Were Our Mathematics Textbooks a Mile Wide and an Inch Deep?

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Abstract

Three mathematics textbooks of different grade levels, compared with Chinese math textbooks of the same grades, were selected that were used in some of the middle schools in Clark County Schools District (CCSD).

Systematical review of the three textbooks were made grade by grade in order to figure out “Are Our Math Textbooks a Mile Wide and an Inch Deep?” It was found that many contents of these math text books were overlapped and repeated from previous grades to upper grades. In these three incoherent courses, topics were highly repetitive. It was noticed that approximately 20% of the contents were new and introduced into upper grade levels. 80% of the contents were re-taught from previous grades. Because of that, much time was spent every year reviewing and re-teaching the same topic again and again. 7th and 8th grade students were still learning basic arithmetic such as fractions, decimals, order of four operations, where Chinese students of the same grade moved on to algebra and geometry and trigonometry topics because the writer looked into Chinese mathematics textbooks from 6th grade to 8th grade. It was found that the Chinese math textbooks covered fewer topics than the U.S. math textbooks for the same grade. The Chinese math textbooks had fewer pages than those of the U.S. math textbooks because the Chinese math textbooks had little graphics or no problems asking students to use a calculator to find the correct answers. The Chinese math textbooks had 90% new contents. Chinese math concepts were taught to mastery. Each concept built upon the next; students were encouraged to move on. What had been taught in Chinese math classrooms was never re-taught and only revisited later. Chinese students outperformed the Unites States because they had uniform national standards.
Chinese math textbooks had little repetition. Besides, Chinese curriculum focused on fewer content areas, but dealt with them in greater depth.

It was found that *enVision* Math textbook (5th grade) was used in some elementary schools of CCSD. If students were taught to master the concepts of mathematics from *enVision* math textbook, those students could study pre-algebra or algebra I in 6th grade because *enVision* math textbook covered nearly all that was taught in Course 1, Course 2, and even in Course 3.

Researchers thought that if students obtained satisfactory achievement results, the curriculum was powerfully linked to them. It was hoped that there would be, in the United States, a set of national standards/curricula at each grade level so that math textbooks would be compiled on the basis of these uniform standards/curricula even if each state wanted to have her own edition of mathematics textbooks because a coherent set of national standards/curriculum would help students gain their desirable academic achievement results.
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Chapter I

Introduction

In the past six years, the writer was assigned to work in sixth grade, seventh grade, and eight grade math classrooms. It was found that the contents of each grade math textbook were repeated nearly 80% that had been taught from previous grades. Even if 80% of the contents were taught from previous grades, students were still unable to master what were supposed to have mastered. Attention was brought to the writer why students were unable to master these contents. Focuses were made on mathematics textbooks. The writer mainly looked into the three mathematics textbooks (Course 1, Course 2, and Course 3, Holt, Nevada Version, Copyright 2007) which were used in some of the middle schools in Clark County Schools District (CCSD), Nevada. It was said that Course 1 was used for Grade 6, Course 2 used for Grade 7, and Course 3 used for Grade 8. Besides, the writer analyzed Chinese 6th grade, 7th grade, and 8th grade mathematics textbooks (People’s Education Press, Beijing, China 2006) to show the contrast between the math textbooks of the two countries. It was found that many contents of these Holt mathematics textbooks were overlapped and repeated from previous grades to upper grades. In these three incoherent courses, topics were highly repetitive and unfocused. It was noticed that approximately 20% of the contents were new and introduced into upper grade levels. 80% of the contents were re-taught from previous grades. Therefore, every year much time was spent reviewing and re-teaching the same topic again and again. As shown in Table 1B (on pp. 43-64), the contents of “Exponents” were taught across three grades, 1-3 in Course 1, 1-2 and 1-4 in Course 2, and 4-1 in Course 3 (see the table on page 43). “Order of Operations” should have been taught and mastered in an elementary school, but it was repeated in 1-4 in Course 1 and 1-5
in Course 2 (see the table on page 43). “Equations and Their Solutions” were repeated across the three grades in the sections of 2-2, 2-4, 2-5, 2-6, 2-7, and 2-8 in Course 1, 1-10, 1-11, and 1-12 in Course 2, and 1-7, 1-8, 2-6, 2-7 in Course 3 (see the table on page 44). “Representing, Comparing, and Ordering Decimals” were taught across three grades such as 3-1 in Course 1, 2-11 in Course 2, and 6-1 in Course 3 (see the table on page 46). In Course 1, Course 2, and Course 3, “Decimals and Fractions” were taught and re-taught across three grades. 7th and 8th grade students were still studying basic arithmetic such as fractions, decimals, order of operations, while Chinese students of the same grade moved on to algebra and geometry and trigonometry topics because the writer also looked into Chinese math textbooks from 6th grade to 8th grade. Their mathematics curricula were continued from previous grade levels as seen from the contents of 6th grade in Table 5 on pp. 211-212, 7th grade in Table 6 on pp. 213-215 and 8th grade in Table 7 on pp. 216-217. As was known to all, the U.S. math textbooks had a lot of repetition. “Researchers blame this pattern on the heavy repetition of basic skills that begins in 5th grade and persists through 8th grade. Students fall so far behind in those years that they never have a chance to catch up. The middle school math … curriculum is an intellectual wasteland. We seriously deprive our kids of intellectual work during those years.”  

Wenyuan Gu (1997) mentioned in his article The Differences of mathematics Achievements Between American Children and Chinese Children that "Math and science curricula in the United States lack a coherent vision of how to educate students, compared with the coursework of other countries, ...The U.S. curriculum is a mile wide and an inch deep" (p.23). It was found that Chinese mathematics textbooks covered fewer topics than the U.S. mathematics textbooks for the same grade. The Chinese math textbooks had fewer pages than the U.S. math textbooks because the Chinese math textbooks had little graphics or no problems
asking students to use a calculator to find the correct answers or the mean of a set of numbers. In Chinese math textbooks there were no multiple choice problems. Students solved all problems, showing paper-pencil work (No work, No credit). The Chinese math textbooks had 90% new contents as seen from Table 5 to Table 7 on pp. 211-217, where it showed the contents which were not repeated. From the 7th grade and 8th grade Chinese mathematics books, the content areas were continued from previous grade. Each concept built upon the next. Students were encouraged to move on. Chinese math concepts were taught to mastery. What had been taught was never re-taught and only revisited later. Chinese students outperformed the students of the Unites States because they had uniform national standards. Chinese math textbooks had little repetition. It was hoped that there would be, in the United States, a set of national standards for academics at each grade level so that math textbooks would be compiled on the basis of these uniform standards because a coherent set of national standards would provide students good academic foundation and help them move on as well as help the nation keep pace globally. Researchers thought that “…the curriculum is powerfully linked to achievement results.”

Unfortunately, “…many states have weakened standards in the past decade to help schools meet requirements of the 2002 No Child Left Behind law.” Cris Prystay (2004) pointed out “Under the Bush administration’s No Child Left Behind policy, funding and jobs depended on how each school rates on standardized state exams. Many districts are reluctant to try something new for fear of slipping up on those exams.”

There was little doubt that these Holt math textbooks might have been compiled on the basis of such expectations. From the writer’s point of view, a good curriculum should start and be introduced from kindergarten level. Elementary schools were the stages of great importance so far as students’ academics foundation was concerned. Their good math foundation laid in elementary schools would pave their way to
move on for the upper grade levels, and that was very essential and extremely important for students in middle schools never to study four operations of whole numbers again.

It was found that *enVision* math textbook was used for the 5th grades in some of the elementary schools in CCSD. The writer wondered whether there would be a good connection or linkage of mathematics concepts from 3rd and 4th grades to the *enVision* math textbook. If the students did not master number sense, number facts, place value, patterns, visualization, and computation from previous grades, it would take a teacher some time to help students review some content areas before *enVision* math text book was used. The contents of the *enVision* math textbook was good from the writer’s point of view, but the questions were, “Do the 5th graders have such ability as to use the math textbook if they did not master what was supposed to master in previous grades?” “Can the 5th graders complete and master what the book was designed by the end of academic year?” because the *enVision* math textbook covered a lot of contents area (see Table 4 on page 198). If 5th graders were able to complete the book and master the concepts of mathematics in a year, they would feel much comfortable to study Pre-algebra or Algebra I in middle schools, thus eliminating a great amount of repetition and definitely improving CCSD students academic achievement. It was hoped that the school district would pay attention to examining and reviewing the results of the use of *enVision* math textbook in order to know how much improvement students were made.

It was hoped that each state or local district would follow the Common Core State Standards for Mathematics under the guidance of the Common Core State Standards Initiative.
Chapter II

The Problem

The purpose of this study was to determine whether mathematics textbooks used by some middle schools in Clark County School District (CCSD), Nevada, were “A Mile Wide and an Inch Deep?” In particular, the study was intended to seek answers to the following questions:

1. Were the contents of each book repeated?
2. Were the concepts of each book overlapped?
3. Were the concepts of each book unfocused?
4. Were the mathematics textbooks “A Mile Wide And an Inch Deep”?
Chapter III

Procedures

To obtain information for answering the research questions set forth in this study, the following steps were taken:

1. Three mathematics textbooks (Course 1, Course 2, and Course 3) were selected that were used in some of the middles schools in Clark County Schools District (CCSD), Nevada. It was found that Course 1 was used for Grade 6, Course 2 was used for Grade 7, and Course 3 was used for Grade 8.

2. The writer gathered some information from Mathematics Course 1, Holt (Nevada Version, Copyright 2007). The writer did not copy all the examples or explanation or vocabulary from the book. In Course 1 Mathematics Textbook, there were 12 chapters which contained 112 sections including 5 extension sections. Systematical analyses were made of every section in each chapter to find whether or not the contents were “a mile wide and an inch deep.”

3. The writer gathered some information from Mathematics Course 2, Holt (Nevada Version, Copyright 2007). The writer did not copy all the examples or explanation or vocabulary from the book. Some details of examples were omitted on purpose. In Course 2 Mathematics Textbook, there were 12 chapters which contained 112 sections including 7 extension sections. Systematical analyses were made of each section from each chapter to find whether or not the contents were “a mile wide and an inch deep.”

4. The writer gathered some information from Mathematics Course 3, Holt (Nevada Version, Copyright 2007). The writer did not copy all the examples or explanation or vocabulary from the math textbook. Some details of examples were omitted on purpose. In Course 3
Mathematics Textbook, there were 14 chapters which contained 111 sections including 3 extension sections. Systematical analyses were made of each section from each chapter to find whether or not the contents were “a mile wide and an inch deep.”

5. The writer used the information gathered from the three mathematics textbooks in order to compare the contents to see whether they were repeated or overlapped.

6. The writer also selected Chinese 6th grade mathematics textbook (People’s Education Press, Beijing, China 2006), 7th grade math textbook (People’s Education Press, Beijing, China2006), and 8th grade math textbook (People’s Education Press, Beijing, China2006)

7. The writer read some literatures from other professional papers to gather information to support his investigation.

8. The writer found that some of the elementary schools in CCSD used enVision Mathematics textbook for 5th graders. The writer read the textbook and used the information from the textbook to compare some of the contents used in Course1, Course2, and Course 3.
Chapter IV

Findings

The following was the information the writer selectively typed from Mathematics Course 1, Holt (Nevada Version, Copyright 2007), Mathematics Course 2, Holt (Nevada Version, Copyright 2007), and Mathematics Course 3, Holt (Nevada Version, Copyright 2007). The writer did not type all examples or explanation or vocabulary from each textbook, but the writer listed nearly all contents typed from each text book. Therefore, the contents of Table 1A (Course 1 shown on pp. 10-42), Table 2A (Course 2 shown on pp. 72-106), and Table 3A (Course 3 shown on pp. 131-165) were stated respectively. Systematical analyses were made of every section in each chapter from each course to find whether or not the contents were “a mile wide and an inch deep.” Details of contents repetition or re-taught from each chapter of Course 1, Course 2, and Course 3 were indicated in Table 1B (Course 1 on p.43), Table 2B (Course 2 on p. 107), and Table 3B (Course 3 on p. 166), which the writer typed and organized from those mathematics courses. Note was also indicated in some sections of each course in Table 1A, Table 2A, and Table 3A.

A. Mathematics Course 1

In Course 1 Math Textbook, there were 12 chapters which contained 112 sections including 5 extension sections. Mathematics Course 1 had 827 pages long. Systematical analyses were made of every section in each chapter to find whether or not the contents were “a mile wide and an inch deep.” Great details were also indicated in Table 1B. From Table1B (on page 43),
many of contents were seen being repeated or overlapped in each grade. Some of typical examples of repletion or overlapping were stated in the following. The writer did not type all of the examples that were shown to be repeated or re-taught in the following statement. Table 1B (on p. 43) was clearly shown which content was to be taught or to be re-taught, etc. It was found that about 20% of the contents were new. The rest of them were re-taught.

