tuesday 6:00 p.m.
10. From 5:30 a.m. to 4:10 p.m.
Directions: Study the words below.

capacity — amount a vessel holds or contains

conversion factor — the number used when making a conversion from one unit to another

Example: to convert between feet and inches the conversion is 12
         to convert between ounces and pounds the conversion factor is 16

distance — how far between two points or locations if following a straight line

elapsed time — how much time passes

length — see distance

linear — having to do with a straight line

mass — a metric term closely related to weight

meter — the base unit of length in the metric system

military — based on a 24 hour clock (as opposed to 2–12 hour periods)

weight — how heavy an object is
Vocabulary Activity

Directions: Fill in the blanks with the best word. Some words may be used more than once—some not at all.

<table>
<thead>
<tr>
<th>length</th>
<th>distance</th>
<th>weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>time</td>
<td>capacity</td>
<td>meter</td>
</tr>
<tr>
<td>liter</td>
<td>gram</td>
<td>mass</td>
</tr>
</tbody>
</table>

1. The ________ is the basic unit of length in the metric system.

2. ________ is measured by teaspoons, milliliters, liters, or quarts.

3. In the customary system, feet, inches, and yards are units of ________.

4. In both the metric and customary systems, seconds, minutes, hours, and centuries are units of ________.

5. Miles and kilometers are units used to measure ________.

6. ________ is measured in units such as ounces, pounds, and tons.

7. The basic metric unit of mass is the ________.

8. The ________ is the basic metric unit of capacity.

9. The kilogram is a unit commonly used to measure_______ in the metric system.
Directions: Study the charts below.

Equivalent Units of Time

| 60 seconds  | = 1 minute |
| 60 minutes  | = 1 hour   |
| 24 hours    | = 1 day    |
| 7 days      | = 1 week   |
| 52 weeks    | = 1 year   |
| 365 days    | = 1 year   |
| 12 months   | = 1 year   |

Units of Time Abbreviations

| seconds     | = sec   |
| minutes     | = min   |
| hours       | = hr    |
| days        | = da    |
| weeks       | = wk    |
| months      | = mo    |
| years       | = yr    |

Examples of Military Time

<table>
<thead>
<tr>
<th>Standard</th>
<th>Written</th>
<th>Stated</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 a.m.</td>
<td>0800 hours</td>
<td>oh eight hundred</td>
</tr>
<tr>
<td>8 p.m.</td>
<td>2000 hours</td>
<td>twenty hundred</td>
</tr>
</tbody>
</table>
**Study Sheet**

**Directions:** Study the conversion factor charts for customary measurement below.

### CONVERSION CHARTS FOR CUSTOMARY MEASUREMENTS

<table>
<thead>
<tr>
<th>Larger To Smaller</th>
<th>Smaller To Larger</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steps</strong></td>
<td><strong>Examples</strong></td>
</tr>
<tr>
<td>1. Choose the units of operation.</td>
<td>hours to minutes, feet to inches, weeks to days</td>
</tr>
<tr>
<td>2. Identify the conversion factor.</td>
<td>1 hr → 60 min, 1 ft → 12 in, 1 wk → 7 da</td>
</tr>
<tr>
<td>3. Multiply the number of units times the conversion factor.</td>
<td>2 hr × 60 = 120 min, 2 ft × 12 = 24 in, 2 wk × 7 = 14 da</td>
</tr>
</tbody>
</table>

---

Unit 6 326

578
**Activity Sheet**

**Directions:** Follow the directions below.

**A. Change to months:**
1. 3 yr = _______mo
2. 4 yr 4 mo = _______mo
3. 9 yr 7 mo = _______mo
4. 2 yr = _______mo
5. 5 yr 9 mo = _______mo

**B. Change to weeks:**
1. 2 yr = _______wk
2. 3 yr 16 wk = _______wk
3. 3 1/2 yr = _______wk
4. 1 yr 41 wk = _______wk
5. 4 yr 8 wk = _______wk

**C. Change to days:**
1. 8 wk = _______da
2. 6 yr = _______da
3. 1 yr 185 da = _______da
4. 30 wk 5 da = _______da

**D. Change to hours:**
1. 2 da 4 hr = _______hr
2. 36 wk = _______hr
3. 1 yr 4 mo = _______hr
4. 30 da = _______hr

**E. Change to years:** (Write remainder as fraction)
1. 15 mo = _________yr
2. 32 mo = _________yr
3. 80 mo = _________yr
Directions: Follow the directions below.

A. Change to minutes:
1. 5 hr = 
2. 1 hr 30 min = 
3. 14 hr 8 min = 
4. 21 hr = 
5. 18 hr = 

B. Change to seconds:
1. 7 min = 
2. 5 min 20 sec = 
3. 24 min = 
4. 52 min = 
5. 45 min 6 sec = 

C. Change to weeks: (Write remainder in days)
1. 15 da = 
2. 11 da = 
3. 38 da = 
4. 62 da = 
5. 90 da =
Directions: Follow the directions below.

A. Change to hours: (Write remainders in minutes)
   1. 480 min = ______   4. 942 min = ______
   2. 120 min = ______   5. 30 min = ______
   3. 84 min = ______

B. Change to minutes: (Write remainders in seconds)
   1. 540 sec = ______   4. 19 hr 30 min = ______
   2. 780 sec = ______   5. 2 hr 15 min = ______
   3. 72 sec = ______

C. Change to weeks: (Write remainders in days)
   1. 375 days = ______   4. 11 days = ______
   2. 29 days = ______   5. 38 days = ______
   3. 15 days = ______
Directions: Fill in the blanks.

1. 5 yr = ___________ da
2. 104 wk = ___________ yr
3. 2 yr = ___________ wk
4. 16 wk 49 da = ___________ wk
5. 9 da 8 hr = ___________ hr
6. 19 hr 30 min = ___________ min
7. 45 min 6 sec = ___________ sec
8. 1 yr 185 da = ___________ da
9. 30 da = ___________ hr
10. 3 1/2 yr = ___________ mo
### Directions: Find the elapsed time.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Hours</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 1:10 p.m.</td>
<td>6:25 p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 12:00 noon</td>
<td>9:34 p.m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 7:15 a.m.</td>
<td>11:30 a.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 2:12 p.m.</td>
<td>8:03 p.m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 11:00 a.m.</td>
<td>4:00 p.m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 9:30 a.m.</td>
<td>3:45 p.m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 10:45 a.m.</td>
<td>3:15 p.m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 9:55 a.m.</td>
<td>2:20 p.m.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Days</th>
<th>Hours</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:25 a.m.</td>
<td>11:40 a.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Jan. 30</td>
<td>Feb. 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30 a.m.</td>
<td>4:45 p.m.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Years</th>
<th>Months</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. May 21, 1954</td>
<td>June 6, 1972</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quiz

Directions: Fill in the blank.

1. 9 ft = _____ in.
2. 23 yd = _____ in.
3. 40 mi = _____ ft
4. 3 ft 2 in. = _____ in.
5. 13 ft = _____ yd
6. 207 in. = _____ yd
7. 3 miles = _____ ft
8. 16 yd = _____ ft
9. 21 mi = _____ yd
10. 48 in. = _____ ft
11. 27 ft = _____ yd
12. 12 in. = _____ yd
13. 7,040 yd = _____ mi
14. 1 cm = _____ m
15. 6 cm = _____ mm
Directions: Study the charts of equivalents and abbreviations below.

**Customary Linear Measurement**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 foot (ft)</td>
<td>12 inches (in.)</td>
</tr>
<tr>
<td>1 yard (yd)</td>
<td>3 feet (ft)</td>
</tr>
<tr>
<td>1 mile (mi)</td>
<td>1,760 yards (yd)</td>
</tr>
<tr>
<td></td>
<td>5,280 feet (ft)</td>
</tr>
</tbody>
</table>

**Metric Linear Measurement**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>meter (m)</td>
<td>the basic unit of length</td>
</tr>
<tr>
<td>kilometer (km)</td>
<td>1000 meters (m)</td>
</tr>
<tr>
<td>hectometer (hm)</td>
<td>100 meters (m)</td>
</tr>
<tr>
<td>decameter (dam)</td>
<td>10 meters (m)</td>
</tr>
<tr>
<td>decimeter (dm)</td>
<td>1/10 meter (m)</td>
</tr>
<tr>
<td>centimeter (cm)</td>
<td>1/100 meter (m)</td>
</tr>
<tr>
<td>millimeter (mm)</td>
<td>1/1000 meter (m)</td>
</tr>
</tbody>
</table>

**Metric Conversion Chart**

<table>
<thead>
<tr>
<th>Unit</th>
<th>+1000</th>
<th>+100</th>
<th>+10</th>
<th>to</th>
<th>x10</th>
<th>x100</th>
<th>x1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>kilometer (km)</td>
<td></td>
<td></td>
<td></td>
<td>from</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hectometer (hm)</td>
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<td></td>
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<td></td>
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<tr>
<td>dekameter (dam)</td>
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<tr>
<td>meter (m)</td>
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<td>decimeter (dm)</td>
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<tr>
<td>centimeter (cm)</td>
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</tr>
<tr>
<td>millimeter (mm)</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Unit 6: Distance/Length 333 535
Study Sheet

Directions: Study the conversion relationships on page 326 and the examples below.

Example: 4 ft = ____?__ in.
Since 1 ft = 12 in., 4 ft x 12 in. = 48 in.

Example: 5,280 ft = ____?__ yd
Since 3 ft = 1 yd, 5,280 ft + 3 ft = 1,760 yd

Directions: Complete the following conversions. Use pencil only. Wrong answers must be corrected so you can use these conversions later.

Convert:
1. ft to in. ft x by ________
2. in. to ft in. + by ________
3. yd to ft yd x by ________
4. ft to yd ft + by ________
5. yd to in. yd x by ________
6. in. to yd in. + by ________
7. mi to ft mi x by ________
8. ft to mi ft + by ________
9. mi to yd mi x by ________
10. yd to mi yd + by ________
Directions: Compute the following conversions.