As shown in Table 1B, the contents of “Exponents” were taught, for example, across three grades, i.e., 1-3 in Course 1, 1-2 and 1-4 in Course 2, and 4-1 in Course 3. “Order of Operations” should have studied in an elementary school, but it was repeated in 1-4 in Course 1 and 1-5 in Course 2. “Equations and Their Solutions” were repeated across the three grades, i.e., sections of 2-2, 2-4, 2-5, 2-6, 2-7, and 2-8 in Course 1, 1-10, 1-11, and 1-12 in Course 2, and 1-7, 1-8, 2-6, and 2-7 in Course 3. “Representing, Comparing, and Ordering Decimals” were taught across three grades, i.e., 3-1 in Course 1, 2-11 in Course 2, and 6-1 in Course 3. “Decimals and Fractions” were students’ weak parts. In Course 1, Course 2, and Course 3, decimals and fractions were taught and re-taught across three grades, but students still did not master them. “Addition Equations” was repeated in 2-5 in Course 1, 1-11 in Course 2, and 1-7 in Course 3. “Multiplication Equations” was repeated in 2-7 in Course 1, 1-12 in Course 2, 1-8 in Course 3. “Multiplying Decimals” was repeated in 3-5 in Course 1, 3-3 in Course 2, and 2-4 in Course 3. As seen from Table 1B (on p. 43), many contents were repeated or overlapped across these three courses, etc.
B. Table 1A

(Mathematics Course 1)

Table 1A showed the contents of Mathematics Course 1 Textbook, where there were 12 chapters which contained 112 sections including 5 extension sections. Mathematics Course 1 had 827 pages long. Additional comments were also made on some sections or chapters. The writer sometimes gave a Note at the end of some sections in certain chapters.

Chapter 1

Whole Numbers and Patterns

Chapter 1 dealt with Numbers and Patterns. There were 7 sections in it.

1-1 Comparing and Ordering Whole Numbers

Example 1 Using Place Value to Compare Whole Numbers
Example 2 Using a Number Line to Order Whole Numbers

Note: In the section, Place Value Table, Standard Form, Expanded Form, and Word Form were indicated. That was vital for students to self-study them.

1-2 Estimating with Whole Numbers

Vocabulary compatible number underestimate overestimate

Example 1 Estimating a Sum or Difference by Rounding
Example 2 Estimating a Product by Rounding
Example 3 Estimating a Quotient Using Compatible Numbers

1-3 Exponents

Vocabulary exponent base exponential form

Example 1 Writing Numbers in Exponential Form

\[ 4 \times 4 \times 4 \rightarrow 4^3 \]

Example 2 Finding the Value of Numbers in Exponential form

\[ 2^7 \rightarrow 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128 \]
Example 3 PROBLEM SOLVING APPLICATION

1-4 Order of Operations

Vocabulary numerical expression evaluate order of operations

Example 1 Using the Order of Operations

9 + 12 × 2 → 9 + 24 = 33, 7 + (12 ×3) ÷6 → 36 ÷6 → 7 + 6 = 13

Example 2 Using the Order of Operations with Exponents

3³ + 8 -16 → 27 + 8 -16 → 35 -16 =19

Example 3 Consumer Application

1-5 Mental math

Vocabulary Commutative Property Associative Property Distributive Property

Example 1 Using Properties to Add and Multiply Whole Numbers

12 + 4 + 18 + 46 → (12 + 18) + (4 + 46) → 30 + 50 = 80

Example 2 Using the Distributive Property to Multiply

4 ×23 = 4× (20+3)

1-6 Problem solving Skill: Choose the Method of Computation

Example 1 Choose a solution method and solve.

867 – 59 → (867 + 1) – (59 + 1) → 868 -60 = 808

1-7 Pattern and Sequences

Vocabulary sequence term arithmetic sequence

Example 1 Extending Arithmetic Sequences

A) 3, 15, 27, 39, ____, ____ , ....

A pattern is to add 12 to each term to get the next term.

Example 2 Completing Other Sequences

B) 1, 6, 2, 12, ____, 24, 8, ______, 16

×6, ÷3, ×6, ÷3, ×6 ÷3, ×6, ÷3,
Chapter 2

Introduction to Algebra

Chapter 2 dealt with Introduction to Algebra. There were 9 sections including an extension section.

2-1 Variables and Expressions

Vocabulary

variable  constant  algebraic expression

Example 1 Evaluating Algebraic Expressions

\[ w \div 3 \text{ when } w = 55, \ 4 \times n + 6^2 \]

Example 2 Evaluating Expressions with Two Variables

\[ l \times w \text{ for } l = 4 \text{ and } w = 2 \]

2-2 Problem Solving Skill: Translate Between Words and Math

Example 1 Social Studies Applications

\[ n - 4,000 \]

Example 2 Translate Words into Math

\[ b \text{ divided by } 14 \rightarrow b \div 14 \text{ or } \frac{b}{14} \]

Example 3 Translating Math into Words

\[ a - 45 \rightarrow a \text{ minus } 45 \text{ or take away } 5 \text{ from } a \]

Note: There were several different ways to write math expressions with words. A table was shown on p.59.

2-3 Translating Between Tables and Expressions

Example 1 Write an Expression

Write an expression for the missing value in each table.

When Reilly’s age is \( n \), Ashley’s age is \( n + 2 \).

Example 2 Writing an Expression for a Sequence
Write an expression for the sequence in the table.

The expression for the sequence is $2n + 1$.

Example 3 Writing an Expression for the Area of a Figure

$$8 \text{ (base (in.))} \times h \text{(height in. )} = 8h \text{ (in}^2)$$

In each row of the table, the area is half the product of the base and the height. The expression is $\frac{8h}{2}$, or $4h$.

2-4 Equations and Their Solutions

Vocabulary  
**equation**   **solution**

Example 1 Determining Solutions of Equations

$a + 23 = 82$ for $a = 61$, $60 \div c = 6$ for $c = 10$, etc.

Are they equal or not?

Example 2 Life Science Application

$12f = i$ for $f = 13$ and $i = 156$

*Note:* Determine whether the given value of each variable is a solution that also appeared on page 95.

2-5 Addition Equations

If an equation contains addition, solve it by subtracting from both sides to “undo” the addition

Example 1 Solving Addition Equations

$$x + 62 = 93 \quad 81 = 17 + y$$

$$-62\quad -62\quad -17\quad -17$$

$$x = 31 \quad 64 = y$$

Example 2 Social Studies Application

$$25 = 6 + d \quad \rightarrow 19 = d$$

2-6 Subtraction Equations

When an equation contains subtraction, use addition to “undo” the subtraction. Remember to add the same amount to both sides of the equation
Example 1 Solving Subtraction Equations

\[ p - 2 = 5 \quad 40 = x - 11 \quad x - 56 = 19 \]

\[ + 2 \quad +2 \]

\[ p = 7 \]

2-7 Multiplication Equations

Example 1 Solving Multiplication Equations

\[ 3x = 12 \quad 8 = 4w \]

Example 2 Problem Solving Application

\[ A = lw \]

2-8 Division Equations

Example 1 Solving Divisions Equations

\[ \frac{y}{5} = 4 \quad 12 = \frac{z}{4} \]

Example 2 Physical Science Application

\[ 15 = \frac{p}{2} \]

Extension Inequalities

Vocabulary  *inequality*

Examples 1 Graphing Inequalities

Example 2 Solving and Graphing Inequalities

\[ y + 7 < 9 \quad 2m \geq 12 \]

*Note:* The extension section should be moved to Chapter 1 of *Course 2*.

Chapter 3

Decimals

Chapter 3 dealt with decimals. There were 9 sections in it.

3-1 Representing, Comparing, and Ordering Decimals
Example 1 Reading and Writing Decimals

1.05

*Expanded form:* $1 + 0.05$

*Word form:* one and five hundredths

Example 2 Earth Science Application

$0.12 < 0.50$

Example 3 Comparing and Ordering Decimals

Order the decimals from least to greatest.

$12.35, 14.3, 14.05 \rightarrow 14.5, 14.30, 14.35$

3-2 Estimating Decimals

Vocabulary *clustering*  *front-end estimation*

Example 2 Rounding Decimals to Estimate Sums and Differences

$3.92 + 6.28; \text{ ones } \rightarrow 4 + 6 = 10$

$8.6355 - 5.039; \text{ hundredths } \rightarrow 8.64 - 5.04 = 3.60$

Example 3 Using Compatible Numbers to Estimate Products and Quotients

$26.76 \times 2.93 = 25 \times 3 = 75, 42.64 \div 16.51 = 45 \div 15 = 3$

Example 4 Using Front-End Estimation

$9.99 + 22.89 + 8.3 \rightarrow 9 + 22 + 8 = 39$

$0.99 + 0.89 + 0.30 \rightarrow 1.00 + 1.00 + 0.50 = 2.50$

$39.00 + 2.50 = 41.50$

3-3 Adding and Subtracting Decimals

Example 2 Using Mental Math to Add and Subtract Decimals

$1.6 + 0.4 = 2$

$3 - 0.8 = 2.2$

Evaluating Decimals Expressions

Evaluate $7.52 - s$ for each value of $s$. 
A) $s = 2.9 \quad 7.52 - s \quad 7.52 - 2.9 = 4.62, \text{ etc}$

3-4 Scientific Notation

Vocabulary  *scientific notation*

Example 1 Multiplying by Power of Ten

$4,325 \times 1,000 = 4,325,000$

$2.54 \times 10,000 = 25,400$

Example 2 Writing Numbers in Scientific Notation

$8,296,000 \rightarrow 8.296 \times 10^6$

Example 3 Writing Numbers in Standard Form

$3.2 \times 10^7 \rightarrow 32,000,000$

3-5 Multiplying Decimals

Example 2 Multiplying a Decimal by a Decimal

$0.2 \times 0.6 = 0.12$

$3.25 \times 4.8 = 15.600$

$0.05 \times 0.9 = 0.045$

Example 3 Evaluating Decimal Expressions

Evaluate $3x$ for $x = 4.047 \rightarrow 3x = 3(4.047) \rightarrow 4.047 \times 3 = 12.14$

3-6 Dividing Decimals by Whole Numbers

Example 1 Find each quotient

$0.75 \div 5 = 0.15 \quad 2.52 \div 3 = 0.84$

Example 2 Evaluate $0.435 \div x$ for $x = 3$

$0.435 \div 3 = 0.145, \text{ etc}$

3-7 Dividing by Decimals

Example 1 Find each quotient.

$3.6 \div 1.2 = 3 \quad 42.3 \div 0.12 = 352.5$
3-8 Problem Solving Skill: Interpret the Quotient

Example 1 Measurement Application

0.87 ÷ 0.15 = ?

87 ÷ 15 = 5.8

Note: The writer found that students had trouble dividing decimals by decimals. Great focuses were made on this part.

3-9 Solving Decimal Equations

Example 1 Solve each equation

\[ g - 3.1 = 4.5 \rightarrow g = 7.6 \]

\[ 3k = 8.1 \rightarrow k = 2.7 \]

\[ \frac{m}{5} = 1.5 \rightarrow m = 7.5 \]

Chapter 4

Number Theory and Fractions

Chapter 4 dealt with number theory and fractions. There were 10 sections including an extension section in it.

4-1 Divisibility

Vocabulary divisible composite number prime number

Note: The table in the book showed “Divisibility Rules” for numbers divisible by 2, 3, 4, 5, 6, 9, 10.

4-2 Factors and Prime Factorization

Vocabulary factor prime factorization

Example 1 List factors of numbers

18

The factors of 18 are 1, 2, 3, 6, 9, 18.

13

13 = 1 • 13
The factor of 13 is 1 and 13.

Example 2 Write the prime factorization of each number.

36

The prime factorization of 36 is $2 \cdot 2 \cdot 3 \cdot 3$, or $2^2 \cdot 3^2$.

4-3 Greatest Common Factor

Example 1 Find the GCF

16 and 24

The GCF of 16 and 24 is 8.

Note: The section showed the three methods: listing factors, prime factorization, and a ladder diagram, to find GCF. These methods were very good.

4-4 Decimals and Fractions

Vocabulary mixed numbers terminating decimal repeating decimal

Example 1 Writing Decimal as Fractions or Mixed Numbers

$0.23 \rightarrow \frac{23}{100}$ \quad $1.7 \rightarrow 1\frac{7}{10}$

Example 2 Writing Fractions as Decimals

$\frac{3}{4} = 0.75$ \quad $\frac{5}{3} = 1.666\ldots = 1.\overline{6}$

Example 3 Comparing and Ordering Fractions and Decimals

$0.5, \frac{1}{2}, 0.37 \rightarrow \frac{1}{2}, 0.37, 0.5$

4-5 Equivalent Fractions

Vocabulary equivalent fractions simplest form

Example 1 Finding Equivalent Fractions

$\frac{6}{8} = \frac{9}{12} = \frac{3}{4}$

Example 2 Multiplying and Dividing to Find Equivalent Fractions

$\frac{2}{3} = \frac{2 \cdot 6}{3 \cdot 6} = \frac{12}{18}$
Example 3 Writing Fractions in Simplest Form

\[
\frac{18}{24} = \frac{18 \div 6}{24 \div 6} = \frac{3}{4}
\]

4-6 Mixed Numbers and Improper Fractions

Vocabulary  
*improper fraction*  *proper fraction*

Example 2 Writing Mixed Numbers as Improper Fractions

\[
2 \frac{1}{5} = \left(\frac{5 \cdot 2}{5} + \frac{1}{5}\right) = \frac{10 + 1}{5} = \frac{11}{5}
\]

4-7 Comparing and Ordering Fractions

Vocabulary  
*like fractions*  *unlike fractions*  *common denominator*

Example 1 Compare, write <, > or =

Example 3 Ordering Fractions

Order \(\frac{3}{7}, \frac{3}{4}\), and \(\frac{1}{4}\) from least to greatest.

Rename with like denominators.

\[
\frac{3 \cdot 4}{7 \cdot 4} = \frac{12}{28} \quad \frac{3 \cdot 7}{4 \cdot 7} = \frac{21}{28} \quad \frac{1 \cdot 7}{4 \cdot 7} = \frac{7}{28}
\]

The fractions in order from least to greatest are \(\frac{1}{4}, \frac{3}{7}, \frac{3}{4}\).

*Note:* The compilers should add to the section another way of how to compare fractions by using cross product.

4-8 Adding and Subtracting with Like Denominators

Example 2 Subtracting Like Fractions and Mixed Numbers

A) \(1 - \frac{2}{3}\)

\[
\frac{3}{3} - \frac{2}{3} = \frac{1}{3}
\]

B) \(\frac{3}{12} - \frac{1}{12} = \frac{2}{12} = \frac{2}{2}
\]

Example 3 Evaluating Expressions with Fractions
\[
\frac{5}{8} - x \text{ for } x = \frac{3}{8} \rightarrow \frac{5}{8} - \frac{3}{8} = \frac{2}{8} = \frac{1}{4}
\]

\[
x + \frac{1}{8} \text{ for } x = \frac{3}{8} \rightarrow \frac{3}{8} + \frac{1}{8} = \frac{4}{8} = \frac{1}{2}
\]

4-9 Estimating Fractions Sums and Differences

Example 1 Estimating Fractions

\[
\frac{8}{9} + \frac{2}{11} \rightarrow 1 + 0 = 1
\]

\[
\frac{7}{12} - \frac{8}{15} = \frac{1}{2} - \frac{1}{2} = 0
\]

Extension Sets of Numbers

Vocabulary set empty set element subset intersection union Venn diagram

Note: The Writer found that there were good examples describing numbers sets in the extension.

Chapter 5

Fraction Operations

Chapter 5 dealt with fraction operations. There were 10 sections in it.

5-1 Least Common Multiple

Vocabulary least common multiple (LCM)

Example 2 Using Multiples to find the LCM

6 and 9

The LCM of 6 and 9 is 18.

12, 10, and 15 \rightarrow LCM: 60

Note: The writer found that there were good methods used to find LCM in the section such as using a number line and prime factorization. It was found that a ladder diagram was used to find factors and prime factorization in 4-2 and GCF in 4-3 of Course 1, but it was not found that the ladder diagram could be used in finding Least Common Multiple (LCM) in 5-1 of Course 1. Actually, the ladder diagram should be also used to find LCM if proper instruction was carried out.
5-2 Adding and subtracting with Unlike Denominators

Vocabulary  
*least common denominator* (LCD)

Example 2 Adding and Subtracting Unlike Fractions

\[
\frac{9}{10} - \frac{7}{8} = \frac{72}{80} - \frac{70}{80} = \frac{2}{80} = \frac{1}{40}
\]

\[
\frac{5}{12} + \frac{1}{6} = \frac{5}{12} + \frac{2}{12} = \frac{7}{12}
\]

*Note:* As mentioned in 5-1, the ladder diagram was also used to find LCD when adding and subtracting with unlike denominators if proper instruction was carried out.

5-3 Adding and subtracting Mixed Numbers

Example 1 Adding and Subtracting Mixed Numbers

\[
2\frac{3}{4} + 1\frac{1}{6} = \frac{218}{24} + \frac{14}{24} = \frac{232}{24} = \frac{11}{12}
\]

\[
8\frac{2}{5} - 6\frac{3}{10} = \frac{84}{10} - \frac{63}{10} = \frac{21}{10}
\]

*Note:* As mentioned in 5-1, the ladder diagram was also used to find LCD when adding and subtracting with unlike denominators if proper instruction was carried out.

5-4 Regrouping to Subtract Mixed Numbers

Example 1 Regrouping Mixed Numbers

\[
6\frac{5}{12} - 2\frac{7}{12} = \frac{74}{12} - \frac{14}{12} = \frac{60}{12} = \frac{5}{6}
\]

\[
5\frac{17}{12} - 2\frac{7}{12} = \frac{30}{12} = \frac{5}{6}
\]

\[
7\frac{2}{3} - 2\frac{5}{6} = \frac{74}{6} - \frac{14}{6} = \frac{50}{6} = \frac{5}{6}
\]
Note: As mentioned in 5-1, the ladder diagram was also used to find LCD when adding and subtracting with unlike denominators if proper instruction was carried out.

5-5 Solving Fraction Equations: Addition and Subtraction

Example 1 Solving Equations by Addition and Subtracting

\[ x + \frac{6}{3} = 11 \]
\[ x = 11 - \frac{6}{3} \]
\[ x = 4 \frac{1}{3} \]

\[ w - \frac{1}{2} = \frac{2}{3} \]
\[ w = \frac{2}{3} + \frac{1}{2} \]
\[ w = \frac{2}{3} + \frac{2}{4} = \frac{5}{4} = 3 \frac{1}{4} \]

5-6 Multiplying Fractions by Whole Numbers

Example 1 Multiplying fractions and Whole Numbers

\[ 3 \cdot \frac{1}{9} = \frac{1}{9} + \frac{1}{9} = \frac{3}{9} = \frac{1}{3} \]
\[ 4 \cdot \frac{7}{8} = \frac{4}{1} \cdot \frac{7}{8} = \frac{28}{8} = \frac{7}{2} \text{ or } 3 \frac{1}{2} \]

Example 2 Evaluating Fraction Expressions

\[ 6x \text{ for } x = \frac{1}{8} \]
\[ 6 \cdot \frac{1}{8} = \frac{6}{8} = \frac{3}{4} \]

5-7 Multiplying Fractions

Example 1 Multiplying Fractions

\[ \frac{1}{3} \cdot \frac{3}{5} = \frac{1}{5} \]

Example 2 Evaluating Fraction Expressions

\[ a \cdot \frac{1}{3} \text{ for } a = \frac{5}{8} \]
\[ \frac{5}{8} \cdot \frac{1}{3} = \frac{5}{24} \]
5-8 Multiplying Mixed Numbers

Example 1 Multiplying Fractions and Mixed Numbers
\[
\frac{1}{3} \cdot 1\frac{1}{2}
\]
\[
\frac{1}{3} \cdot \frac{3}{2} = \frac{3}{6} = \frac{1}{2}
\]

Example 2 Multiplying Mixed Numbers
\[
2\frac{1}{2} \cdot 1\frac{1}{3}
\]
\[
\frac{5}{2} \cdot \frac{4}{3} = \frac{20}{6} = \frac{10}{3} = 3\frac{1}{3}
\]

5-9 Dividing Fractions and Mixed Numbers

Vocabulary \textit{reciprocal}

Example 1 Finding Reciprocals
\[
\frac{1}{5} \cdot 5 = 1 \text{ The reciprocal of } \frac{1}{5} \text{ is } 5.
\]

Example 2 Using Reciprocals to Divide Fractions and Mixed Numbers
\[
\frac{3}{4} \div \frac{1}{2} \rightarrow \frac{3}{4} \cdot \frac{2}{1} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}
\]
\[
2\frac{2}{3} \div 1\frac{1}{6} \rightarrow \frac{8}{3} \div \frac{7}{6} = \frac{8}{3} \cdot \frac{6}{7} = \frac{16}{7} = 2\frac{2}{7}
\]

5-10 Solving Fraction Equations: Multiplication and Division

Example 1 Solving Equations by Multiplying and Dividing
\[
\frac{2}{3}x = 14
\]
\[
\frac{2}{3}x \div \frac{2}{3} = 14 \div \frac{2}{3}
\]
\[
\frac{2}{3}x \cdot \frac{3}{2} = 14 \cdot \frac{3}{2}
\]
\[
x = \frac{42}{2}, \text{ or } 21
\]
Chapter 6
Collecting and Displaying Data

Chapter 6 dealt with collecting and displaying data. There were 10 sections in it.

6-1 Problem solving Skill: Make a Table

Example 1 Weather Application
Example 2 Organizing Data in a Table

6-2 Mean, Median, Mode, and Range

Vocabulary

mean  median  mode  range

Example 1 Finding the Mean of a Data Set
Example 2 Finding the Mean, Median, Mode, and Range of a Data Set

6-3 Additional Data and Outliers

Vocabulary outlier

Example 2 Social Studies Application
Example 3 Describing a Data Set

6-4 Bar Graphs

Vocabulary bar graph  double-bar graph

Example 1 Reading a Bar Graph
Example 2 Making a Bar Graph

6-5 Line Plots, Frequency Tables, and Histograms

Vocabulary line plot  frequency table  histogram

Example 1 Making a Tally Table
Example 2 Making a Line Plot
Example 3 Making a Frequency Table with Intervals
Example 4 Making a Histogram
6-6 Ordered Pairs

Vocabulary  *coordinate grid  ordered pair*

Example 1 Identifying Ordered Pairs

Name the ordered pair for each location.

For example, where is the library, school, etc.?

Example 2 Graphing Ordered Pairs

\[ Q \left( \frac{1}{2}, 6 \right) \quad S(0,4) \]

*Note:* It was found that no four quadrants were introduced in the section. Only graphing ordered pairs and identifying ordered pairs were asked to do on a coordinate grid in Quadrant I. If students did not study it in an elementary school, this section was a good example. If they studied it in an elementary, it should not be re-taught here. It should be taught after the integers were introduced.

6-7 Line Graphs

Vocabulary  *line graph  double-line graph*

Example 1 Making a Line Graph

Example 2 Reading a Line Graph

Example 3 Making a Double-Line Graph

6-8 Misleading Graphs

Example 1 Misleading Bar Graphs

Example 2 Misleading Line Graphs

6-9 Stem-and-Leaf Plots

Vocabulary  *stem-and-leaf plot*

Example 1 creating Stem-and-Leaf Plots

Example 2 Reading Stem-and-Leaf Plots

6-10 Choosing an Appropriate Display

Example 1 Choosing an Appropriate Data Display
Note: It was found that a table of *Common Uses of Data Displays* was made so that students could understand more how to choose an appropriate display. That was a good table.

Chapter 7

**Proportional Relationships**

Chapter 7 dealt with proportional relationships. There were 11 sections including an extension section in it.

**7-1 Ratios and Rates**

**Vocabulary**

* ratio  equivalent ratios  rate  unit rate*

**Example 1 Writing Ratios**

\[
\frac{5}{4} \text{ or } 5 \text{ to } 4 \text{ or } 5 : 4
\]

**Example 2 Writing Equivalent Ratios**

\[
\frac{4}{6} = \frac{2}{3} \quad \frac{4}{6} = \frac{8}{12}
\]

So \(\frac{2}{3}\) and \(\frac{8}{12}\) are equivalent ratios.

Divide both terms by the second term to find the unite rate.

\[
\text{unit rate} = \frac{\$1.98}{2} = \frac{\$1.98 + 2}{2\div 2} = \frac{\$99}{1} = \$0.99 \text{ for 1 liter}
\]

When the prices of two or more items are compared, the item with the lowest unit rate is the best deal.

**7-2 Using Tables to Explore Equivalent Ratios and Rates**

**Example 1 Making a Table to Find Equivalent Ratios**

**7-3 Proportions**

**Vocabulary**

* proportion*

**Example 1 Modeling Proportions**

**Example 2 Using Cross Products to Complete Proportions**

*Note: The use of proportion was very important in math. It was found that students may have difficulty solving problems with proportion. From the writer’s point of view, more word problems of proportion should be added to this section.*
7-4 Similar Figures

Vocabulary  

- corresponding sides
- corresponding angles
- similar

Example 1 Finding Missing Measures in Similar Figures

The two triangles are similar.

Find the missing length $x$ and the measure of $\angle A$.

\[
\frac{8}{12} = \frac{6}{x}
\]

Example 2 Problem Solving Application

Note: From the writer’s point of view, this section was also very important to students. More word problems of proportions should be added to this section.

7-5 Indirect Measurement

Vocabulary  

- indirect measurement

Example 1 Using Indirect Measurement

\[
\frac{6}{h} = \frac{12}{228} \quad \rightarrow h = 114
\]

The snowman was 114 feet tall.

Note: The sections of 7-3, 7-4, and 7-5 were related to each other. From the writer’s point of view, more word problems of these sections should be added to the end of this section.

7-6 Scale Drawing and Maps

Vocabulary  

- scale drawing
- scale

Example 1 Finding Actual Distances

Example 2 Astronomy Application

7-7 Percents

Vocabulary  

- percent

Example 1 Modeling Percents

Example 2 Writing Percents as Fractions

\[
40\% = \frac{40}{100}
\]
Example 4 Writing Percents as Decimals

\[ 24\% = \frac{24}{100} = 0.24 \]

**7-8 Percents, Decimals, and Fractions**

Example 1 Writing Decimals as Percents

\[ 0.3 = \frac{3}{10} = \frac{30}{100} = 30\% \]

Example 2 Writing Fractions as Percents

\[ \frac{4}{5} = \frac{80}{100} = 80\% \]

\[ \frac{3}{8} = 0.375 = 37.5\% \]

**7-9 Percent Problems**

Formula: \[ \frac{\%}{100} = \frac{\text{is}}{\text{of}} \]

Example 3 Multiplying to Find a Percent of a Number

Find 20% of 150.

\[ 0.20 \cdot 150 = 30 \]

So 30 is 20% of 150.

*Note*: More examples should be added.

**7-10 Using Percents**

Vocabulary *discount* *tip* *sales tax*

Example 1 Finding Discounts

Example 2 Finding Tips

Example 3 Finding Sales Tax

**Extension Simple Interest**

Vocabulary *interest* *principal* *simple interest*

Formula: \[ I = p \cdot r \cdot t \]

Example 1 Finding Simple Interest
Chapter 8

Geometric Relationships

Chapter 8 dealt with geometric relationships. There were 11 sections in it.