A. Change to inches:
   1. 8 ft
   2. 3 1/2 ft
   3. 50 ft

B. Change to feet:
   4. 6 yd
   5. 4 2/3 yd

C. Change to inches:
   6. 9 yd
   7. 7 1/2 yd

D. Change to miles:
   8. 15,840 ft
   9. 3,300 ft
   10. 8,800 yd
Directions: Follow the directions below.

A. Change to Inches:
1. 1 ft 10 in. ________
2. 5 ft 11 in. ________
3. 21 ft 7 in. ________

B. Change to Feet:
4. 3 yd 1 ft ________
5. 5 yd 2 ft ________
6. 35 yd 1 1/2 ft ________

C. Change to Inches:
7. 1 yd 2 ft ________
8. 2 yd 11 in. ________
9. 1/2 yd ________

D. Change to Yards:
10. 7 mi ________
11. 4 1/2 mi ________
12. 20 mi ________

E. Change to Miles:
13. 3 mi 1,760 ft ________
14. 12 mi 1,320 ft ________
15. 450 ft ________
Directions: Convert each of the following as stated.

1. 48 in. = ________ ft
2. 5 ft 4 in. = ________ in.
3. 7 ft = ________ in.
4. 2 yd 9 in. = ________ in.
5. 72 in. = ________ yd
6. 27 in. = ________ ft
7. 4 ft 7 in. = ________ in.
8. 2 yd 9 in. = ________ in.
9. 6 yd 5 in. = ________ in.
10. 108 in. = ________ ft
11. 42 ft = ________ yd
12. 6 yd 1 ft = ________ ft
13. 10 mi 1000 ft = ________ ft
14. 25 yd = ________ ft
15. 3,300 ft = ________ mi
Activity Sheet

Directions: Use the chart on page 333 to convert the following metric measurements.

1. 1 cm = __________ mm
2. 1 dm = __________ mm
3. _______ dm = 1 m
4. 1 dam = __________ m
5. 1 hm = __________ dam
6. 1 km = __________ hm
7. _______ cm = 1 dm
8. 1000 m = __________ km
9. _______ cm = 60 mm
10. 2 dm = __________ cm
Activity Sheet

Directions: Solve the following problems. Convert before computing when necessary. Refer to the equivalency charts on page 333.

1. $1 \text{ ft} + 3 \text{ ft} = \underline{\ } \text{ ft}$
2. $2 \text{ yd} + 1 \text{ ft} = \underline{\ } \text{ ft}$
3. $1 \text{ mi} + 1 \text{ ft} = \underline{\ } \text{ yd}$
4. $2 \text{ ft} + 6 \text{ in.} = \underline{\ } \text{ in.}$
5. $36 \text{ in.} + 36 \text{ in.} = \underline{\ } \text{ yd}$
6. $20 \text{ dam} + 1 \text{ dam} = \underline{\ } \text{ dam}$
7. $2 \text{ m} + 10 \text{ cm} = \underline{\ } \text{ cm}$
8. $1 \text{ km} + 1 \text{ hm} = \underline{\ } \text{ hm}$
9. $1 \text{ hm} + 1 \text{ dam} + 1000 \text{ mm} = \underline{\ } \text{ m}$
10. $1 \text{ dm} + 2 \text{ m} = \underline{\ } \text{ cm}$
Word Problems

Directions: Use the steps on pp. 317-319 to solve the word problems below.

1. The Catson's fence is 60 in. high. What is the height of the fence in feet?

2. Mr. Barton is 6 ft 2 in. tall. How many inches tall is he?

3. Hank threw a baseball 180 feet. How many yards did he throw the ball?

4. It took Sue 3 min 25 sec to run around the block. How many seconds did it take?

5. The capacity of a container is 2 gal 1 qt. What is the capacity in quarts?

6. Miss Copeland bought a 2 lb 8 oz can of shortening. How many ounces of shortening did she buy?

7. An elephant weighs exactly two tons. How much does he weigh in pounds?

8. How many gallons of punch is needed for a party for 20 people, if you plan for each guest to drink 2 – 8 oz cups?

9. The train ride from Chicago to Indianapolis takes 4 hr to go 182 miles. What is the average speed of the train?

10. Jerry exercised three times a week for a year in a class that met for an hour. How much exercise did he get in a year? (Convert to largest unit of time.)
Quiz

Directions: Convert the following customary measurements.

1. 1 gal. = ________ qt

2. ______ pt = 1 qt

3. 3 gal. = ________ qt

4. ______ qt = 4 pt

5. 3 tsp = ________ tbsp

6. 1 pt = ________ c

7. 6 tsp = ________ tbsp

8. 4 c = ________ pt

9. 2 qt = ________ gal.

10. 1 gal. = ________ pt
Quiz

Directions: Convert the following metric measurements.

1. 100 cL = _________ L
2. 1 daL = _________ L
3. 1 cL = _________ mL
4. 1 kL = _________ L
5. 1 hL = _________ L
6. 1 mL = _________ L
7. 1 daL = _________ L
8. 1 hL = _________ daL
9. 1 daL = _________ mL
10. 1 kL = _________ hL
Directions: Study the charts below.

Customary Liquid Measurement

3 teaspoons (tsp) = 1 tablespoon (tbsp)
16 tablespoons = 1 cup (c)
1 cup = 8 fl oz
2 cups = 1 pint (pt)
2 pints = 1 quart (qt)
4 quarts = 1 gallon (gal.)

Metric Liquid Measurement

250 milliliters = 1 metric cup
4 metric cups = 1 liter
1000 milliliters = 1 liter
100 centiliters = 1 liter
10 deciliters = 1 liter
1 dekaliter = 10 liters
1 hectoliter = 100 liters
1 kiloliter = 1000 liters

Metric Conversion Chart

<table>
<thead>
<tr>
<th>kiloliter (kL)</th>
<th>hectoliter (hL)</th>
<th>dekaliter (dal)</th>
<th>liter (L)</th>
<th>deciliter (dL)</th>
<th>centiliter (cL)</th>
<th>milliliter (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>× 1000</td>
<td>× 100</td>
<td>× 10</td>
<td>to</td>
<td>from</td>
<td>× 10</td>
<td>× 100</td>
</tr>
</tbody>
</table>

Unit 6: Capacity
**Activity Sheet**

**Directions:** Follow the directions below.

<table>
<thead>
<tr>
<th>A. Change to ounces:</th>
<th>B. Change to pints:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 7 pt</td>
<td>4. 3 qt</td>
</tr>
<tr>
<td>2. 2 pt. 8 oz</td>
<td>5. 5 qt 1 pt</td>
</tr>
<tr>
<td>3. 5 1/2 pt</td>
<td>6. 25 qt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Change to ounces:</th>
<th>D. Change to pints:</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. 5 qt</td>
<td>10. 48 oz</td>
</tr>
<tr>
<td>8. 3 qt 4 oz</td>
<td>11. 2 pt 4 oz</td>
</tr>
<tr>
<td>9. 26 qt</td>
<td>12. 6 oz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. Change to gallons:</th>
<th>F. Convert:</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. 10 qt</td>
<td>19. 3 liters = _______ milliliters</td>
</tr>
<tr>
<td>14. 2 qt 1 pt</td>
<td>20. 2 metric cups = _______ milliliters</td>
</tr>
<tr>
<td>15. 64 oz</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G. Change to gallons:</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. 12 qt</td>
</tr>
<tr>
<td>17. 56 pt</td>
</tr>
<tr>
<td>18. 16 gal 2 qt</td>
</tr>
</tbody>
</table>
Directions: Convert each quantity given below.

Change:
1. 6 pt = _______ qt
2. 15 qt = _______ gal.
3. 5 gal. 3 qt = _______ qt
4. 3 qt 1 pt = _______ pt
5. 3 gal. 2 qt = _______ qt
6. 13 qt = _______ pt
7. 288 oz = _______ qt
8. 11 gal. 2 qt = _______ gal.
9. 8 metric cups = _______ liters
10. 4 liters = _______ metric cups
Directions: Convert the quantities below.

1. 7 pt = _______ oz or _______ qt
2. 5 qt 1 pt = _______ pt or _______ gal.
3. 5 qt = _______ oz or _______ pt
4. 2 pt 4 oz = _______ pt or _______ oz
5. 8 gal. = _______ qt or _______ pt
6. 80 oz = _______ pt or _______ qt
7. 56 pt = _______ gal. or _______ qt
8. 8 qt 3 pt = _______ pt or _______ gal.
9. 500 mL = _______ metric cups
10. 5 L = _______ metric cups
11. 12 qt = _______ gal.
12. 1 liter = _______ mL
Directions: Convert the following measurements.

1. 1 pound = _______ ounces
2. ______ pounds = 1 ton
3. 32 ounces = _______ pounds
4. 1/4 pound = _______ ounces
5. 8 ounces = _______ pound
6. 1000 pounds = _______ ton
7. ______ milligrams = 1 gram
8. 1 kilogram = _______ grams
9. 100 grams = _______ hectogram
10. ______ decigrams = 1/10 gram

Directions: Solve the following problems. Convert before computing when necessary.

11. 1 pound + 3 ounces = _______ oz
12. 2 tons + 1/2 ton = _______ lb
13. 10 grams x 10 grams = _______ hg
14. 100 grams + 10 grams = _______ kg
15. 2 decigrams + 8 decigrams = _______ g
Directions: Study the equivalency charts below for customary and metric units of weight/mass.

**Customary Weight**

16 ounces (oz) = 1 pound (lb)  
2000 pounds (lb) = 1 ton (T)

**Common Metric Equivalents**

1000 milligrams = 1 gram  
1000 grams = 1 kilogram  
1000 kilograms = 1 metric ton

**Metric Conversion Chart**

<table>
<thead>
<tr>
<th>1000</th>
<th>100</th>
<th>10</th>
<th>to</th>
<th>from</th>
<th>x 10</th>
<th>x 100</th>
<th>x 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>kilogram (kg)</td>
<td>hectogram (hg)</td>
<td>dekagram (dag)</td>
<td>gram (g)</td>
<td>decigram (dg)</td>
<td>centigram (cg)</td>
<td>milligram (mg)</td>
<td></td>
</tr>
<tr>
<td>x 1000</td>
<td>x 100</td>
<td>x 10</td>
<td>to</td>
<td>from</td>
<td>+ 10</td>
<td>+ 100</td>
<td>+ 1000</td>
</tr>
</tbody>
</table>
Directions: Convert:

1. 4 lb to ounces
2. 6 tons to pounds
3. 10 tons to pounds
4. 48 oz to pounds
5. 2 grams to milligrams
6. 2000 grams to kilograms
7. 5 kilograms to grams
8. 10 lb 16 oz to ounces
9. 64 oz to lb
10. 3 T to lb
Directions: Follow the directions below.

Change:
1. 3 lb to ounces
2. 1/4 lb to ounces
3. 7 tons to lb
4. 6 tons to lb
5. 32 oz to lb
6. 21 oz to lb
7. 4000 lb to ton
8. 8000 lb to T
9. 1 lb 3 oz to ounces
10. 8 oz to lb
Directions: Decide what kind of measure is being used. Write W for weight; C for capacity; or L for length.

<table>
<thead>
<tr>
<th>W—Weight</th>
<th>C—Capacity</th>
<th>L—Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. grams</td>
<td>2. gallons</td>
<td></td>
</tr>
<tr>
<td>3. inches</td>
<td>4. centimeters</td>
<td></td>
</tr>
<tr>
<td>5. millimeters</td>
<td>6. pounds</td>
<td></td>
</tr>
<tr>
<td>7. quarts</td>
<td>8. yards</td>
<td></td>
</tr>
<tr>
<td>9. kilograms</td>
<td>10. cups</td>
<td></td>
</tr>
<tr>
<td>11. meters</td>
<td>12. pints</td>
<td></td>
</tr>
<tr>
<td>13. tons</td>
<td>14. kilometers</td>
<td></td>
</tr>
<tr>
<td>15. miles</td>
<td>16. feet</td>
<td></td>
</tr>
<tr>
<td>17. ounces</td>
<td>18. liters</td>
<td></td>
</tr>
<tr>
<td>19. milligrams</td>
<td>20. milliliters</td>
<td></td>
</tr>
</tbody>
</table>
Directions: Add and simplify.

<table>
<thead>
<tr>
<th></th>
<th>A.</th>
<th>B.</th>
<th>C.</th>
<th>D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17 hr 22 min</td>
<td>2 ft 9 in.</td>
<td>5 gal. 2 qt</td>
<td>4 lb 10 oz</td>
</tr>
<tr>
<td></td>
<td>+ 5 hr 38 min</td>
<td>+ 11 ft 2 in.</td>
<td>+ 3 gal. 1 qt</td>
<td>+ 7 lb 9 oz</td>
</tr>
<tr>
<td>2</td>
<td>6 da 15 hr</td>
<td>1 mi 2600 ft</td>
<td>2 c 4 oz</td>
<td>6 lb 8 oz</td>
</tr>
<tr>
<td></td>
<td>+ 8 hr</td>
<td>+ 4 mi 2685 ft</td>
<td>+ 1 c 7 oz</td>
<td>+ 5 lb 10 oz</td>
</tr>
<tr>
<td>3</td>
<td>2 yr 3 mo</td>
<td>2 yd 1 ft 8 in.</td>
<td>3 gal. 3 qt 1 pt</td>
<td>3 lb 6 oz</td>
</tr>
<tr>
<td></td>
<td>+ 3 yr 8 mo</td>
<td>+ 1 yd 2 ft 11 in.</td>
<td>8 gal. 1 pt</td>
<td>+ 1 lb 8 oz</td>
</tr>
</tbody>
</table>

<table>
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<th>C.</th>
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<tr>
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<td>+ 5 lb 10 oz</td>
</tr>
<tr>
<td>3</td>
<td>2 yr 3 mo</td>
<td>2 yd 1 ft 8 in.</td>
<td>3 gal. 3 qt 1 pt</td>
<td>3 lb 6 oz</td>
</tr>
<tr>
<td></td>
<td>+ 3 yr 8 mo</td>
<td>+ 1 yd 2 ft 11 in.</td>
<td>8 gal. 1 pt</td>
<td>+ 1 lb 8 oz</td>
</tr>
</tbody>
</table>

Unit 6
Directions: Subtract, converting when necessary, and simplify.

A. 1. 10 yr 4 mo 2. 3 mo 2 wk 3. 17 hr 30 min
    - 7 mo - 1 mo 3 wk - 10 hr 28 min

B. 1. 7 ft 10 in. 2. 28 yd 3. 5 mi 100 ft
    - 3 ft 7 in. - 24 yd 2 ft - 280 ft

C. 1. 5 qt 1 pt 2. 1 pt 8 oz 3. 6 gal. 1 qt
    - 2 qt 1 pt - 14 oz - 2 gal. 3 qt

D. 1. 9 lb 2 oz 2. 11 T 3. 6 lb 13 oz
    - 3 lb 11 oz - 3 T 1,800 lb - 3 lb 4 oz
Directions: Multiply and simplify.

A. 1. $4 \text{ min}$ $12 \text{ sec} \times 8$
2. $5 \text{ yr}$ $3 \text{ mo} \times 3$
3. $5 \text{ hr}$ $20 \text{ min} \times 5$

B. 1. $5 \text{ ft}$ $2 \text{ in.} \times 4$
2. $4 \text{ mi}$ $300 \text{ yd} \times 9$
3. $2 \text{ yd}$ $2 \text{ ft}$ $6 \text{ in.} \times 4$

C. 1. $4 \text{ gal}$ $2 \text{ qt} \times 4$
2. $1 \text{ pt}$ $7 \text{ oz} \times 4$
3. $2 \text{ qt}$ $1 \text{ pt} \times 5$

D. 1. $2 \text{ T}$ $500 \text{ lb} \times 9$
2. $6 \text{ lb}$ $4 \text{ oz} \times 8$
3. $3 \text{ lb}$ $2 \text{ oz} \times 6$
Activity Sheet

Directions: Match the metric unit to its approximate amount. Write the correct numeral on each line.

1. 100 kilometers  __________ a. about 1 yard
2. 1 liter  __________ b. about a teaspoon
3. 5 grams  __________ c. the thickness of a dime
4. 1 meter  __________ d. a little more than 2 pounds
5. a kilogram  __________ e. the width of a thumbtack
6. 1 millimeter  __________ f. about 60 miles
7. 1 centimeter  __________ g. about the weight of a new pencil
8. 400 grams  __________ h. about 1 pound
9. 5 milliliters  __________ i. about a quart
10. 1 milligram  __________ j. about the weight of a dollar bill
Directions: Solve the following problems using the steps on page 317.

1. After purchasing a 1 qt bottle of vinegar, you use 8 fl oz in a recipe. How much vinegar is left in the bottle?

2. John purchased 10 pints of different flavors of yogurt. Has he purchased more or less than a gallon of yogurt?

3. Three books weighing 1 lb 5 oz, 2 lb 1 oz and 2 lb 13 oz have been packed in a box weighing 5 oz. What is the total weight of the package?

4. Shirley's favorite baseball bat weighs 1 lb. Tom prefers using an 18 oz bat. Whose bat is heavier, and by how much?

5. At the Price-Right grocery a shopper can buy raisins in 1 lb boxes for 89¢ each. Also available is a package of eight 2 oz boxes for 98¢. Do these packages contain the same amount of raisins? Which is the better buy?

6. One board measures 3 ft 7 in. Another board measures 4 ft. How much longer is the second board?

7. If floor boards are 2 in. wide, how many will be required to cover a floor 17 ft wide?

8. How many yards of ribbon are needed to make 30 school officer badges if it takes 9 in. of ribbon to make one badge?

9. A plane travels 150 meters per second. How many kilometers does it travel in 20 minutes?
Word Problems

10. There are three windows in the office. Each window requires 86 cm of fabric for curtains. How many meters of fabric will be needed?

11. How many ounces of water must be added to a 6 oz can of frozen lemonade concentrate to make 1 qt of lemonade?

12. Lisa parked her car at the airport. When she entered the parking lot, her ticket read 30 NOV 7:35 a.m. How long was her car parked in the parking lot if she picked it up on December 2 at 6:10 p.m.?

13. A bus leaves the station every 7 minutes for the center city. If you missed the 10:56 bus, what time is the next scheduled bus?

14. If a bus leaves Tallahassee at 5:00 p.m. and arrives in Miami at 4:50 a.m. the following morning, how long does it take to make the trip?

15. How many 4 oz bags can be filled from 12 oz of peanuts?

16. How many quart bottles can be filled from three 10-gallon cans of milk?

17. Mary and her father caught three fish, one weighing 650 mg and another weighing 1.2 mg, and a third weighing 775 mg. What was the total weight of the fish caught, expressed in kilograms?

18. Martha worked from 8 a.m. to 4 p.m. five days a week with a half hour lunch break each day. How many hours does she work in one week?

19. Derek began his morning deliveries at 7:10 a.m. and finished them at 11:50 a.m. How much time did he spend making the deliveries?
Section 1: Perimeter

Section 2: Area
Section 1

What This Section is About...

In this section you will study and practice finding perimeter for polygons and circumferences of circles.

Suggested Plan

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<tr>
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<td></td>
</tr>
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Student's Guide
Concept: Find The Perimeter of a Polygon

How do you find the perimeter of a polygon?

Example 1: Find the perimeter of the polygon shown.

```
28 in.  34 in.
30 in.
```

Step 1: Write the formula.

\[ P = S_1 + S_2 + S_3 \]

Step 2: Substitute numerical values.

\[ P = 28 + 30 + 34 \]

Step 3: Compute.

\[
\begin{array}{c}
28 \\
30 \\
+ 34 \\
\hline
92 \\
\end{array}
\]

\[ P = 92 \text{ inches} \]

Step 4: Convert, if possible.