8-1 Building Blocks of Geometry

Vocabulary  point  line  plane  line segment  ray

   Example 1 Identifying Points, Lines, and Planes
   Example 2 Identifying Line Segments and Rays

8-2 Measuring and Classifying angles

Vocabulary  angle  vertex  acute angle  right angle  obtuse angle  straight angle

   Example 1 Measuring an Angle with a Protractor
   Example 2 Drawing an Angle with a Protractor
   Example 3 Classifying Angles

8-3 Angle Relationships

Vocabulary  congruent  vertical angle  adjacent angle  complementary angles supplementary angles

   Example 1 Identifying Types of Angle Pairs
   Example 2 Identifying an Unknown Angle Measures

8-4 Classifying Lines

Vocabulary  parallel lines  perpendicular lines  skew lines

   Example 1 Classifying Pairs of Lines

8-5 Triangles

Vocabulary  acute triangle  obtuse triangle  right angle  scalene triangle  isosceles equilateral triangle  triangle

   Example 2 Using Properties of Angles to Label Triangles
   Example 3 Classifying Triangles by Lengths of sides
The perimeter of the isosceles triangle is 7.8 cm \( a + (3.8 + 2) = 7.8 \) \( a = 2 \)cm

8-6 Quadrilaterals

Vocabulary \textit{quadrilateral parallelogram rectangle rhombus square trapezoid}

Example 1 Naming Quadrilaterals
Example 2 Classifying Quadrilaterals

8-7 Polygons

Vocabulary \textit{polygon regular polygon}

Example 1 Identifying Polygon
Example 2 Problem solving Application

\textit{Note:} It was good to illustrate the each interior measure of a polygon, but it should tell students the formula: \((n-2) \times 180^\circ\).

8-8 Geometric Patterns

Example 1 Extending Geometric Patterns
Example 2 Completing Geometrical Patterns

8-9 Congruence

Example 1 Identifying Congruent Figures

8-10 Transformations

Vocabulary \textit{transformation translation rotation reflection line of reflection}

Example 1 Identifying Transformation
Example 2 Drawing Transformation

\textit{Note:} It was found that no transformation is described in the coordinate plane, but it appeared on p. 463 (LAB).

8-11 Line Symmetry

Vocabulary \textit{line symmetry line of symmetry}

Example 1 Identifying Lines of Symmetry
Example 2 Finding Multiple Lines of Symmetry
Chapter 9

Measurement and Geometry

Chapter 9 dealt with measurement and geometry. There were 8 sections in it.

9-1 Understanding Customary Units of Measure

Vocabulary  
*customary system*

Example 1 Choosing Appropriate Units of Length
Example 2 Choosing Appropriate Units of Weight
Example 3 Choosing Appropriate Units of Capacity
Example 4 Finding Measurements

9-2 Understanding Metric Units of Measure

Vocabulary  
*metric system*

Example 1 Choosing Appropriate Units of Length
Example 2 Choosing Appropriate Units of Mass
Example 3 Choosing appropriate Units of Capacity
Example 4 Finding Measurements

9-3 Converting Customary Units

Example 1 Using a Conversion Factor

\[
93 \text{ in.} \times \frac{1 \text{ ft}}{12 \text{ in.}} = 7.75 \text{ ft}
\]

\[
2 \text{ lb} \times \frac{16 \text{ oz}}{1 \text{ lb}} = 32 \text{ oz}
\]

Example 2 Converting Units of Measure by Using Proportions

\[
48 \text{ qt} = \frac{48 \text{ qt}}{1 \text{ gal}} \rightarrow 4 \cdot x = 48 \rightarrow x = 12 \rightarrow 48 \text{ q} = 12 \text{ gal}
\]

9-4 Converting Metric Units

Example 2 Using Powers of Ten to Convert Metric Units of Measure

The width of a book is about 22 cm.

\[
22 \text{ cm} = \frac{22 \text{ cm}}{1} \rightarrow 22 \text{ cm} = (22 \cdot 10) \text{ mm} \rightarrow 22 \text{ cm} = 220 \text{ mm}
\]
Example 3 Converting Metric Units of Measure

\[ 11 \text{m} = \text{____ cm} \rightarrow 11 \text{m} \times \frac{100 \text{cm}}{1 \text{m}} = 1,100 \text{ cm} \]

9-5 Time and Temperature

Example 1 converting time

\[ 450 \text{ min} = \text{____ hr} \rightarrow 450 \text{ min} \times \frac{1 \text{ hr}}{60 \text{ min}} = \frac{450}{60} \text{ hr} \rightarrow 450 \text{ min} = 7 \frac{1}{2} \text{ hr} \]

Example 2 Finding Elapsed Time

Example 3 Estimating Temperature

**Formula:**

\[ F = \frac{9}{5} C + 32 \]

\[ C = \frac{5}{9} (F - 32) \]

20°C is about \( \text{____} °F \rightarrow F = \frac{9}{5} \times 20 + 32 \rightarrow F = 40 + 30 \approx 70 \) 20°C is about 70°F

9-6 Finding Angle Measures in Polygons

Example 1 Subtracting to Find Angle Measures

Example 2 Estimating Angle Measures

9-7 Perimeter

Example 1 Finding the Perimeter of a Polygon

Example 2 Using a Formula to find Perimeter

A rectangle formula: \( P = 2l + 2w \)

Example 3 Finding Unknown Side Lengths and the Perimeter of a Polygon

9-8 Circles and Circumference

Vocabulary

\text{circle, center, radius (radii), diameter, circumference, pi} \]

Example 1 Naming Parts of a Circle

Name the circle, a diameter, and radii.

Example 3 Using the Formula for the Circumference of a Circle
Chapter 10

Measurement: Area and Volume

Chapter 10 dealt with measurement regarding area and volume. There were 9 sections in it.

10-1 Estimating and Finding Area

Vocabulary  area

Example 1 Estimating the Area of an Irregular Figure

Example 2 Finding the area of the rectangle

Example 3 Finding the Area of a Parallelogram

10-2 Area of Triangles and Trapezoids

Example 1 Finding the Area of a Triangle

Example 3 Finding the Area of a Trapezoid

Note: From the writer’s point of view, more word problems should be added to this section to find the height of a triangle if its area and base were given, or to find the base of a triangle if its area and height were given, because students already learned how to solve equations in Chapter 2 and some of Chapter 11 in Course 1.

10-3 Area of Composite Figures

Example 1 Finding Areas of Composite Figure

10-4 Comparing Perimeter and Area

Example 1 Changing Dimensions

When the dimensions of the rectangle are doubled, the perimeter is also doubled, and the area becomes four times as great.

Example 2 Measurement Application

When the dimensions of the rectangle are multiplied by 3, the perimeter is multiplied by 3, and the area is multiplied by 9, or $3^2$.

10-5 Area of Circles

Example 1 Estimating the Area of a Circle
Example 2 Using the Formula for the Area of a Circle

*Note:* From the writer’s point of view, more word problems should be added to this section to find the radius or diameter if the area was given or if the circumference was given, because students already studied the circumference in 9-8 of *Course 1.*

### 10-6 Three-Dimensional Figures

Vocabulary  
*polygon*  *face*  *edge*  *vertex*  *prism*  *base*  *pyramid*  *cylinder*  *cone*

Example 1 Identifying Faces, Edge, and vertices

Example 2 Naming Three-Dimensional Figures

### 10-7 Volume of Prisms

Example 1 Finding the Volume of a Rectangular Prism

Example 2 Finding the Volume of a Triangle Prism

### 10-8 Volume of Cylinders

Example 1 Finding the Volume of a Cylinder

Example 3 Comparing Volume of Cylinder

### 10-9 Surface Area

Vocabulary  
*surface area*  *net*

Example 1 Finding the Surface Area of a Prism

Example 2 Finding the Surface Area of a Pyramid

Example 3 Finding the Surface Area of a Cylinder

*Note:* From the writer’s point of view, more problems should be added in this chapter when students were asked to find the height or length of a certain figure if the area, the surface area, and the volume were given. That was most challenging to students.
Chapter 11
Integers, Graphs, and Functions

Chapter 11 dealt with graphs and functions. There were 11 sections including an extension section in it.

11-1 Integers in Real-World Situations

Vocabulary
positive number  negative number  opposites  integers

Example 1 Identifying Positive and Negative Numbers in the Real World
(i.e., a gain of 20 yard in football, spending $75, 10 feet below sea level

Example 2 Graphing Integers
(i.e., on the number lines)

Example 3 Writing Integer Expressions to Represent Situations

11-2 Comparing and Ordering Integers

Example 1 Comparing Integers
Use the number line to compare each pair of integers. Write < or >.

Example 2 Ordering Integers
Order the integers in each set from least to greatest

11-3 The Coordinate Plane

Vocabulary coordinate plane  axis  x-axis  y-axis  quadrants  origin
coordinates  x-coordinate  y-coordinate

Example 1 Identifying Quadrants
Name the quadrant where each point is located.

Example 2 Locating Points on a Coordinate Plane
K From the origin, k is 1 unit right and 4 units up. \( \rightarrow (1, 4) \), etc

Example 3 Graphing Points on a Coordinate Plane
P(-3, -2)  R(0, 4)  M(3, -4)
11-4 Adding Integers

Example 1 Writing Integers Addition
Write the addition modeled on each number line.

Example 2 Adding Integers

Example 3 Evaluating Integer Expressions
Evaluate \( x + 3 \) for \( x = -9 \). \( \rightarrow -9 + 3 = -6 \)

11-5 Subtracting Integers

Example 1 Write the subtraction modeled on each number line.

\[
8 + (-10) = -2 \quad 2 - (-4) = 6
\]

Example 2 Subtracting Integers

\[
7 - 4 = 3 \quad -8 - (-2) = -6
\]

Example 3 Evaluating Integer Expressions

\[
x - (-4) \text{ for } x = -5 \rightarrow -5 - (-4) = -1
\]

11-6 Multiplying Integers

Example 1 Multiplying Integers

\[
4 \cdot 3 = 12 \quad 2 \cdot (-4) = -8 \quad -5 \cdot 2 = -10 \quad -3 \cdot (-4) = 12
\]

Example 2 Evaluating Integer Expressions

Evaluate \( 5x \) for \( x = -4 \) \( \rightarrow 5 \cdot (-4) = -20 \)

11-7 Dividing Integers

Example 1 Dividing Integer

\[
12 \div (-3) = -4 \quad -15 \div (-3) = 5
\]

Example 2 Evaluating Integer Expressions

Evaluate \( \frac{x}{3} \) for \( x = -18 \) \( \rightarrow \frac{-18}{3} = -18 \div 3 = -6 \)

11-8 Solving Integers Equations

Example 1 Adding and Subtracting to solve Equations
4 + x = -2
-4 + 4 + x = -2 - 4
x = -6
y - 6 = -5
y - 6 + 6 = -5 + 6
y = 1

Example 2 Multiplying and Dividing to Solve Equations

-3a = 15
\[
\frac{-3a}{-3} = \frac{15}{-3}
\]
a = -5

\[
\frac{b}{-4} = -2
\]
-4 • \frac{b}{-4} = -4 • (-2)

b = 8

11-9 Tables and Functions

Vocabulary function input output

Example 1 Writing Equations from Function Tables

<table>
<thead>
<tr>
<th>x</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>15</td>
<td>?</td>
</tr>
</tbody>
</table>

y is 2 times x + 1 as shown from the above table. y = 20 + 1 = 21

Example 2 Translating Words into Math

The length of a rectangle is 5 times its width. \( l = 5w \)

Example 3 Problem Solving Application

11-10 Graphing Functions

Vocabulary linear equation
Example 1 Finding Solutions of Equations with Two Variables

Use the given x=values to write solutions of the equation $y = 16x + 6$ as ordered pairs.

<table>
<thead>
<tr>
<th>x</th>
<th>$16x + 6$</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$16(1) + 6$</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>$16(2) + 6$</td>
<td>38</td>
</tr>
<tr>
<td>3</td>
<td>$16(3) + 6$</td>
<td>54</td>
</tr>
<tr>
<td>4</td>
<td>$16(4) + 6$</td>
<td>70</td>
</tr>
</tbody>
</table>

Example 2 Determine whether the ordered pair is a solution to the given equation.

$(8, 16) ; y = 2x → 16 = 2(8) → 16 = 16$ So $(8, 16)$ is a solution of $y = 2x$

Example 3 Reading Solutions on Graph

When $x = 1$, $y = 3$. The ordered pair is $(1, 3)$

Example 4 Graph the function described by the equation.

$y = 2x + 1$

Extension Integer Exponents

Example 1 Find a pattern in the table

<table>
<thead>
<tr>
<th>Power</th>
<th>$10^3$</th>
<th>$10^2$</th>
<th>$10^1$</th>
<th>$10^0$</th>
<th>$10^{-1}$</th>
<th>$10^{-2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1,000</td>
<td>100</td>
<td>10</td>
<td>0</td>
<td>$\frac{1}{10}$</td>
<td>$\frac{1}{100}$</td>
</tr>
</tbody>
</table>

One possible pattern is “divided by 10.”

Example 2 Finding each value $2^0$, $2^{-1}$, $2^{-2}$, $2^{-3}$

<table>
<thead>
<tr>
<th>Power</th>
<th>$2^3$</th>
<th>$2^2$</th>
<th>$2^1$</th>
<th>$2^0$</th>
<th>$2^{-1}$</th>
<th>$2^{-2}$</th>
<th>$2^{-3}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

One possible pattern is “divided by 2.”

$2^0 = 2 ÷ 2 = 1$  $2^{-1} = 1 ÷ 2 = \frac{1}{2}$  $2^{-2} = \frac{1}{2} ÷ 2 = \frac{1}{4}$  $2^{-3} = \frac{1}{4} ÷ 2 = \frac{1}{8}$

Look at the table in Example 2. There is another pattern.

$2^{-1} = \frac{1}{2}$  $2^{-2} = \frac{1}{2^2} = \frac{1}{4}$  $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

Note: This pattern worked for all negative exponents. It was found that there were a lot of good exercises for students to practice in this section.
Chapter 12
Probability

Chapter 12 dealt with probability. There were 7 sections including an extension section in it.

12-1 Introduction to Probability

Example 1 Estimating the Likelihood of an Event

Write impossible, unlikely, as likely as not, likely, or certain to describe each event.