Solution: \[ P = 7 \text{ ft } 8 \text{ in.} \]
Example 2: Find the perimeter of the figure below.

\[
\begin{array}{c}
\text{46 ft} \\
\text{24 ft} \\
\text{24 ft} \\
\text{46 ft}
\end{array}
\]

Step 1: Write the formula.

\[P = S_1 + S_2 + S_3 + S_4\]

Step 2: Substitute numbers.

\[P = 46 + 24 + 46 + 24 \text{ or } (2 \times 46) + (2 \times 24)\]

\[P = 92 + 48\]

Step 3: Compute.

\[92 + 48 = 140\]

\[P = 140 \text{ ft}\]

Step 4: Convert.

Solution: \(P = 46 \text{ yd 2 feet}\)
UNIT 7: PERIMETER

Concept:

Find the Circumference of a Circle

Example 1: Find the circumference of a circle having a diameter of 3 feet.

Step 1: Write the formula.

\[ C = \pi d \]

Step 2: Substitute numerical values. Let \( \pi = 3.14 \).

\[ C = 3.14 \times 3' \]

Step 3: Compute.

\[ C = 9.42 \text{ ft} \]

Example 2: Find the circumference of a circle having a radius of 4 cm.

Step 1: Write the formula.

\[ C = 2\pi r \]

Step 2: Substitute numerical values.

\[ C = (2) \times (4) \times (3.14) \]

Step 3: Compute.

\[ 2 \times 4 \times 3.14 = 25.12 \]

\[ C = 25.12 \text{ cm} \]
Quiz

Directions: Find the perimeter of each figure below. Write each answer in the blank.

1. _______ 2. _______

3. _______ 4. _______

5. _______ 6. _______

Unit 7: Section 1
Quiz

Directions: Find the circumference for figures 1-5.

1. ______ ft

2. ______ cm

3. ______ in.

4. ______ m

5. ______ in.

6. ______ ft
Directions: Study the words and definitions below.

circle — a set of points in a plane that are all the same distance from a point called the center

circumference — the distance around a circle

diameter — segment that passes through the center of the circle with endpoints on the circle

formula — a general fact or rule expressed by symbols

parallelogram — quadrilateral with opposite sides parallel and equal length

perimeter — the sum of the lengths of the sides of a polygon

pi (π) — a ratio (circumference divided by diameter) pi is approximately 3.14 or 22/7

polygon — closed figure with at least three sides constructed of line segments

quadrilateral — any four-sided polygon

radius — distance from the center of a circle to the circle itself

rectangle — quadrilateral with opposite sides parallel and equal length and all angles 90°

regular polygon — a polygon which has all sides the same length and all angles the same measure

square — quadrilateral with all sides same length and all angles 90°

trapezoid — quadrilateral with exactly one pair of parallel sides both called bases
Directions: Using the words below, identify each of the figures.

polygon square diameter
rectangle quadrilateral radius
circle parallelogram trapezoid

1. _______  2. _______

3. _______  4. _______
Vocabulary Activity

5. __________
6. __________
7. __________
8. __________
9. __________
10. __________
Directions: Study the formulas below.

perimeter = the sum of all sides

perimeter = side₁ + side₂ + side₃ + side₄

P = S₁ + S₂ + S₃ (triangle)

P = S₁ + S₂ + S₃ + S₄ (4-sided polygon)

P = 4s (square)

P = 2l + 2w (rectangle)

circumference = the distance around a circle

C = πd

C = πr²

Unit 7: Section 1
Directions: Find the perimeter of each figure below.

1. _______ in.
2. _______ ft
3. _______ in.
4. _______ yd
5. _______ ft
6. _______ in.
7. _______ ft
8. _______ yd
9. _______ ft
Activity Sheet

Directions: Find the perimeter of each of the figures below.

1. __________ feet
2. __________ inches
3. __________ yards
4. __________ inches
5. __________ feet
6. __________ feet
7. __________ inches
8. __________ feet
9. __________ feet

Unit 7: Section 1

372622
Activity Sheet

Directions: Find the perimeters.

1. _____ in.
2. _____ ft
3. _____ yd

4. _____ cm
5. _____ m

6. The Jones' Fence Company bid on a job to fence a triangular area. The sides were each 9 2/3 yards long. What was the perimeter?

7. How many feet of fencing will be needed to fence this yard?

8. A lot is shaped like a rectangle. It is 39 m long and 36 m wide. What is the perimeter?
Directions: Find the circumference for each circle. Use 3.14 for π.

1. _____ cm
2. _____ m
3. _____ yd
4. _____ in.
5. _____ ft
6. _____ in.
7. _____ ft
8. _____ ft
9. _____ yd
Section 2

What This Section is About...

In this section you will practice finding the area of rectangles, triangles, parallelograms, trapezoids, and circles.

Suggested Plan

<table>
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<th>Checkpoints</th>
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<tr>
<td>✓ What concepts will be presented?</td>
<td>✏ See examples on the following pages.</td>
</tr>
<tr>
<td>1. Find the area of a rectangle</td>
<td></td>
</tr>
<tr>
<td>2. Find the area of a square</td>
<td></td>
</tr>
<tr>
<td>3. Find the area of a triangle</td>
<td></td>
</tr>
<tr>
<td>4. Find the area of a parallelogram</td>
<td></td>
</tr>
<tr>
<td>5. Find the area of a trapezoid</td>
<td></td>
</tr>
<tr>
<td>6. Find the area of a circle</td>
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</table>

Student's Guide
UNIT 7: PERIMETER/AREA

Area

Concept: Find the Area of a Rectangle

How do you find the area of a rectangle?

Example: Find the area of the rectangle below.

8 cm

4 cm

Area = base \times height
A = bh

Step 1: Write the formula.

\[
A = bh
\]

Step 2: Substitute the numerical values.

\[
A = 8 \text{ cm} \times 4 \text{ cm}
\]

Step 3: Compute.

\[
8 \times 4 = 32
\]

Solution: \( A = 32 \text{ sq cm} \)
Concept: Find the Area of a Square

Example: Find the area of the square below.

9 in.

\[ A = s \times s = s^2 \]

Step 1: Write the formula.

\[ A = s \times s \]

Step 2: Substitute the numerical values.

\[ A = 9'' \times 9'' \]

Step 3: Compute.

\[ 9 \times 9 = 81 \]

Solution: 81 sq in.
Concept: Find the Area of a Triangle

Example: Find the area of the triangle below.

![Diagram of a triangle with base 15 in. and height 8 in.]

Area = base x height

\[ A = \frac{1}{2} (bh) \]

Step 1: Write the formula.

\[ Area = \frac{1}{2} (15 \times 8) \]

Step 2: Substitute numerical values.

Step 3: Compute.

\[ Area = \frac{15 \times 8}{2} = \frac{120}{2} = 60 \]

Solution: 60 sq in.
Concept: Find the Area of a Parallelogram

Example: Find the area of the parallelogram below.

8 yd
9 yd
12 yd

Area = base x height
A = bh

Step 1: Write the formula.

Area = bh

Step 2: Substitute the numerical values.

A = 12 x 8

Step 3: Compute.

A = 12 x 8 = 96

Solution: 96 sq yd
Concept: Find the Area of a Trapezoid

Example: Find the area of the trapezoid below.

![Trapezoid diagram]

Area = \[ \frac{\text{height} \times \text{sum of bases}}{2} \]

\[ A = \frac{h(b_1 + b_2)}{2} \]

Step 1: Write the formula.

\[ A = \frac{h(b_1 + b_2)}{2} \]

Step 2: Substitute the numerical values.

\[ \frac{3(7 + 10)}{2} \]

Step 3: Compute.

\[ \frac{3(7 + 10)}{2} = \frac{51}{2} = 25.2 \]

Solution: 25.5 cm²
Concept: Finding the Area of a Circle

Example 1: Find the area of the circle below.

\[
\text{Area} = 3.14 \times \text{radius} \times \text{radius}
\]

\[
A = \pi r^2
\]

Step 1: Write the formula.

\[
\text{Area} = \pi r^2
\]

Step 2: Substitute the numerical values.

\[
\text{Area} = 3.14 \times 2^2 = 3.14 \times 4
\]

Step 3: Compute.

\[
\begin{array}{c}
3.14 \\
\times 4 \\
\hline
12.56
\end{array}
\]

Solution: 12.56 m\(^2\)
Example 2: Find the area of the circle below.

\[
\text{Area} = 3.14 \times \text{diameter}
\]
\[
A = \frac{1}{4} \pi d^2
\]

Step 1: Write the formula.
\[
A = \frac{1}{4} \pi d^2
\]

Step 2: Substitute the numerical values.
\[
A = 3.14 \times \frac{1}{4} \times 14' \times 14'
\]

Step 3: Compute.
\[
\begin{align*}
3.14 \\
\times 14 \\
12.56 \\
314 \\
43.96
\end{align*}
\]

Solution: \( A = 43.96 \text{ sq ft} \)

\[
\frac{43}{100} \text{ sq ft}
\]
Directions: Find the area of the following figures.

1. ______ sq in.
2. ______ sq ft

3. ______ sq in.
4. ______ sq in.

5. ______ sq in.
   (Round to nearest whole number)

6. ______ sq in.
   (Round to nearest whole number)

Unit 7: Section 2
Directions: Find the area of the following figures.

7. _____ sq in.
8. _____ sq ft

9. _____ sq in.
10. _____ sq in.
Directions: Study the words and definitions below.

altitude — perpendicular distance from a base to an opposite vertex

area — the measure of the surface using square units

base — usually the side that the polygon sits on

height — always refers to the vertical height; height measured at a right angle to a given base
Directions: Study the formulas for area below.

rectangle

\[ A = bh \quad \text{Area} = \text{base} \times \text{height} \]

square

\[ A = s^2 \quad \text{Area} = \text{side} \times \text{side} \]

parallelogram

\[ A = bh \quad \text{Area} = \text{base} \times \text{height} \]

triangle

\[ A = \frac{1}{2}bh \quad \text{Area} = \frac{\text{base} \times \text{height}}{2} \]

trapezoid

\[ A = \frac{h \left( b_1 + b_2 \right)}{2} \quad \text{Area} = \frac{\text{height} \times \text{sum of bases}}{2} \]

circle

\[ A = \pi r^2 \quad \text{Area} = 3.14 \times \text{radius} \times \text{radius} \]
\[ A = \pi d \quad \text{Area} = 3.14 \times \text{diameter} \]
Directions: Find the areas of the following:

1. \(17 \frac{1}{2} \text{ yd}\) sq yd (round)

2. \(11 \text{ ft}\) \(7 \text{ ft}\) \(13 \text{ ft}\) sq ft (round)

3. \(9.6 \text{ m}\) \(4.4 \text{ m}\) sq m (round)

4. \(9 \text{ ft}\) \(11 \text{ ft}\) sq ft

5. \(5 \text{ cm}\) sq cm

6. \(4.6 \text{ cm}\) sq cm
Directions: Find the area of each of the following.

1. __________ sq in.

2. __________ sq yd
   (Round to whole number)

3. __________ sq ft

4. __________ sq m

5. __________ sq in.

6. __________ sq in.
   (Round to whole number)
Directions: Find the area of each of the following.

1. ______ sq m
2. ______ sq cm
3. ______ sq m
(Round to whole number)
4. ______ sq ft
(Round to whole number)
5. ______ sq yd
6. ______ sq ft
7. ______ sq ft
8. ______ sq yd
(Round to whole number)
Directions: Find the area of each of the following.

1. ______ sq m
2. ______ sq in.
3. ______ sq ft (Round to nearest whole number)
4. ______ sq cm (Round to nearest whole number)
5. ______ sq m (Round answer to nearest tenth)
6. ______ sq in. (Round answer to nearest hundredth)
UNIT 8: GRAPHS
UNIT 8: GRAPHS

Unit 8

What This Section is About...

In this unit on graphs you will study how circle, line, and bar graphs are used to provide information in concise forms. You will also interpret and construct circle, line, and bar graphs.

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<td>1. Interpret graphs</td>
<td></td>
</tr>
<tr>
<td>2. Construct graphs</td>
<td></td>
</tr>
<tr>
<td>How much do I already know?</td>
<td>✅  Take Quiz as pretest.</td>
</tr>
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<tr>
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</tr>
</tbody>
</table>
UNIT 8: GRAPHS

Concept: Interpret Graphs

How do you interpret a bar graph?

Example 1: Interpret Bar Graphs

TALLAHASSEE'S ANNUAL RAINFALL

<table>
<thead>
<tr>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
</tr>
<tr>
<td>70</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>40</td>
</tr>
</tbody>
</table>

|-------|------|------|------|------|------|

Step 1: Read the title of the graph as a key to its purpose.

The graph above shows Tallahassee's annual rainfall for the past five years.

Step 2: Read the scales, and determine information given and values to be determined from the graph.

In the graph above, in which year did the most rain fall?

Solution: 1986

Step 3: Determine the value which each major unit of the vertical scale represents.

About how many inches of rain fell in 1988?

Solution: 48 inches

Step 4: Compare the length of the bars to determine the relationships.

Step 5: Read the horizontal scale for the type of data provided.

Step 6: Continue to read the other values in the same manner.
UNIT 8: GRAPHS

Concept: Interpret Graphs

How do you interpret a line graph?

Example 2: Interpret Line Graphs

Average Monthly Temperatures

<table>
<thead>
<tr>
<th>Months of the Year</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

Step 1: Determine information given from title and labels.

Solution: Average monthly temperatures

Step 2: Locate the given values on either the horizontal or vertical scale.

Solution: Vertical scale has temperature in increments of 20 degrees.

Step 3: Compare the heights of the points on the line to determine the values and relationships.

Solution: Which month had the highest temperature? June. Which month had the lowest? January.
Concept: Interpret Graphs

How do you interpret a circle graph?

Example 3: Interpret Circle Graphs

Heather's Budget

Step 1: Read the problem carefully to find out what is being asked.

a. If Heather's income is $15,600 per year, how much is to be spent for each item per year? Per month?

b. Compare the percent to be spent for the rent to the percent being saved.

Step 2: Look at the circle the find the categories and values.

The graph above shows Heather's expenses.

Step 3: Multiply the total quantity by the percent given for each section of the circle graph.

Solution: (a)

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
<th>Total Income</th>
<th>Per Year</th>
<th>Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>25%</td>
<td>$15,600</td>
<td>$3,900</td>
<td>$325</td>
</tr>
<tr>
<td>Clothing</td>
<td>18%</td>
<td>$15,600</td>
<td>$1,560</td>
<td>$156</td>
</tr>
<tr>
<td>Bus</td>
<td>10%</td>
<td>$15,600</td>
<td>$1,560</td>
<td>$130</td>
</tr>
<tr>
<td>Rent</td>
<td>33%</td>
<td>$15,600</td>
<td>$5,148</td>
<td>$429</td>
</tr>
<tr>
<td>Savings</td>
<td>10%</td>
<td>$15,600</td>
<td>$1,560</td>
<td>$130</td>
</tr>
<tr>
<td>Misc.</td>
<td>4%</td>
<td>$15,600</td>
<td>$624</td>
<td>$52</td>
</tr>
</tbody>
</table>

Solution: (b.) 3 1/3 times as much for rent
Example 1: Construct a bar graph showing the following data: Final grades: English-90; Math-75; Art-95; and Music-63.

Step 1: Decide on a title and the horizontal and vertical scales.

Step 2: Using a ruler, draw the bar graph to scale.

Step 3: Label the values on the scales and identify type of data.

Solution: On the vertical scale, put grades in numerals by tens. On the horizontal scale, list the subjects.

Step 4: Fill in the bars to the appropriate level for each subject.
UNIT 8: GRAPHS

Concept: Construct Graphs

Example 2: Construct a line graph showing the following data:

Correct problems on math tests
Test 1  3
Test 2  5
Test 3  2
Test 4  6
Test 5  7
Test 6  6

Step 1: Draw a graph having a horizontal guide line on the bottom and a vertical guide line on the left side. (May use graph paper.)

Step 2: Choose a convenient scale for the related numbers, first rounding very large numbers. Write the number scale along one of the guide lines, and label it.

Step 3: Print the numbers of the tests below the other horizontal scale and label (tests).

Step 4: Make a dot at the corresponding location represented by each number in the data list—i.e., at the intersection of Test 1-3, Test 2-5, etc.

Step 5: Select an appropriate title and label the line graph.

Correct Problems Math Tests

Student's Guide
UNIT 8: GRAPHS

Concept: Construct Graphs

How do you construct a pictograph?

Example 3: Construct a pictograph using the following data:

Number of students taking typing

<table>
<thead>
<tr>
<th>School</th>
<th>No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackson High</td>
<td>350</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>150</td>
</tr>
<tr>
<td>Lincoln High</td>
<td>100</td>
</tr>
<tr>
<td>Madison High</td>
<td>75</td>
</tr>
<tr>
<td>Washington High</td>
<td>250</td>
</tr>
</tbody>
</table>

Step 1: Decide how you are going to present the information (one symbol for every 50 students).

Step 2: Choose a scale and a symbol (stick figure).

Step 3: Print the labels, including school names and the numbers for the scale and the title.

Step 4: Graph the data.

Typing Students

<table>
<thead>
<tr>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackson</td>
</tr>
<tr>
<td>Jefferson</td>
</tr>
<tr>
<td>Lincoln</td>
</tr>
<tr>
<td>Madison</td>
</tr>
<tr>
<td>Washington</td>
</tr>
</tbody>
</table>

Each human represents 50 students.
Directions: Use the following graphs to answer the questions.

Graph 1

1. How many reports did Sally write in January? ____________
2. Which month did Sally write the greatest number of reports? ____________
   The least number? ____________
3. What was the total number of reports Sally wrote in January, April, and June combined? ____________

Graph 2

1. In which months were the sales the same for mobile homes? ____________
2. Did the sale of mobile homes increase during the last three months of the year? ____________
3. In which month was the greatest number of homes sold? ____________
   The least number? _______
Quiz

Directions: Use the graphs below to answer the questions.

Graph 3

Record of Points Scored

1. How many points were scored in Game 1? 
2. How many more points were scored in Game 3 than Game 2?
3. The total score of the three games combined was __________

Graph 4

Allowance

1. What percentage of her allowance does Arlene spend on entertainment?
2. Of $150.00, what is the amount Arlene would have left after spending her allowance on clothing?
3. What is the total percentage allowed for entertainment, food, and miscellaneous expenses?
Graph 5

Automobile Sales

<table>
<thead>
<tr>
<th>Months</th>
<th>Automobile Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>2</td>
</tr>
<tr>
<td>Feb.</td>
<td>6</td>
</tr>
<tr>
<td>Mar.</td>
<td>4</td>
</tr>
<tr>
<td>Apr.</td>
<td>5</td>
</tr>
</tbody>
</table>

Directions: Use the information to make a line graph.
Vocabulary

Directions: Study the types of graphs below.

Bar Graph - Used to compare the lengths of lines (bars).

Line Graph - Used to show changes by connecting dots to form a line.

Circle Graph - Used to compare the whole to its individual parts.
Directions: Construct a bar, line, and circle graph using your personal data for each activity listed.

**Bar Graph**

**Circle Graph**

**Line Graph**

**TV Viewing**
Directions: Use the graphs to answer the questions below.

1. Complete the picture graph using the following table:

   **CAR SALES**

<table>
<thead>
<tr>
<th>Month</th>
<th>Cars Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>45</td>
</tr>
<tr>
<td>November</td>
<td>15</td>
</tr>
<tr>
<td>December</td>
<td>60</td>
</tr>
</tbody>
</table>

   Each """" represents 10 cars.