Example 2 Writing Probabilities

35% = 0.35 or \( \frac{35}{100} = \frac{7}{20} \)  
0.6 = \( \frac{6}{10} = \frac{3}{5} \)  
0.6 = 60%  
\( \frac{9}{25} = 0.36 = 36\% \)

Example 3 Comparing Probabilities

Compare: 50% > 25%  
Compare: 25% = 25%

12-2 Experimental Probability

Vocabulary  
experiment    outcome     experimental probability

Example 1 Identifying Outcomes

Formula: Experimental Probability

Probability \( \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} \)

Example 2 Finding Experimental Probability

Example 3 Comparing Experimental Probabilities

Ian tossed a cone 30 times and recorded whether it landed on its base or on its side. Based on Ian’s experiment, which way is the cone more likely to land?

<table>
<thead>
<tr>
<th>Outcome</th>
<th>On its base</th>
<th>On its side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>+++++ 11</td>
<td>+++++ +++++ +++++ +++++ 111</td>
</tr>
</tbody>
</table>

\( P(\text{base}) \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} = \frac{7}{30} \)

\( P(\text{side}) \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} = \frac{23}{30} \)

\( \frac{7}{30} < \frac{23}{30} \)
It is more likely that the cone will land on its side.

### 12-3 Counting Methods and Sample Space

**Vocabulary**

- *sample space*

**Example 1 Problem Solving Application**

**Example 2 Making an Organized List**

**Example 3 Using the Fundamental Counting Principal**

There are 4 choices for fine arts classes and 6 choices for athletics classes.

\[4 \times 6 = 24\]

Multiply the number of choices in each category. There are 24 possible combinations.

### 12-4 Theoretical Probability

**Vocabulary**

- *theoretical probability*
- *equally likely*
- *fair*
- *complement*

**Formula:**

\[
\text{probability} = \frac{\text{number of ways the event can occur}}{\text{total number of equally likely outcomes}}
\]

**Example 1 Finding Theoretical Probability**

What is the probability that a fair coin will land heads up?

\[
P(\text{heads}) = \frac{1 \text{ way event can occur}}{2 \text{ possible outcomes}} = \frac{1}{2}
\]

What is the probability of rolling a number less than 5 on a fair number cube?

\[
P(\text{less than 5}) = \frac{4 \text{ ways event can occur}}{6 \text{ possible outcomes}} = \frac{4}{6} = \frac{2}{3}
\]

**Example 2 Finding the Complement of an Event**

Suppose there is a 10% chance of rain today. What is the probability that it will NOT rain?

\[
P(\text{rain}) + P(\text{not rain}) = 100\\
\]

\[
P(\text{not rain}) = 100\% - 10\%\\
\]

\[
P(\text{not rain}) = 90\%
\]
12-5 Compound Events

Vocabulary  
*compound event*

Example 1 Finding Probabilities of Compound Events

Find the probability that the number cube will show an odd number *and* that the coin will show tails.

\[
P(\text{odd, tails}) = \frac{3 \text{ ways event can occur}}{12 \text{ possible outcomes}} = \frac{3}{12} = \frac{1}{4}
\]

12-6 Making Predictions

Vocabulary  
*prediction*  
*population*  
*sample*

Example 1 Using Sample Surveys to Make Predictions

Example 2 Using Theoretical Probability to Make Predictions

If you roll a number cube 24 times, how many times do you expect to roll a 5?

\[
P(\text{rolling a 5}) = \frac{1}{6}
\]

\[
\frac{1}{6} = \frac{x}{24} \rightarrow x = 4
\]

You can expect to roll a 5 about 4 times.

Example 3 Problem Solving Application

**Extension Independent and Dependent Events**

Vocabulary  
*independent events*  
*dependent events*

Example 1 Finding the Probability of Independent Events

Finding the probability of rolling a 3 on a number cube and the spinner shown landing on A (A, B, C, D, E)  
\[
P(3 \text{ and } A) = P(3) \cdot P(A) = \frac{1}{6} \cdot \frac{1}{5} = \frac{1}{30}
\]

Example 2 Finding the Probability of Dependent Events

A bag contains 3 red marbles and 2 blue marbles. Find the probability of drawing a red marble and then a blue marble.

\[
P(\text{red and blue}) = P(\text{red}) \cdot P(\text{blue after red})
\]
\[ P(\text{red}) = \frac{3}{5} \]

\[ P(\text{blue after red}) = \frac{2}{4} = \frac{1}{2} \]

\[ P(\text{red and blue}) = P(\text{red} \cdot p(\text{blue after red}) = \frac{3}{5} \cdot \frac{1}{2} = \frac{3}{10} \]

The probability of drawing a red marble and then a blue marble is \( \frac{3}{10} \).
C. Table 1B

Mathematics Course 1

Mathematics Course 1 was analyzed. The following mini-tables were shown to see whether the contents of each chapter were overlapped or repeated in each grade (Course 1, Course 2, and Course 3). For example, when 1-3 Exponents was shown in Mathematics Course 1 below, it meant that the 1-3Exponents section was also introduced or mentioned in 1-2 and 1-4 in Mathematics Course 2 and in 4-1 in Course 3 below. They were somewhat related each other.

Chapter 1 Whole Numbers and Patterns

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*Course 1, Course 2, Course 3* refer to different editions or editions of the same course.
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<td>and Division Equation</td>
<td>by Multiplying or</td>
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<td>12-6 Solving</td>
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<td>Inequalities by</td>
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<td>Multiplying or</td>
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<td>3-4 Scientific Notation</td>
<td>1-4 Applying Exponents</td>
<td>4-4 Scientific Notation</td>
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<td>2-4 Multiplying Rational Numbers</td>
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<th>Names of Text Books</th>
<th>Mathematics Course 1</th>
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<thead>
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<th>Names of Text Books</th>
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<tr>
<td>Contents</td>
<td>3-7 Dividing Decimals</td>
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<td>Names of Text Books</td>
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D. Mathematics Course 2

In Course 2 Mathematics Textbook, there were 12 chapters which contained 112 sections including 7 extension sections. Mathematics Course 2 had 841 pages long. Systematical analyses were made of every section in each chapter to find whether or not the contents were “a mile wide and an inch deep.” Great details were also indicated in Table 2B on page 107. From Table 2B, many of contents were seen being repeated or overlapped in each grade. Some of typical examples of repletion or overlapping were stated in the following. The writer did not type all of the examples to show whether to be repeated or re-taught in the following statement. Table 2B was clearly shown which content was to be taught or to be re-taught, etc. It was found that about 20% of the contents were new.

As was shown in Table 2B, there were a great number of contents re-taught in Course 2 and Course 3. Exponents in 1-2 in Course 2, for example, was again taught after it was taught in Course 1 and continued being repeated in Course 3. The writer selected some examples from each course. Typical examples were stated as follows.

In Course 2:

1-2 Exponents

Example 1 Evaluating Powers

A) $5^2 = 5 \cdot 5 = 25$    C) $25^1 = 25$

Example 2 Expressing Whole Numbers as Powers

A) 49, base 7    $49 = 7 \cdot 7 = 7^2$
Students studied from 1-3 from *Course 1* how to deal with exponents. Why was it specifically indicated in this section?

In *Course 1*:

### 1-3 Exponents

**Vocabulary** *exponent* *base* *exponential form*

**Example 1** Writing Numbers in Exponential Form

\[4 \times 4 \times 4 \rightarrow 4^3\]

**Example 2** Finding the Value of Numbers in Exponential Form

\[2^7 \rightarrow 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128\]

**Example 3** PROBLEM SOLVING APPLICATION

In *Course 3*:

### 4-1 Exponents

**Vocabulary** *exponential form* *exponent* *base* *power*

**Example 1** Writing Exponents

A) \(5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 5^7\)

B) \((-4) \cdot (-4) \cdot (-4) = (-4)^3\)

C) \(8 \cdot 8 \cdot 8 \cdot p \cdot p \cdot p = 8^4p^3\)

**Example 2** Evaluating Power

A) \(3^4\)  B) \(12^2\)  C) \((-8)^3\)  D) \((-2)^3\)

**Example 3** Using the Order of Operations
Evaluate \(x - y(z \cdot y^2)\) for \(x = 20\), \(y = 4\), and \(z = 2\)

Example 4 Geometry Application

The number of diagonal of a n-sided figure is \(\frac{1}{2}(n^2 - 3n)\). Use the formula to find the number of diagonals for a 6-sided figure.

\[
\frac{1}{2}(n^2 - 3n) \rightarrow \frac{1}{2}(6^2 - 3 \cdot 6) \rightarrow \frac{1}{2}(36 - 18) = 9
\]

The writer thought that students studied *Exponents and Their Solutions* in one chapter after they studied negative numbers. It was not necessary to let students study it here and there without mastering it.

*Order of “Operation* should have been taught in 4\(^{th}\) and 5\(^{th}\) grade. Students were supposed to have mastered the order of operations. However, *Order of Operations* was re-taught in *Course 1, Course 2*, and in *Course 3*. Some examples were stated as follows:

In *Course 2*:

**1-5 Order Operations**

Example 1 Using the Order of Operations

Simplify each expression.

A) \(27 - 18 \div 6\)

\(27 - 3 = 24\)

B) \(36 - 18 \div 2 \cdot 3 + 8\)

\(36 - 9 \cdot 3 + 8\)

\(36 - 27 + 8\)
9 + 8 = 17

C) 5 + 6² · 10
   5 + 36 · 10
   5 + 360 = 365

Example 2 Using the Order of Operations with Grouping Symbols

A) 36 – (2 · 6 ) ÷3
   36 – 12 ÷ 3
   36 – 4 = 32

B) [(4 + 12 ÷ 4) - 2]³
   [(4 + 3) -2]³
   [7 - 2]³
   5³ = 125

Students studied order of operations in 1-4 in Course 1. Why was it again stated here? Since they learned it from previous grades, exponent and the performance of the operation in parentheses were to be added.

In Course 1:

1-8 Order of Operations

Vocabulary numerical expression evaluate order of operations

Example 1 Using the Order of Operations

  9 + 12 × 2 → 9 + 24 = 33, 7 + (12 ×3) ÷6 → 7+ 36 ÷6 → 7 + 6 = 13

Example 2 Using the Order of Operations with Exponents

  3³ + 8 -16 → 27 + 8 -16 → 35 -16 =19
Example 3 Consumer Application

In *Course 3*, there was no specific section to be illustrated regarding *Order of Operations* in *Course 3*, but it was mentioned in 1-1 section and in *Skills Bank* on Page 828. The writer thought that basic *Order of Operations* was taught in elementary schools. Students should know what to do with order of operations. It was not necessary to have specific sections or chapters to re-teach *order of operations*. The details of order of operations in middle school should be revisited or reviewed in one chapter and then revisited in their-already-taught sections.

*Variable and Algebraic Expressions* was taught in *Course 1*, *Course 2*, and *Course 3*, respectively. Some examples were stated as follows:

In *Course 2*:

1-7 **Variables and Algebraic Expressions**

Vocabulary *variable constant algebraic expression evaluate*

Example 1 Evaluating Algebraic Expressions

Evaluate $n + 7$ for each value of $n$.

A) $n = 3$  
$n + 7$  
$3 + 7 = 10$

Example 2 Evaluating Algebraic Expressions Involving Order of Operations

A) $3x - 2$ for $x = 5$  
$3(5) - 2$  
$15 - 2 = 13$

B) $n ÷ 2 + n$ for $n = 4$  
$4 ÷ 2 + 4$  
$2 + 4 = 6$

C) $6y^2 + 2y$ for $y = 2$  
$6(2)^2 - 2(2)$  
$6(4) + 2(2)$  
$24 + 4 = 28$

Example 3 Evaluate $\frac{3}{n} + 2m$ for $n = 3$ and $m = 4$.  
$\frac{3}{3} + 2(4)$  
$1 + 8 = 9$
In Course 1:

2-1 Variables and Expressions

Vocabulary  variable constant  algebraic expression

Example 1 Evaluating Algebraic Expressions

w ÷ 3 when w = 55, 4 × n + 6²

Example 2 Evaluating Expressions with Two Variables

l × w for l = 4 and w = 2

In Course 3:

1-1 Variables and Expressions

Vocabulary  variable coefficient algebraic expression constant  evaluate substitute

Example 1 Evaluating Algebraic Expressions with One Variable

A) x + 5 for x = 11
B) 2a + 3 for a = 4
C) 4(3 + n) -2 for n = 0, 1, 2

Example 2 Evaluating Algebraic Expressions with Two Variables

A) 5x + 2y for x = 13 and y = 11
B) 2.5p – 4q for p 12 and q = 6.5

This section was introduced in 2-1 of Course 1 and 1-7 of Course 2 and 1-1 of Course 3.

Unfortunately, it was found that negative integers were not introduced. The book was intended
for 8th graders who already learned integers. Why did the compilers not make examples with negative integers in 1-1 of Course 3? Variables and Expressions should be taught in one chapter and then revisited later.

Equations and Their Solution was taught in Chapter 2 of Course 1, Chapter 1 of Course 2, and Chapter 1 of Course 3, respectively, the contents of which were repeated. Comparing and Ordering Decimals, Fractions, and Percents were re-taught in each course. From Table 1B, Table 2B, and Table 3B, repletion of certain contents were noted in mini-tables from each course.
E. Table 2A

(Mathematics Course 2)

Table 2A showed Mathematics Course 2 Textbook, where there were 12 chapters which contained 112 sections including 7 extension sections. Mathematics Course 2 had 841 pages long. Additional comments were also made on some sections or chapters after the contents were studied. The writer gave a note at the end of certain sections in a chapter.