2. What is the total number of cars sold from August through November?

3. What is the highest score received?

4. On which test did the student receive twice the score as on Test 1?
Directions: Label and complete the graph below.

1. Place these titles in correct locations.
   - Average Rainfall
   - Inches of Rain
   - Months

2. The point (●) for January is drawn to show the average rainfall to be ________________.

3. Complete the graph using the following:
   - Rainfall
     - April: 4 inches
     - May: 1½ inches
     - June: 0 inches

Rainfall:
- April: 4 inches
- May: 1½ inches
- June: 0 inches
1. What does this graph show?

_____________________

2. This is an example of what type of graph?

_____________________

3. What was the temperature at 11 a.m.?

_____________________

4. What was the lowest temperature recorded?

_____________________

At what time was it recorded?

_____________________

5. How many degrees difference between temperatures from 10 a.m. until 1 p.m.?

_____________________

6. This graph shows a player's record for one baseball season.

Complete the table to show the number of hits, walks, strike outs, etc. (Hint: Take a percentage of the given total for each.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hits</td>
<td>2</td>
</tr>
<tr>
<td>Walks</td>
<td>3</td>
</tr>
<tr>
<td>Strike outs</td>
<td>14%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
</tr>
</tbody>
</table>
Directions: Use the information below to complete the bar graph.

<table>
<thead>
<tr>
<th>Test</th>
<th>Words Spelled Correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Record of Words Spelled Correctly

Test
Activity Sheet

Directions: Follow the directions with each graph below.

Graph 1

Weight While Dieting

1. A person recorded his weight on the first day of each month. What was the weight for each month?

   ________________
   ________________
   ________________
   ________________

2. In which months was the same amount of weight lost?

   ________________

3. If the person were to keep dieting and lost the same amount of weight from July 1 to August 1 as from May 1 to July 1, how much would the person weigh?

   ________________

Graph 2

Budget

4. Complete a table to show how much money could be spent on each item of the graph with a $200.00 spending budget.

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: Complete a horizontal bar graph using the information below:

Graph 3

1. Label the names of "members" in the correct spots on the graph.

2. Show the number of years of membership for each member listed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td>5</td>
</tr>
<tr>
<td>Kenn</td>
<td>2</td>
</tr>
<tr>
<td>Cathy</td>
<td>3½</td>
</tr>
<tr>
<td>Sue</td>
<td>½</td>
</tr>
</tbody>
</table>

Membership Record
UNIT 9: CENTRAL TENDENCY
UNIT 9: CENTRAL TENDENCY

Central Tendency

What This Unit is About...

In this unit you will learn how to look at a set of data for patterns and ways to describe the data. The description of the data will include what are called measures of central tendency. The measures included here are mean, median, mode, and range.

Suggested Plan

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<tr>
<td>1. Finding the mean</td>
<td></td>
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<tr>
<td>2. Finding the median</td>
<td></td>
</tr>
<tr>
<td>3. Finding the mode</td>
<td></td>
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<tr>
<td>4. Finding the range</td>
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<td>Take Quiz as posttest.</td>
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</tbody>
</table>
Concept: Finding the Mean

Example: Find the mean of the following numbers:
72, 61, 80, 62, 72, 73, 56, 78

The mean is the average of a set of numbers.

Step 1: Add the numbers.

72
61
80
62
72
73
56
+ 78
---
554

8 addends

Step 2: Divide the sum by the number of addends.

69
8 ) 554
48
-48
74
-72
-2
UNIT 9: CENTRAL TENDENCY

Concept: Finding the Median

How do you find the median of a set of data?

Example: Find the median of the following numbers:
98, 72, 64, 85, 68, 89, 92, 75, 78

The median is the middle number in a group of numbers arranged in order of size.

Step 1. Arrange numbers from smallest to largest.
64, 68, 72, 75, 78, 85, 89, 92, 98

Step 2: Locate the middle value.
64, 68, 72, 75, 85, 89, 92, 98

Concept: Finding the Mode

How do you find the mode of a set of data?

Example: Find the mode of the following numbers:
56, 61, 62, 72, 72, 73, 78, 80

The mode is the number occurring most frequently in a group of numbers.

Step 1: Count the frequency of occurrences for each value.
Step 2: Locate the most frequently occurring value.
Example: 56, 61, 62, 72, 72, 73, 78, 80
UNIT 9: CENTRAL TENDENCY

Concept: Finding the Range

How do you find the range of a given set of data?

Example: Find the range of the following numbers:

12, 19, 18, 12, 11, 10, 15

The range is the difference between the largest and the smallest numbers in the set of numbers.

Step 1: Identify the largest and smallest numbers in the set.

12, 19, 18, 12, 11, 10, 15

Step 2: Write down the largest number and subtract the smallest number from it. The difference is the range.

19
-10
--
9
Directions: Complete the following. (Round numbers to nearest whole number.)

1. Find the mean of the following set of scores.
   78, 83, 91, 82, 86
   mean ________

2. Find the mean for the following set of numbers.
   9, 5, 8, 4, 10, 3, 7, 8, 6, 7, 9, 9, 7, 3, 8, 9
   mean ________

3. Find the median for the following sets of numbers.
   a. 6, 7, 8, 9, 5, 6, 0, 5, 6
   median ________
   b. 4.2, 5.6, 4.7, 3.8, 4.7, 6.1
   median ________

4. Find the mode of each of the following sets of numbers.
   a. 11, 15, 10, 19, 15, 11, 12, 17, 15, 13, 14, 12
   mode ________
   b. 49, 34, 57, 53, 55, 34, 57, 53, 34
   mode ________

5. Find the mean, median, mode, and range for the following set of numbers.
   6, 4, 8, 3, 7, 8, 6, 9, 2, 7, 9, 8, 4, 9, 6, 2
   mean ________ mode ________
   median ________ range ________

Unit 9
Vocabulary

Directions: Read and study.

data — factual information used for reasoning, discussion, or calculation

frequency — the number of repetitions

mean — average; quotient of the sum of all items divided by the number of items

median — middle number when the set of data is arranged in order of size

mode — item appearing most frequently. There may be more than one mode or no mode at all.

range — the difference between largest and smallest numbers in a set of numbers

statistics — a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data
Vocabulary Activity

Directions: Use the vocabulary words to fill in the blanks below.

1. In this unit you are studying a branch of mathematics dealing with the collection of data, which is called ________________.

2. The factual information collected for analysis is known as ________________.

3. Numerical data can be described in various ways:
   a) The difference between the smallest and largest numbers in a set is called ________________.
   b) The middle number in a set of data, arranged in order of size, is called the ________________.
   c) The average of the numbers in the set of data is called the ________________.
   d) An item (number) that is repeated most frequently in the set is called the ________________.
   e) The number of times a number is repeated is called the ________________.
Directions: Complete the following:

1. Find the mean for the following sets of numbers:
   a. .5, .6, .8, .09, 1, 3, 2
   b. 16, 18, 5, 3, 9, 10, 16, 18, 13, 20

2. Find the mode for the following sets of numbers:
   a. 8, 9, 7, 8, 7, 6, 8, 3, 8, 2, 8
   b. 3.1, 2, 3, 1, 0, 5
   c. 5, 6.4, 5, 3, 3, 5, 0, 1, 5, 14, 8, 3

3. Find the median for the following sets of numbers:
   a. 16, 15, 3, 16, 15, 4, 2, 1, 3, 15, 3, 16, 0
   b. 3.2, 3.3, 4, 0, 1, 3.1, 4.1, 4, 3.2
   c. 10, 15, 30, 40, 80, 90
Activity Sheet

**Directions:** Complete. (Round answers to tenths.)

1. **Find the mode** for the following sets of numbers:
   a. 72, 61, 80, 62, 72, 73, 58, 78  
   b. 8, 7, 5, 6, 9, 

2. **Find the median** for the following sets of numbers:
   a. 7, 9, 10, 10, 4, 6, 3, 6, 6, 8, 9 
   b. 13, 12, 3, 7, 8, 12 

3. **Find the mean** for the following sets of numbers:
   a. 75°, 73°, 65°, 75°, 74°, 68°, 65° 
   b. 3.1, 4, 0, 2.5, 7, 3.6, 5 

---

Unit 9
Activity Sheet

Directions: Find the mean, median, and mode for the following sets of numbers. Show work. (Round answers to tenths.)

1. 0, 1, 2, 3, 4, 5, 6
   - mean a. __________
   - median b. __________
   - mode c. __________

2. .5, .6, 1.1, .5, 2.1, 3
   - mean a. __________
   - median b. __________
   - mode c. __________

3. 21, 23, 19, 17, 21, 18, 22, 18, 17, 23, 18, 23, 16, 23
   - mean a. __________
   - median b. __________
   - mode c. __________

4. 8, 7, 8, 9, 7, 6, 5, 7, 8, 4, 8, 9, 6, 9, 2, 9
   - mean a. __________
   - median b. __________
   - mode c. __________
Activity Sheet

Directions: Complete.

Find the mean for the following sets of numbers:
1. 83, 91, 78, 86, 84 mean ________
2. .6, .8, .6, .9, .3, .2 mean ________
3. 21, 22, 24, 19 mean ________

Find the median of the following sets of numbers:
4. .2, 3.1, 0, 5 median ________
5. 8, 9, 7, 8, 6, 8, 2, 1 median ________
6. 21, 22, 21, 22, 21, 22, 22, 21 median ________

Find the mode of the following set of numbers:
7. 14, 15, 3, 2, 8, 7, 14, 8, 2 mode ________
     3, 8, 14, 16, 2, 3, 15, 2

Find the mean, median, and mode for the following set of temperatures:
78°, 76°, 64°, 63°, 70°, 75°, 76°, 60°
8. mean ________
9. median ________
10. mode ________
### Activity Sheet

#### Directions: Find the mean of the following sets of numbers.

1. 83, 91, 78, 86, 84
   - mean

2. .6, .8, .6, .9, .3, .2
   - mean

3. 21, 22, 24, 19
   - mean

#### Directions: Find the median of the following sets of numbers.

4. 2, 3.1, 0, 5
   - median

5. 8, 9, 7, 8, 6, 8, 3, 2, 1
   - median

6. 21, 22, 21, 22, 21, 22, 22, 21
   - median
Directions: Find the mode of the following sets of numbers.