Chapter 1

Algebraic Reasoning

Chapter 1 dealt with algebraic reasoning that contained 12 sections. For example:

1-1 Numbers and Patterns

Example 1 Identify a possible pattern. Use the pattern to write the next three numbers.

Example 2 Identify a possible pattern. Use the pattern to draw the next three figures.

Example 3 Using Table to identify and Extend Patterns

Note: The examples showed students how to find a pattern. The contents of 1-1 section above were also studied in 1-7 in Course 1. Since students learned how to find arithmetic sequence, they should further study geometric sequence in this section. Unfortunately it was stated in 4-5 of Course 2.

1-2 Exponents

Vocabulary Power exponent base

Example 1 Evaluating Powers

A) \(5^2 = 5 \cdot 5 = 25\)   C) \(25^1 = 25\)
B)

Example 2 Expressing Whole Numbers as Powers

A) 49, base 7 \(49 = 7 \cdot 7 = 7^2\)
Note: Students learned exponents from 1-3 from Course 1 how to deal with exponents. Why was it again specifically indicated in this section?

1-3 Metric Measurements

Example 1 Choosing the Appropriate Metric Unit
Example 2 Converting Metric Units
Example 3 Using Unit Conversion to Make Comparison

Note: All examples above showed students how to choose or convert metric units. The same contents were also studied in 9-2, 9-3, and 9-4 in Course 1. If students learned it from previous grade, why was it again specifically indicated in the section?

1-4 Applying Exponents

Vocabulary scientific notation

Example 1 Multiplying by Power of Ten
Example 2 Write 9,580,000 in scientific notation
Example 3 Writing Numbers in Standard Form
Example 4 Comparing Numbers in Scientific Notation

Note: All examples above showed students how to write scientific notation. Actually students learned it from 1-3 and 3-4 in Course 1. Since students studied it from previous grade or before, why was it specifically indicated here again? Negative exponents should be stated in this section rather than being stated in Extension (on page 134), Chapter 2 in Course 2.

1-5 Order Operations

Vocabulary numerical expression order of operations

Example 1 Using the Order of Operations

Simplify each expression.

D) 27-18 ÷ 6
   27 – 3 = 24
E) 36 – 18 ÷ 2 • 3 + 8
   36 – 9 • 3 + 8
   36 – 27 + 8
   9 + 8 = 17
F) 5 + 6^2 • 10


\begin{align*}
5 + 36 \cdot 10 \\
5 + 360 &= 365
\end{align*}

Example 2 Using the Order of Operations with Grouping Symbols

C) \(36 - (2 \cdot 6) ÷ 3\)

\[
\begin{align*}
36 - 12 ÷ 3 \\
36 - 4 &= 32
\end{align*}
\]

D) \([(4 + 12 ÷ 4) - 2]^3\)

\[
\begin{align*}
[(4 + 3) - 2]^3 \\
[7 - 2]^3 \\
5^3 &= 125
\end{align*}
\]

Note: Students learned order of operations in 1-4 in Course 1. Why was it again stated here? Since they learned it from previous grades, exponent and the performance of the operation in parentheses should be added. Unfortunately, no contents of such examples were stated in this section.

1-6 Properties

Vocabulary \textit{Commutative Property} \textit{Associated Property} \textit{Identity Property} \textit{Distributive Property}

Example 1 Identifying Properties of Addition and Multiplication

Example 2 Using Properties to Simplify Expressions

Example 3 Using the distributive Property to Multiply Mentally

Note: Students learned it from previous grades, they were supposed to know how to identify and use these properties. Most of the contents were studied in 1-5 in Course1. The only new contents were added of order of variables and identity property in this section.

1-7 Variables and Algebraic Expressions

Vocabulary \textit{variable} \textit{constant} \textit{algebraic expression} \textit{evaluate}

Example 1 Evaluating Algebraic Expressions

Evaluate \(n + 7\) for each value of \(n\).

B) \(n = 3\) \(n + 7 = 10\)

Example 2 Evaluating Algebraic Expressions Involving Order of Operations

D) \(3x - 2\) for \(x = 5\) \(3(5) - 2 = 13\)

E) \(n ÷ 2 + n\) for \(n = 4\) \(4 ÷ 2 + 4 = 6\)
F) \(6y^2 + 2y\) for \(y = 2\)  
\[
6(2)^2 - 2(2) \quad 6(4) + 2(2) \quad 24 + 4 = 28
\]

Example 3 Evaluate \(\frac{3}{n} + 2m\) for \(n = 3\) and \(m = 4\).  
\[
\frac{3}{3} + 2(4) \quad 1 + 8 = 9
\]

Note: Students learned variables and algebraic expressions in 2-1 of Course 1 before. Since students learned integers in Chapter 11, Course 1, why weren’t there any examples involved in using integers (positive numbers and negative numbers) in algebraic expressions?

1-8 Translate Words into Math

Example 1 Translating Verbal Expressions into Algebraic Expressions

Example 2 Translating Real-World Problems into Algebraic Expression

Note: Students learned the translation of words into math from previous grades in 2-2, Course 1. In this section, there is a table for the translation of words into math. This would help students review what they studied from previous grades. That was a wonderful revisit and a good table.

1-9 Simplifying Algebraic Expressions

Vocabulary term coefficient

Example 1 Identifying Like Terms

Example 2 Simplifying Algebraic Expressions

Example 3 Geometry Application

Note: Students were taught how to simplify algebraic expressions. 1-9 section was a new section to students because students did not study how to combine like terms. Since this was a new section, examples of using integers should be explained. Unfortunately, no examples were indicated in this section. Students learned integers. They should know how to combine such terms as \(3x^2 - 7x^2 + 6x - 8x - 10 - (-18) - 8x^0\), etc., if proper instruction was conducted.

1-10 Equations and Their Solutions

Vocabulary equation solution

Example 1 Determine whether the given value of the variable is a solution.

Example 2 Writing an Equation to Determine Whether a Number is a Solution

Example 3 Deriving a Real-World Situation from an Equation

Note: Students already learned how to solve equations and determine their solutions from previous grades in 2-4, Course 1.
1-11 Addition and Subtraction Equations

Vocabulary  Addition Property of Equality  Inverse Operations  Subtraction Property of Equality

Example 1 Solving an Equation by Addition

\[ x - 8 = 17 \rightarrow x - 8 + 8 = 17 + 8 \quad x = 25 \]

Example 2 Solving an Equation by subtraction

\[ a + 5 = 11 \rightarrow a + 5 - 5 = 11 - 5 \quad a = 6 \]

Note: Students already learned addition and subtraction equations from 2-5 and 2-6 in Course 1.

1-12 Multiplication and Division Equation

Vocabulary  Multiplication Property of Equality  Division Property of Equality

Example 1 Solving an Equation by Multiplication

\[ \frac{x}{7} = 20 \rightarrow (7) \frac{x}{7} = 20 \cdot (7) \rightarrow x = 140 \]

Example 2 Solving an Equation by division

\[ 240 = 4z \rightarrow \frac{240}{4} = \frac{4z}{4} \rightarrow z = 60 \quad \text{Note: No integer involved above.} \]

Note: Students already learned multiplication and division equation from 2-7 and 2-8 in Course 1. Since students learned the four operations of integers in Chapter 11, Course 1, why shouldn’t there be examples containing negative variables in this section? Students should know how to solve the following problems if proper instruction was conducted. For example:

\[-x + 2 = -7 \quad -3y - 4 = 20, \quad \text{etc.} \]

Chapter 2

Integers and Rational Numbers

Chapter 2 dealt with integers and rational numbers. It contained 12 sections including an extension section.

2-1 Integers

Example 1 Graphing Integers and Their Opposite on a Number Line

Graph the integers – 3 and its opposite on a number line.
Example 2 Comparing Integers Using a Number Line

Compare the integers. Use < or >.

Example 3 Ordering Integers Using a Number Line

Use a number line to order the integers -2, 5, 1, -1, and 0 from least to great.

Example 4 Finding Absolute Value

Use a number line to find each absolute value. |7| |-4|

Note: The contents of 2-1 were also indicated in 11-1 and 11-2 in Chapter 11 in Course 1. The only new knowledge – finding absolute value – was added in here. Students already learned integers in Chapter 11 in Course 1. The contents of from 2-1 to 2-5 of Chapter 2 were also indicated in Chapter 11 in Course 1. 90% of the contents of Chapter 2 were duplicated here.

2-2 Adding Integers

Example 1 Modeling Integer Addition

Using a number line to find each sum -3 + (-6) 4 + (-7)

Example 2 Adding Integers Using Absolute Value

Find each sum. -7 + (-4) -8 + 6

Example 3 Evaluate Expressions with Integers

Evaluate a + b for a = 6 and b = -10

Note: This section was also studied in 11-4 in Course 1.

2-3 Subtracting Integers

Example 1 Modeling Integer subtraction

Use a number line to find each difference.

A) 3 - 8 B) -4 -2 C) 2 - (-3)

Example 2 Subtracting Integers by Adding the Opposite

Find each difference

A) 5 - 9 B) -9 - (-2) C) -4 - 3

Example 3 Evaluating Expressions with Integers

Evaluate a - b for each set of values
A) \(a = -6, b = 7\)  B) \(a = 14, b = -9\)

*Note:* This section was also studied in 11-5 in *Course 1*.

### 2-4 Multiplying and Dividing Integers

#### Example 1 Multiplying Integers Using Repeated Addition

Use a number line to find each product.

A) \(3 \cdot (-3)\)  B) \(-4 \cdot 2\)

#### Example 2 Multiplying Integers

A) \(-4 \cdot (-2)\)  B) \(-3 \cdot 6\)

#### Example 3 Dividing Integers

Find each quotient.

A) \(72 ÷ (-9)\)  B) \(-144 ÷ 12\)  C) \(-100 ÷ (-5)\)

*Note:* This section was also studied in 11-6 and 11-7 in *Course 1*.

### 2-5 Solving Equations Containing Integers

#### Example 1 Solving Addition and Subtraction Equations

Solve each equation.

A) \(-3 + y = -5\)  B) \(n + 3 = -10\)  C) \(x - 8 = -32\)

#### Example 2 Solving Multiplication and Division Equations

A) \(\frac{a}{-3} = 9\)  B) \(-120 = 6x\)

*Note:* This section was also studied in 11-8 in *Course 1*. Unfortunately, no examples of negative variables were involved. Students already learned how to perform the four operations of integers. They should know how to solve such problems if proper instruction was conducted.

### 2-6 Prime Factorization

#### Example 1 Identifying Prime and Composite Numbers

Tell whether each number is prime or composite

A) \(19\)  B) \(20\)

#### Example 2 Using a Factor Tree to Find Prime Factorization

Write the prime factorization of each number
Example 3 Using a Step Diagram to Find Prime Factorization

Write the prime factorization of each number.

A) 252    B) 495

Note: Students already learned how to find prime numbers, composite numbers, and prime factorization in 4-1 and 4-2 in Course 1.

2-7 Greatest Common Factor

Example 1 Using a List to Find the GCF

Find the greatest common factor (GCF) of 24, 36, and 48

Example 2 Using Prime Factorization to Find the GCF

Find the greatest common factor (GCF)

A) 6, 45    B) 504, 132, 96, 60

Note: Students already learned how to find GCF because they learned it in 4-3, Course 1.

2-8 Least Common Multiple

Vocabulary

multiple    least common multiple (LCM)

Example 1 Using a List to Find the LCM

A) 3, 5    B) 4, 6, 12

Example 2 Using Prime Factorization to Find the LCM

Find the least common multiple (LCM)

A) 78, 110    B) 9, 27, 4

Note: Students already learned how to find LCM in 5-1, Course 1.

2-9 Equivalent Fractions and Mixed Numbers

Example 1 Finding Equivalent Fractions

Find two fractions equivalent to \( \frac{14}{16} \)

Example 2 Writing Fractions in Simplest Form
Write the fraction \( \frac{24}{36} \).

Example 3 Determine Whether Fractions Are Equivalent.

Example 4 Converting Between Improper Fractions and Mixed Numbers

Write \( \frac{21}{4} \) as a mixed number. B) Write \( \frac{2}{3} \) as an improper fraction.

Note: Students learned how to find equivalent fractions, how to reduce fractions to the simplest form, and how to change improper fraction into mixed numbers because they learned them in 4-5 and 4-6 in Course 1.

2-10 Equivalent Fractions and Decimals

Example 1 Writing Fractions as Decimals

A) \( \frac{3}{4} \)   B) \( \frac{6}{5} \)   C) \( \frac{1}{3} \)

Example 2 Using Mental Math to Write Fractions as Decimals

\( \frac{2}{5} \times \frac{2}{2} = \frac{4}{10} = 0.4 \)

Example 3 Writing Decimals as Fractions

Write each decimal as a fraction in simplest form.

A) 0.036        B) 1.28

Note: Students learned how to write fractions as decimals and vice versa in 4-4 in Course 1.

2-11 Comparing and Ordering Rational Numbers

Example 1 Comparing Fractions

Compare the fractions. Write < or >.

A) \( \frac{5}{6} \) ___ \( \frac{7}{10} \)   B) \( \frac{3}{5} \) ___ \( \frac{5}{9} \)

Example 2 Comparing Decimals

Compare the decimals. Write < or >.

A) 0.81 ___ 0.84      B) 0.34 ___ 0.342

Example 3 Ordering Fractions and Decimals

Order \( \frac{3}{5} \), 0.77, -0.1, and 1 \( \frac{1}{5} \) from least to greatest.
Note: Students learned how to compare and order rational numbers in 3-1 in Course 1. In this section negative numbers were added as compared with 3-2 in Course 1.

**Extension Negative Exponents**

Example 1 Evaluate Negative Exponents

Evaluate $10^{-4}$. $10^{-4} = \frac{1}{10^4} = \frac{1}{10,000} = 0.0001$

Example 2 Writing Small Numbers in Scientific Notation

Writing 0.000065 in scientific notation.