7. 14, 15, 3, 2, 8, 7, 14, 8, 2, 3, 8, 14, 16, 2, 3, 15, 2

8. 94, 78, 85, 97, 65, 72, 85, 92, 98, 63, 72, 69, 85, 95, 93

Directions: Find the range of the following sets of numbers.

9. 6, 4, 8, 3, 7, 8, 6, 9, 2, 5

10. 42, 47, 49, 43, 45, 47, 48

Directions: Find the mean, median, mode, and range of the following sets of temperatures.

78°, 76°, 64°, 63°, 70°, 75°, 76°, 60°

11. mean

12. median

13. mode

14. range
UNIT 10: INTEGERS

Section 1: Addition
Section 2: Multiplication
UNIT 10: INTEGERS

Addition

Section 1

What This Section is About...

In this unit you will learn how to solve problems with integers. An integer is any whole number, or its opposite, and zero. You will learn how to add integers in Section 1.

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<table>
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<tr>
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</tr>
<tr>
<td>• Addition of integers</td>
<td></td>
</tr>
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</tr>
<tr>
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</tr>
</tbody>
</table>

Student's Guide
Concept: Addition of Integers

How do you add integers?

Example 1: Add $5 + 5$

Step 1: Look at the signs. Both are positive. (Remember: no sign is the same as a positive sign.)

Step 2: Add and write the common sign in the answer.

$$5 + 5 = 10$$

Example 2: Add $-5 + 3$

Step 1: Look at the signs. One is negative; one is positive.

Step 2: Subtract and take the sign of larger number.

$$\begin{array}{c}
-5 \\
+3 \\
\hline
-2
\end{array}$$

Example 3: Add $-5 + -5 = $

Step 1: Look at the signs. Both are negative.

Step 2: Add and write the common sign.

$$-5 + -5 = -10$$
Example 4: Add \((-6) + (9) =\)

Step 1: Look at the signs. One is negative; one is positive.

Step 2: Subtract and write the sign of the larger number in the answer.

\((-6) + (9) = 3\)

Review: Look at the signs.

Alike: Add and write the common sign.

Different: Subtract and write the sign of the larger number.
Quiz

Directions: Answer each question below.

1. What are integers?

2. State the rules for adding integers.

3. Define absolute value.

4. What are negative numbers?

5. Add: 
   +3  -3  +6  -5  -10  +2
   +2  -2  +8  -5  +2  -10

6. Add: 
   (-3) + (-7) + (-5) + (+3) + (-6) + (+2) + (+7) =

7. On which side of zero (on the number line) do negative values appear?

   __________________________

8. Is zero negative or positive?

   __________________________
Vocabulary

Directions: Read and study.

**absolute value** — the number without its sign (example: absolute value of $-8$ is $8$)

**common signs** — two or more integers having the same sign

**integers** — the set of whole numbers together with their opposites; signed numbers {...$-3$, $-2$, $-1$, $0$, $+1$, $+2$, $+3$...}

**negative** — having a value less than zero

**opposite** — additive inverse; when a number is added to its opposite the result is zero; opposites come in pairs

Examples: 4 is the opposite of $-4$ ($4 + (-4) = 0$)

-7 is the opposite of 7 ($-7 + 7 = 0$)

**positive** — having a value greater than zero

**sign** — one of two symbols (+, −) used to label a numeral, to identify its value as positive or negative
Activity Sheet

Directions: Follow the directions below.

1. Fill in the blanks:
   a. When the signs are alike you ____________ the two numbers and use the ____________ sign with the answer.
   b. When the signs are not alike you ____________ the two numbers and use the ____________ of the ____________ number (absolute value) with the answer.

2. Add:
   a. +8 + 2
   b. -3 - 2
   c. +17 + 16
   d. -18 + 2
   e. -20 - 5
   f. -16 + 3
   g. -88 + 10
   h. +82 - 15
   i. 63 - 6
   j. 8 + 8
   k. -32 + 11
   l. -8 - 21
   m. 55 66
   n. 39 -8
   o. 8 -39

3. Add:
   a. (-8) + (-2) + (-5) = ____________
   b. (-16) + (-5) + (2) = ____________
   c. (-3) + (+2) + (-5) = ____________
Directions: Follow the directions below.

1. There are two possible signs that an integer can have. What are they?

   _____________ and _____________

2. How can you indicate an integer is positive, if you do not wish to write the
   sign (+)? Show example here: ______________

3. Solve:

   a. (+3) + (-2) + (+6) = ______________

   b. (-8) + (-2) + (+3) = ______________

   c. (-2) + (-8) + (-5) + (+8) = ______________

   d. (-111) + (21) + (18) + (-100) = ______________

   e. (42) + (6) + (-40) + (-8) = ______________

   f. (37) + (-37) + (37) = ______________

   g. (48) + (-49) + (-7) = ______________

   h. (-75) + (-4) + (-21) = ______________
Activity Sheet

Directions:  Read each statement below.
Write T for True and F for False on each line.

1. When you are adding integers and the signs are the same, use the sign of the smaller integer with the answer.

2. Zero is neither positive nor negative.

3. The answer is always positive when you add.

4. The answer is always negative when you add.

5. You cannot determine the sign of the sum until you see the result when adding.

6. Zero is larger than –1.

7. Zero is larger than –10.

8. Negative numbers are to the left of zero on a number line.

9. The absolute value of negative ten is ten (10).

10. Absolute value can be treated as if it is positive.

Solve:

11. +1  12. –4  13. +5  14. –8  15. +1 0

+2   –3   –6   +7   +9

16. +1  17. –4  18. +1  19. –2  20. –2 3

+1  2   –1  5   –1  8   +2  1   +2  4

+1  3   –1  6   +1  9   –2  2   +2  5
Activity Sheet

Directions: Fill in the blanks.

1. If I gain 4 yd and then gain 5 yd, I ________ made a first down in football. I am _____ yd _____ short/over.

2. If I gain 5 yd, lose 4 yd, and then gain 10 yd on three plays, I ________ made a first down. I am _____ yd _____ short/over.

3. If I use (+) to show a gain and (−) to show a loss, how far does the ball travel (total) on the following football plays?

   +3, −2, −1, +6, −5, −2, +1.

4. Set up the part of the number line from −5 to +15.

Note: First down equals ten yards.
**Activity Sheet**

**Directions:** Add the integers.

<p>| | | | | |</p>
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<tr>
<th></th>
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</thead>
<tbody>
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<td>a.</td>
<td>+9</td>
<td>b.</td>
<td>−9</td>
<td>c.</td>
</tr>
<tr>
<td></td>
<td>+9</td>
<td></td>
<td>−8</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>−9 3</td>
<td>f.</td>
<td>+9 2</td>
<td>g.</td>
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<td></td>
<td>−9 4</td>
<td></td>
<td>+9 1</td>
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<td>i.</td>
<td>8 7</td>
<td>j.</td>
<td>−8 0</td>
<td>k.</td>
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<td></td>
<td>−8 1</td>
<td></td>
<td>−8 6</td>
<td></td>
</tr>
<tr>
<td>m.</td>
<td>5 + −9 + −5 + 8 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n.</td>
<td>5 + 7 + 5 + 6 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o.</td>
<td>(−5) + (−5) + 5 + 4 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p.</td>
<td>53 + −5 + 2 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>q.</td>
<td>−5 + 1 + 4 + 9 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r.</td>
<td>−48 + 4 + 7 =</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>s.</td>
<td>46 + (−45) + (−44) =</td>
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Section 2

What This Section is About...

In this unit you will learn how to solve problems with integers. An integer is any whole number, or its opposite, and zero. You will learn how to multiply integers in Section 2.

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Student's Guide
Concept: Multiplication of Integers

How do you multiply integers?

Example 1: Multiply \( +5 \times +4 \)

Step 1: Look at the signs. The signs are alike. The answer will be positive.
Step 2: Multiply and write the answer as positive.

\[ +5 \times +4 = +20 \]

Example 2: Multiply \( -27 \times 3 \)

Step 1: Look at the signs. The signs are different. The answer will be negative.
Step 2: Multiply and write the answer as negative.

\[ -27 \times 3 = -71 \]

Example 3: Multiply \( -27 \times -3 = \)

Step 1: Look at the signs. The signs are the same. The answer will be positive.
Step 2: Multiply and write the answer as positive.

\[ -27 \times -3 = +71 \]

Note: When you have a string of positive factors, the sign of the product can be easily determined by counting the number of negative factors. If the count is even, the product is positive; if the count is odd, the product is negative.
Quiz

Directions: Fill in each blank with the correct answer.

1. When multiplying two integers, the sign of the answer is ________________
   if the signs of the integers are alike, and ________________ if the signs are not alike.

2. Multiplication and ________________ of integers do not have the same rules.

3. A dot (•) between factors means to ____________________.

4. An x between factors means to ____________________.

5. Enclosing factors in parentheses means to ____________________.

6. Putting one number inside the parentheses and the other outside, with no operational sign printed between them, means to ____________________.

7. \((-3)(5) = \underline{\hspace{2cm}}\) 8. \((-2)(-6) = \underline{\hspace{2cm}}\)

9. \((5)(-3)(-2) = \underline{\hspace{2cm}}\) 10. \((4)(-6)(-3) = \underline{\hspace{2cm}}\)

11. \((3)(-2)(-1)(-1)(-5) = \underline{\hspace{2cm}}\) 12. \((5)(-2)(0)(9) = \underline{\hspace{2cm}}\)
Directions: Fill in each blank with the correct answer.

1. The product of a positive and a positive results in a ___________.
2. A positive times a negative gives a ___________.
3. The product of two negative integers gives a ___________.
4. Positive two (+2) times negative three (-3) gives a product of negative (-6) because the ___________ of the factors are ___________.
5. The sign of the product for this problem: (-2) (-3) (16) (-221) (74) (-33) (41) can be determined by counting the number of ___________ factors.
   The sign in this case will be _________.
6. (-3) • (-3) = __________ 7. (-5) (2) = __________
8. 16 x 2 = __________ 9. -16 x -2 = __________
10. (25) (-3) = __________ 11. 14 • 2 • -1 • 0 = __________
12. 5 • (-11) = __________ 13. (3) (-2) (-5) (-1) = __________

Directions: Determine only the sign for the final products.