$0.000065 = 6.5 \times 10^{-5}$

Example 3 Writing Small Numbers in Standard Forms

Write $3.4 \times 10^{-6}$ in standard form. $3.4 \times 10^{-6} = 0.0000034$

Example 4 Comparing Numbers Using Scientific Notation

Compare. Write <, >, or =.

A) $3.7 \times 10^{-8}$ ___ $6.1 \times 10^{-12}$

Note: The extension should be combined with 1-4 of Course 2 rather than being stated here isolatedly. They should be put together.

**Chapter 3**

**Applying Rational Numbers**

Chapter 3, containing 12 sections in it, dealt with application of rational numbers.

**3-1 Problem Solving Skills: Estimate with Decimals**

Example 1 Estimating Sums and Differences of Decimals

Estimate by rounding to the nearest integer.

A) $86.9 + 58.4 \rightarrow 87 + 58 = 145$
B) $10.38 - 6.721 \rightarrow 10 - 7 = 3$

Example 2 Estimating Products and Quotients of Decimals

Use compatible numbers to estimate
A) 32.66 • 7.69 → 30 × 8 = 240  
B) 36.5 ÷ (- 8.241) → 36 ÷ (- 9) = - 4

Note: The section was also stated in 3-2 in Course 1.

3-2 Adding and Subtracting Decimals

Example 1 Adding Decimals

Add. Estimate to check whether each answer is reasonable.

Example 2 Subtracting Decimals

Note: The section was also stated in 3-3 in Course 1.

3-3 Multiplying Decimals

Example 1 Multiplying Integers by Decimals

Example 2 Multiplying Decimals by Decimals

Note: The section was also stated in 3-5 in Course 1, but the only new thing was added about negative numbers were introduced.

3-4 Dividing Decimals by Integers

Example 1 Dividing Decimals by integers

Note: This section was also stated in 3-3, 3-6, and 3-7 in Course 1. Negative numbers were added to the section.

3-5 Dividing Decimals and Integers by Decimals

Example 1 Dividing Decimals by Decimals

Divide

A) 4.32 ÷ 3.6  
B) 12.95 ÷ (- 1.25)

Example 2 Dividing Integers by Decimals

Divide. Estimate to check whether each answer is reasonable.

A) 9 ÷ 1.25  
B) -12 ÷ (-1.6)

Note: This section was also stated in 3-7 in Course 1 with negative numbers added to it.
3-6 Solving Equations Containing Decimals

Example 1 Solving Equations by Adding or Subtracting

A) \( S - 3.84 = 7.2 \)  B) \( y + 20.51 = 26 \)

Example 2 Solving Equations by Multiplying or Dividing

A) \( \frac{w}{3.9} = 1.2 \)  B) \( 4 = 1.6c \)

*Note: This section was also stated in 3-9 in Course 1*

3-7 Problem solving Skill: Estimate with Fractions

Example 1 Measurement Application

Example 2 Estimating Sums and Differences

Example 3 Estimating Products and Quotients

*Note: This section was also introduced in 4-9 in Course 1.*

3-8 Adding and Subtracting Fractions

Example 1 Adding and Subtracting Fractions with Like Denominators

Example 2 Adding and Subtracting Fractions with Unlike Denominators

*Note: This section was also introduced in 4-8 and 5-2 respectively with negative numbers added to them.*

3-9 Adding and Subtracting Mixed Numbers

Example 1 Measurement Application

Example 2 Adding Mixed Numbers

Example 3 Subtracting Mixed Numbers

*Note: This section was also stated in 5-3 in Course 1, but no negative fractions were introduced. They should be included in this section.*

3-10 Multiplying Fractions and Mixed Numbers

Example 2 Multiplying Fractions

Example 3 Multiplying Mixed Numbers

*Note: This section was also stated in 5-8 in Course 1, but negative fractions were added to it.*
3-11 Dividing Fractions and Mixed Numbers

Vocabulary  
\textit{reciprocal}  

Example 1 Dividing Fractions  
Example 2 dividing Mixed Numbers

Note: This section was also stated in 5-9 in Course 1, but no negative fractions were introduced in this section. That was not consistent with the sections above.

3-12 Solving Equations Containing Fractions

Example 1 Solving Equations by Adding or Subtracting  
A) \[ x - \frac{1}{5} = \frac{3}{5} \]  
B) \[ \frac{5}{12} + y = \frac{2}{3} \]  
C) \[ \frac{7}{18} + u = \frac{14}{27} \]

Example 2 Solving Equations by Multiplying  
A) \[ \frac{2}{3} \times x = \frac{4}{5} \]  
B) \[ 3y = \frac{6}{7} \]

Note: This section was also stated in 5-5 in Course 1, but no negative integers were involved.

Chapter 4 Patterns and Functions

Chapter 4 dealt with patterns and functions which had 7 sections including an extension section.

4-1 The Coordinate Plane

Example 1 Identifying Quadrants on a Coordinate Plane  
Example 2 Plotting Points on a Coordinate Plane  
Example 3 Identifying Points on a Coordinate Plane

Note: This section was also introduced in 11-3 in Course 1.

4-2 Tables and Graphs

Example 1 Identifying Ordered pairs from a Table of Values  
Write ordered pairs from the table.  
The ordered pairs are (5, 6), (7,7), (9,7), and (11,9).

Example 2 Graphing Ordered pairs from a Table of Values
Write and graph the ordered pairs from the table.

The ordered pairs are (-3, 4), (-1, 1), (1, -2), and (3, -5).

Plot the points on a coordinate plane.

*Note:* This section was also introduced in 11-10 in *Course 1*.

### 4-3 Interpreting Graphs

Example 1 Relating Graphs to Situations.

Example 2 Problem solving Application

*Note:* This section was partially new to students. More interpretation of graphs should be introduced in the section.

### 4-4 Functions, Tables, and Graphs

Vocabulary *function* *input* *output*

Example 1 Completing a Function Table.

Example 2 Graphing Function Using Ordered Pairs

*Note:* The section was also stated in 11-9 in *Course 1*

### 4-5 Problem solving Skill: Find a pattern in Sequences

Vocabulary *sequence* *term* *arithmetic sequence* *geometric sequence*

Example 1 Identifying patterns in Sequences

Example 2 Identifying Functions in Sequences

Example 3 Using Functions to Extend Sequences

*Note:* This section was also introduced in 1-7 in *Course 1* regarding arithmetic sequences. Unfortunately, there was no formula or rule as to how to find arithmetic sequence and geometric sequence. That was a great pity.

### 4-6 Graphing Linear Functions

Vocabulary *linear equation* *linear function*

Example 1 Graphing Linear Functions

Graph the linear function \(y = 2x + 1\)
Note: This section was also stated in 11-10 in Course 1.

Extension  Nonlinear Functions

Vocabulary  nonlinear function

Example 1 Identifying Graphs of Nonlinear Functions

Example 2 Identifying Nonlinear Relationships in Function Tables

Note: This section was not supposed to be stated here. If it was to be introduced, it should be explained deep with sections of linear functions; otherwise it should be introduced in great details in Course 3.

Chapter 5

Proportional Relationships

Chapter 5 dealt with proportional relationships. It had 10 sections including an extension section.

5-1 Ratios

Vocabulary  ratio

Example 1 Writing Ratios

Example 2 Writing Ratios in Simplest Form

Note: The section was also introduced in 7-1 in Course 1.

5-2 Rates

Vocabulary  rate  unit rate

Example 1 Finding Unit Rates

A) During exercise, Sonia’s heart beats 675 times in 5 minutes. How many times does it beat per minute?

\[
\frac{675 \text{ beats}}{5 \text{ minutes}} = \frac{135 \text{ beats}}{1 \text{ minutes}}
\]

Example 2 Finding Average Speed

Note: This section was also introduced in 7-1 in Course 1. Both ratios and rates were stated in Course 1. Why was it again stated here with no new knowledge added to both sections.
5-3 Slope and Rates of Change

Vocabulary  

slope

Example 1 Identifying the Slope of the Line
Tell whether the slope is positive or negative. Then find the slope.

Example 2 Using Slope and a Point to Graph a Line
Use the given slope and point to graph each line.

Example 3 Identifying Rates of Change in Graphs
Tell whether each graph shows a constant or variable rate of change.

Example 4 Using Rate of Change to solve Problems

Note: This section was new in this book of Course 2.

5-4 Identifying and Writing Proportions

Vocabulary  
equivalent ratios  proportion

Example 1 Comparing Ratios in Simplest Form
Determine whether the ratios are proportional.

Example 2 Comparing Ratios Using a Common Denominator

Example 3 Finding Equivalent Ratios and Writing Proportions

Note: This section was also stated in 7-3 in Course 1.

5-5 Solving Proportions

Vocabulary  
cross product

Example 1 solving Proportions Using Cross Products

Note: This section was also introduced in 7-2 in Course 1.

5-6 Customary Measurements

Example 1 Choosing the Appropriate Customary Unit

Example 2 Converting Customary Units

Example 3 Adding or Subtracting Mixed Units of Measure
Note: This section was also stated in 9-1 in Course 1.

5-7 Similar Figures and Proportions

Vocabulary  
*similar*  *corresponding sides*  *corresponding angles*

Example 1 Determining Whether Two Triangles Are Similar

Tell whether the triangles are similar.

Example 2 Determining whether Two Four-sided figures Are Similar.

Tell whether the figures are similar.

Note: This section was also stated in 7-4 in Course 1.

5-8 Using Similar Figures

Vocabulary  *indirect measurement*

Example 1 Finding Unknown Lengths in Similar Figures

Example 2 Measurement Application

Example 3 Estimating with Indirect Measurement

Note: This section was also stated in 7-4 in Course 1.

5-9 Scale Drawings and Scale Models

Vocabulary  *scale model*  *scale factor*  *scale drawing*

Example 1 Finding a Scale Factor

Example 2 Using Scale Factors to Find Unknown Lengths

Example 3 Measurement Application

Note: This section was also introduced in 7-6 in Course 1.

Extension  Dimensional Analysis

Example 1 Making Unit Conversions

Use a unit conversion factor to covert 80 miles per hour to feet per hour.

\[
\frac{80 \text{ mi}}{1 \text{ hr}} \times \frac{5,280 \text{ ft}}{1 \text{ mi}} = \frac{80 \times 5,260 \text{ ft}}{1 \text{ hr}} = \frac{422,400 \text{ ft}}{1 \text{ hr}}
\]

Eighty miles per hour is 422,400 feet per hour.
Chapter 6

Percents

Chapter 6 dealt with percents. It had 7 sections in it.

6-1 Percents

Vocabulary percent

- Example 1 Modeling Percents
- Example 2 Writing Percents as Fractions
- Example 3 Writing Percents as Decimals

Note: This section was also introduced in 7-7 in Course 1.

6-2 Fractions, Decimals, and Percents

Example 1 Writing Decimals as Percents

Example 2 Writing Fractions as Percents

6-3 Problem Solving Skill: Estimate with Percents

- Example 1 Using Fractions to Estimate Percents
- Example 3 Estimating with Simple Percents

Note: This section was also stated in 4-9 in Course 1.

6-4 Percent of a Number

\[
\frac{\text{part}}{\text{whole}} = \frac{67}{100} = \frac{n}{90}
\]

Example 1 Using Proportions to Find Percents of Numbers

Find the percent of each number.

A) \(67\% \text{ of } 90 \rightarrow \frac{67}{100} = \frac{n}{90} \rightarrow n = 60.3 \rightarrow 67\% \text{ of } 90 \text{ is } 60.3.

Example 2 Using Decimal Equivalents to Find Percents of Numbers

Find the percent of each number. Check whether your answer is reasonable.
A) $8\%$ of $50 = 0.08 \cdot 50 = 4$
B) $0.5\%$ of $36 = 0.005 \cdot 36 = 0.18$

Note: This section was also introduced in 7-9 in Course 1 with a formula $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$. The formula $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ should be shown in the section again. Unfortunately, different methods to find percent of a number or percent change were not fully covered in this section. The formula $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ was not enough. Since students already learned how to find percent change, new ways should be introduced. Isn’t it “a mile wide and an inch deep?”

6-5 Solving Percent Problems

Applying Percents

Example 1 Using Proportions to Solve Problems with Percent

A) What percent of $90$ is $45$?

\[
\frac{n}{100} = \frac{45}{90} \rightarrow n = 50 \quad \text{50}\% \text{ of } 90 \text{ is } 50.
\]

B) $12$ is $8\%$ of what number?

\[
\frac{8}{100} = \frac{12}{n} \rightarrow n = 150 \quad 12 \text{ is } 8\% \text{ of } 150.
\]

Example 2 Using Equations to solve Problems with Percents

A) What percent of $75$ is $150$?

\[
n \cdot 75 = 105 \quad \rightarrow \quad n = 140\% 
\]

B) $48$ is $20\%$ of what number?

\[
48 = 20\% \cdot n \quad \rightarrow \quad n = 140\% 
\]

Note: This section was also stated in 7-9 in Course 1. The writer thought there were three types of percent problems that the compilers should include in the book. Each type involved three numbers. Although the formula $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$ was good, different types of solving percent problems should be introduced. When you know two of the numbers, you can write an equation and solve it to find the third number. For example:

**Finding a Per Cent of a Number**

What number is $75\%$ of $900$?

\[
n = 0.75 \cdot 900
\]
Finding What Per Cent a Number is of Another?