14. (5) (0) (-1) (2) (-6) (-5) = __________
15. (2) (-6) (-5) (5) (-1) = __________
16. -3 • 4 • 2 • -5 = __________
Directions: Fill in the blank with the correct answer.

1. If the factors are both positive, the answer will be ________________.

2. If the factors are both negative, the answer will be ________________.

3. If one factor is positive and the other is negative, the answer will be ________________.

4. If the number of the negative factors is even, the sign of the product will be ________________.

Directions: Compute.

5. \((-3) (-11) = \) ________________

6. \((5)(-3) = \) ________________

7. \(25 \times (-5) = \) ________________

8. \((-30)(2) \times (-10) = \) ________________

9. \((5)(-2)(-3)(-1) = \) ________________

10. \((2)(-2)(2)(-2)(-2)(-2) = \) ________________
Activity Sheet

Directions: Fill in the blank with the correct answer.

1. In multiplication, if the signs are alike, the answer is ________________.
   If the signs are not alike, the answer is ________________.

2. The rules deal with only ________________ integers at the time, except for the shortcut rule in multiplication.

Directions: Determine the sign for each product.

3. (+) (+) = __________
4. (+) (-) = __________
5. (-) (-) = __________
6. (-) (+) = __________
7. (+) (+) = __________
8. (-) (-) = __________
9. (+) (-) = __________
10. (-) (-) = __________
11. (+) (+) = __________
12. (-) (+) = __________
13. (-) (-) = __________
14. (+) (-) = __________
15. (+) (-) (-) (+) (-) (+) (-) (-) (+) (+) (-) = __________
16. (-3) (-10) = __________
UNIT 11: EQUATIONS

Unit 11

What This Unit is About...

In this unit you will learn the procedures used to solve simple equations. The equations will involve addition or multiplication, or a combination of addition and multiplication.

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<tr>
<td>2. Solve equations of the form ( x + a = b )</td>
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Student's Guide
UNIT 11: EQUATIONS

Concept: Solving Equations of the Form \( ax = b \)

Example: Find \( x \) when \( a = -4 \) and \( b = 8 \) in the equation \( ax = b \).

Step 1: Write the equation.

\[-4x = 8\]

Step 2: Isolate \( x \) by dividing both sides of the equation by the "a" value (-4).

\[-4x \div -4 = 8 \div -4\]

Suggestion: "x" must be isolated, so use the opposite operation. Since \(-4x\) means \(-4\) multiplied by \(x\), the opposite operation is division.

\[-4x = 8\]
\[-4\]

and say, "If I divide the left side of the equation by \(-4\), I must also divide the right side of the equation by \(-4\)."

\[-4x = 8\]
\[-4\]

and say, "Since \(-4 + -4 = 1\), I can think of \(-4x + -4\) as \(x\), therefore \(x = 8 + -4\)."

\[x = \frac{8}{-4}\]
Step 3: Compute:

\[ x = \frac{-8}{-4} \]

\[ x = -2 \]

Step 4: Check by substituting for x, and computing.

\[-4x = 8 \]
\[-4(-2) = 8 \]
\[8 = 8 \]

Concept: Solve Equations of the Form \( x + a = b \)

Example: Find x when \( x + 36 = 100 \).

Step 1: Write the equation.

\[ x + 36 = 100 \]

Step 2: Isolate x by adding the opposite of the "b" value (36) to both sides of the equation.

\[ x + 36 + -36 = 100 + -36 \]

Step 3: Compute:

\[ (x + 0) = 64 \]

\[ x = 64 \]
UNIT 11: EQUATIONS

Step 4: Check by substituting for x, and computing.

\[ x + 36 = 100 \]
\[ 64 + 36 = 100 \]
\[ 100 = 100 \]

Concept: Solve Equations of the Form \( ax + b = c \)

Example: Find x if \( 2x + 4 = 6 \).

Step 1: Write the equation.

\[ 2x + 4 = 6 \]

Step 2: a) Isolate x. Add the opposite value of "b" (4) to both sides of the equation. Compute.

\[ 2x + 4 = 6 \]
\[ 2x + 4 + (-4) = 6 + (-4) \]
\[ 2x = 2 \]

b) Divide by the value of "a" (2) on both sides of the equation. Compute.

\[ 2x = 2 \]
\[ \frac{2x}{2} = \frac{2}{2} \]
\[ x = 1 \]

Step 3: Check by substituting the value for x.

\[ 2(1) + 4 = 6 \]
\[ 2 + 4 = 6 \]
\[ 6 = 6 \]
Directions: Find the value of x for equations of the form $ax = b$.

1. $1x = 6\quad x = \underline{\phantom{00}}$

2. $2x = -3\quad x = \underline{\phantom{00}}$

3. $-4x = -2\quad x = \underline{\phantom{00}}$

4. $16x = 4\quad x = \underline{\phantom{00}}$

5. $-3x = 12\quad x = \underline{\phantom{00}}$
Vocabulary

Directions: Study the words and definitions below.

adding the opposite — in solving equations, to undo addition add the opposite of the given integer (instead of subtracting)

equation — a statement of equality between two quantities
   Example: \((5a + 2 = 12)\)

isolate the variable — to work toward having the variable alone on one side of the equation

solve — to find all values which make an equation true

substitution — taking the place of another
   Example: \(5a + 2b + 3c\) when \(a = 2, b = 3, c = 4\)
   \[5(2) + 2(3) + 3(4)\]

variable — a symbol, usually a letter, used to represent a number in an expression or an equation
Directions: Find the variable for equations of the form when $ax = b$.

1. $-5a = 10 \quad x = \underline{\phantom{00}}$
2. $12b = 6 \quad x = \underline{\phantom{00}}$
3. $3c = -2 \quad x = \underline{\phantom{00}}$
4. $7d = -21 \quad x = \underline{\phantom{00}}$
5. $-27e = 3 \quad x = \underline{\phantom{00}}$
6. $-15f = 3 \quad x = \underline{\phantom{00}}$
7. $-3g = -15 \quad x = \underline{\phantom{00}}$
8. $24h = -8 \quad x = \underline{\phantom{00}}$
9. $-2k = 12 \quad x = \underline{\phantom{00}}$
10. $2m = 12 \quad x = \underline{\phantom{00}}$
Activity Sheet

Directions: Find the value for equations of the form \( ax = b \).

1. \( 22x = 11 \) \( x = \) __________
2. \( -17x = 34 \) \( x = \) __________
3. \( -25x = 5 \) \( x = \) __________
4. \( -5x = -25 \) \( x = \) __________
5. \( -27 = 9 \) \( x = \) __________
6. \( 3x = -27 \) \( x = \) __________
7. \( -45x = 5 \) \( x = \) __________
8. \( 9x = -45 \) \( x = \) __________
9. \( 3x = 2 \) \( x = \) __________
10. \( 1x = 2 \) \( x = \) __________
Activity Sheet

Directions: Solve for the variable for equations of the form $a + x = b$.

1. $k + 17 = 9 \quad x = \underline{\hspace{2cm}}$

2. $y + 21 = -11 \quad x = \underline{\hspace{2cm}}$

3. $m + 18 = -57 \quad x = \underline{\hspace{2cm}}$

4. $b + -13 = 14 \quad x = \underline{\hspace{2cm}}$

5. $r + -15 = 43 \quad x = \underline{\hspace{2cm}}$

Unit 11
Directions: Solve for the variable for equations of the form $a + x = b$.

1. $z + -3 = -8$  
   $z = \underline{5}$

2. $x + -7 = 12$  
   $x = \underline{19}$

3. $b + 4 = 17$  
   $b = \underline{13}$

4. $x + -4 = -37$  
   $x = \underline{-33}$

5. $y + 27 = -11$  
   $y = \underline{-38}$

6. $c + 11 = -5$  
   $c = \underline{-16}$

7. $k + -11 = -21$  
   $k = \underline{-10}$

8. $a + -7 = 8$  
   $a = \underline{15}$

9. $p + -5 = -5$  
   $p = \underline{0}$

10. $q + -371 = -371$  
    $q = \underline{0}$
Directions: Find the value of $x$ for equations of the form $ax + b = c$.

1. $x + 3 = 7 \quad x = \underline{\quad \quad}$

2. $2x + 5 = 9 \quad x = \underline{\quad \quad}$

3. $-2x + 4 = 10 \quad x = \underline{\quad \quad}$

4. $5x + (-10) = 20 \quad x = \underline{\quad \quad}$

5. $2x + 2 = 7 \quad x = \underline{\quad \quad}$
Activity Sheet

Directions: Find the value of x for equations of the form ax + b = c.

1. \(9x + 9 = 36\) \(x = \) ________

2. \(5x + 4 = 10\) \(x = \) ________

3. \(16x + 2 = -30\) \(x = \) ________

4. \(-27x + 3 = 42\) \(x = \) ________

5. \(-2x + -5 = -15\) \(x = \) ________
Directions: Find the value of $x$ for equations of the form $ax + b = c$.

1. $4x + 3 = 2 \quad x = \underline{\phantom{0}}$

2. $x + 2 = 7 \quad x = \underline{\phantom{0}}$

3. $3x + 4 = 6 \quad x = \underline{\phantom{0}}$

4. $2x + 5 = 9 \quad x = \underline{\phantom{0}}$

5. $2x + 2 = 4 \quad x = \underline{\phantom{0}}$

6. $18x + 3 = 12 \quad x = \underline{\phantom{0}}$

7. $6x + 2 = 9 \quad x = \underline{\phantom{0}}$

8. $3x + 9 = 30 \quad x = \underline{\phantom{0}}$

9. $14x + 2 = 28 \quad x = \underline{\phantom{0}}$

10. $2x + 1 = 5 \quad x = \underline{\phantom{0}}$
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