What per cent of 5 is 2?

\[
n \cdot 5 = 2
\]

Finding a Number Given is Per Cent

72 is 9% of what number?

\[
72 = 0.09 \cdot n
\]

Note: These three types of per cent problems were essential to those students who were confused with the formula \( \frac{\text{is}}{\text{of}} = \frac{\%}{100} \) because the writer found that some students (especially those students with special needs in regular classrooms) did not know how to set up an equation with the formula \( \frac{\text{is}}{\text{of}} = \frac{\%}{100} \).

6-6 Percent of Change

Vocabulary percent of change percent of increase percent of decrease

Percent of change = \( \frac{\text{amount of change}}{\text{original amount}} \)

Example 1 Finding Percent of Change

A) 27 is decreased to 20 → 27 - 20 = 7 Percent of change = \( \frac{7}{27} \) ≈ 0.259 ≈ 25.9%

B) 32 is increased to 67 → 67 - 32 = 35 → \( \frac{35}{32} \) = 1.09375 ≈ 109.4%

Example 2 Using Percent of Change

The regular price of an MP3 player is $79.99 with 25% off. What is the sale price?

25% · 79.99 = d → d ≈ $20.00

The sale price: $79.99 - $20.00 = $59.99.

Note: This section was also stated in 7-10 in Course 1.

6-7 Simple Interest

Vocabulary interest simple interest principal

Formula: \( I = p \cdot r \cdot t \)
Example 1 Using the Simple Interest Formula

\[ I = \$300, \, P = \$1,000, \, r = \ ? \, , \, t = 5 \text{ years} \]

\[ 300 = 1,000 \cdot r \cdot 5 \quad \rightarrow \quad 300 = 5,000r \quad \rightarrow \quad 0.06 = r \quad \text{The interest rate is 6\%.} \]

*Note: This section was also stated in Extension in Chapter 7 of *Course 1*, p. 400.*

Chapter 7

**Collecting, Displaying and Analyzing Data**

Chapter 7 dealt with collecting, displaying and analyzing data. It had 10 sections.

**7-1 Frequency Tables, Stem-and Leaf Plots, and Line Plots**

Vocabulary: *frequency table* cumulative frequency *stem-and-leaf plot* *line plot*

- Example 1 Organizing and Interpreting Data in a Frequency Table
- Example 2 Organizing and Interpreting Data in a Stem-and-Leaf Plot
- Example 3 Organizing and Interpreting Data in a Line Plot

*Note: This section (Example 1 and Example 2) was also stated in 6-5 and 6-9 of *Course 1*.*

**7-2 Mean, Median, Mode, and Range**

Vocabulary: *mean* median *mode* range outlier

- Example 1 Finding the mean, Median, Mode, and Range of a Data Set
- Example 2 Choosing the Best Measure to Describe a Set of Data
- Example 3 Exploring the Effects of Outliers on Measures of Central Tendency

*Note: This section was also stated in 6-2 of *Course 1*.*

**7-3 Bar Graphs and Histograms**

Vocabulary: *bar graph* double-bar graph histogram

- Example 1 Interpreting a Bar Graph
- Example 2 Making a double-Bar Graph
- Example 3 Making a Histogram
Note: This section was also stated in 6-4 and 6-5 of Course 1.

**7-4 Reading and Interpreting Circle Graphs**

Vocabulary  
*circle graph  sector*

Example 2 Interpreting Circle Graphs

Example 3 Choosing an Appropriate Graph

Note: This section was also introduced in Course 1, but it didn’t go deep. On Page 524 (Course 1), only how to “Construct Circle Graphs” was introduced. More should be done about circle graphs in that page.

**7-5 Box-and Whisker Plots**

Vocabulary  
*box-and-whisker plot  lower quartile  upper quartile  inter-quartile range*

Example 1 Making a Box-and-Whisker Plot

Example 2 Comparing Box-and-Whisker Plots

Note: This section was also shallowly introduced on Page 790, Course 1. It only showed the definition and the graph, but how to make a Box-and-Whisker Plot and how to analyze the data were not introduced on that page.

**7-6 line Graphs**

Vocabulary  
*line graph  double-line graph*

Example 1 Making a Line Graph

Example 2 Using a Line Graph to Estimate Data

Example 3 Making a Double-Line Graph

Note: This section was also stated in 6-7 in Course 1.

**7-7 Choosing an Appropriate Display**

Example 1 Choosing an Appropriate Display

Example 2 Identifying the Most Appropriate Display

Note: This section was also introduced in 6-10 of Course 1.

**7-8 Populations and Samples**

Example 1 Analyzing Sampling Methods
Example 2 Identifying Potentially Biased Sample
Example 3 Verifying claims Based on Statistical Data

Note: This section was new to students in Course 2.

7-9 Scatter Plots

Example 1 Making a Scatter Plot
Example 2 Determining Relationships Between Two Sets of Data

Note: This section was new to students in Course 2.

7-10 Misleading Graphs

Example 1 social Studies Application
Example 2 Analyzing Misleading Graphs

Note: This section was also introduced in 6-8 of Course 1.

Chapter 8

Geometric Figures

Chapter 8 dealt with geometric figures. It had 12 sections including an extension section.

8-1 Building Blocks of Geometry

Vocabulary  point  line  plane  ray  line segment  congruent

Example 1 Identifying Points, Lines and Planes
Example 2 Identifying Line Segments and Rays
Example 3 Identifying Congruent Line Segment

Note: This section was also introduced in 8-1 in Course 1.

8-2 Classifying Angles

Vocabulary  angle  vertex  right angle  obtuse angle  straight angle  complementary angle  supplementary angles

Example 1 Classifying Angles
Example 2 Identifying Complementary and Supplementary Angles
Example 3 Finding Angle Measures

Note: This section was also introduced in 8-2 and 8-3 in Course 1

8-3 Angle Relationships

Vocabulary: perpendicular lines, parallel lines, skew lines, adjacent angles, vertical angles, transversal, corresponding angles

Example 1 Identifying Parallel, Perpendicular, and Skew lines

Example 2 Using Angle Relationships to find Angle Measures

Line \( n \parallel \) line \( p \). Find the measure of each angle.

Note: This section was also introduced in 8-3 in Course 1.

8-4 Properties of Circles

Vocabulary: circle, center of a circle, arc, radius, diameter, chord, central angle, sector

Example 1 Identifying Parts of Circles

Note: This section was also introduced in 9-8 of Course 1. Since students already learned how to find circumferences and area of circles (10-5, Course 1), the compilers should include the information as to how to find the radius and diameter if area or circumference were given. Some students did not know how to solve such problems.

8-5 Classifying Polygons

Vocabulary: polygon, regular polygon

Example 1 Identifying Polygons

Determine whether each figure is a polygon. If it is not, explain why not.

Example 2 Classifying Polygons

Example 3 Identifying and Classifying Regular Polygons

Note: This section was also introduced in 8-7 in Course 1.

8-6 Classifying Triangles

Vocabulary: scalene triangle, isosceles triangle, equilateral triangle, acute triangle, obtuse triangle, right angle

Example 1 Classifying Triangles
Example 2 Identifying Triangles

*Note:* This section was also introduced in 8-5 in *Course 1.*

### 8-7 Classifying Quadrilaterals

Vocabulary *parallelogram rectangle rhombus square trapezoid*

Example 1 Classifying Quadrilaterals

Example 2 Drawing Quadrilaterals

*Note:* This section was also introduced in 8-6 in *Course 1.*

### 8-8 Angles in Polygons

Example 1 Finding an Angle Measure in a Triangle

Find the unknown angle measure in the triangle.

\[ 25^0 + 37^0 + x = 180^0 \quad x = 118^0 \]

Example 2 Finding an Angle Measure in a Quadrilateral

Find the unknown angle measure in the quadrilateral.

\[ 98^0 + 137^0 + 52^0 + x = 360^0 \quad x = 73^0 \]

Example 3 Drawing Triangles to Find the Sum of Interior Angles

Divide the polygon into triangles to find the sum of its angle measures.

*Note:* This section was also introduced in 8-5 in *Course 1* although not much detail was stated in that section.

### 8-9 Congruent Figures

Example 1 Identifying Congruent Figures in the Real World

Example 2 Identifying Congruent Triangles

Example 3 Using Congruent to Find Missing Measures

*Note:* This section was also stated in 8-9 in *Course 1* although not much detail was made in that section.

### 8-10 Translations, Reflections, and Rotations

Vocabulary *transformation image translation reflection line of reflection rotation*
Example 1 Identifying Types of Translations
Example 2 Graphing Translations on a Coordinate Plane
Example 3 Graphing Reflections on a Coordinate Plane
Example 4 Graphing Rotations on a Coordinate Plane

*Note:* This section was also introduced in 8-10 of *Course 1* although not much detail was made in that section. In this section Examples 2, 3, and 4 were partly new to students because more details on graphing and transformation were introduced.

**8-11 Symmetry**

Vocabulary *line symmetry* *line of symmetry* *asymmetry* *rotational symmetry* *center of rotation*

Example 1 Identifying Line Symmetry
Example 2 Social Studies Application
Example 3 Identifying Rotational Symmetry

*Note:* This section was also stated in 8-11 of *Course 1*.

**Extension   Dilations**

Vocabulary *dilation*

Example 1 Identifying Dilations
Example 2 Using a Dilation to Enlarge a Figure
Example 3 Using a Dilation to Reduce a Figure

*Note:* This section was new to students.

**Chapter 9**

**Measurement: Two-Dimensional Figures**

Chapter 9 dealt with measurement regarding two-dimensional figures 9 sections including an extension section.

**9-1 Accuracy and Precision**

Vocabulary *precision* *accuracy* *significant digits*

Example 1 Judging Precision of Measurements
Example 2 Identifying Significant Digits
Example 3 Using Significant Digits in Addition or Subtraction
Example 4 Using Significant Digits in Multiplication or Division

*Note:* This section was also stated in 9-1, 9-2, 9-3, and 9-4 of *Course 1* although much information was not introduced as to how to judge precision of measurements there. In this section much detail was introduced regarding accuracy and precision.

**9-2 Perimeter and Circumference**

**Vocabulary**  
*perimeter  circumference*

Example 1 Finding the Perimeter of a Polygon
Example 2 Using Properties of a Rectangle to Find Perimeter
Example 3 Finding the Circumference of a Circle

*Note:* This section was also introduced in 9-8 of *Course 1*.

**9-3 Area of Parallelograms**

**Vocabulary**  
*area*

Example 1 Finding the Area of a Rectangle
Example 2 Finding Length or Width of a Rectangle
Example 3 Finding the Area of a Parallelogram

*Note:* This section was also introduced in 10-1, 10-2, and 10-3 of *Course 1*.

**9-4 Area of Triangles and Trapezoids**

Example 1 Finding the Area of a Triangle
Example 2 Finding the Area of a Trapezoid

*Note:* This section was also introduced in 10-2 of *Course 1*.

**9-5 Area of Circles**

Example 1 Finding the Area of a Circle
Example 2 Social Studies Application
Example 3 Measurement Application
Note: This section was also introduced in 10-5 of Course 1.

9-6 Area of Irregular Figures

Example 1 Estimating the Area of an Irregular Figure

Example 2 Finding the Area of an Irregular Figure

Example 3 Problem Solving Application

Note: This section was also introduced in 10-3 of Course 1. That was an important section regarding composite figures. More detail and variety of exercises should be included so that students could practice solving problems with irregular figures because the writer found that some students had difficulty finding the areas or perimeter of composite figures.

9-7 Squares and Square Roots

Vocabulary

perfect square  square root  radical sign

Example 1 Finding Squares of Numbers

Example 2 Finding Square Roots of Perfect Squares

Example 3 Estimating Square Roots

Note: This section was new to students.

9-8 The Pythagorean Theorem

Vocabulary

leg  hypotenuse  Pythagorean Theorem

Formula:  \( a^2 + b^2 = c^2 \)

Example 1 Calculating the Length of a Side of a Right Triangle

Note: This section was new to students.

Extension  Identifying and Graphing Irrational Numbers

Vocabulary

irrational numbers

Example 1 Identifying Rational and Irrational Numbers

Example 2 Graphing Rational Number and Irrational Numbers

Note: This section was new to students.
Chapter 10

Measurement: Three-Dimensional figures

Chapter 10 dealt with measurement regarding three-dimensional figures. It had 5 sections including an extension section.

10-1 Introduction to Three-Dimensional Figures

Vocabulary *face* *edge* *polyhedron* *vertex* *base* *prism* *pyramid* *cylinder* *cone*

Example 1 Naming Prism and Pyramids

Example 2 Classifying Three-Dimensional Figures

*Note*: This section was also introduced in 10-6 of *Course 1*.

10-2 Volume of Prism and Cylinders

Vocabulary *volume*

Example 1 Using Cubes to Find the Volume of a Rectangular Prism

Example 2 Using a Formula to Find the Volume of a Prism

Example 3 Using a Formula to Find the Volume of a Cylinder

*Note*: This section was also introduced in 10-7 and 10-8 of *Course 1*.

10-3 Volume of Pyramids and Cones

Example 1 Finding the Volume of a Rectangular Pyramid

Example 2 Finding the Volume of a Cone

*Note*: This section was new to students regarding the volume of rectangular pyramid and a cone.

10-4 Surface Area of Prisms and Cylinders

Vocabulary *net* *surface area*

Example 1 Finding the Surface Area of a Prism

\[ S = 2lw + 2lh + 2wh \]

Example 2 Problem Solving Application
10-5 Changing Dimensions

Example 1 Finding the Surface Area of a Similar Figure

A) The surface area of a box is 27 in\(^2\). What is the surface area of a similar box that is larger by a scale factor of 5?
\[ S = 27 \cdot 5^2 = 675\text{in}^2 \]

Example 2 Finding Volume Using Similar Figures

Note: This section was new to students.

Extension Cross Sections

Vocabulary

Example 1 Identifying Cross Sections

Example 2 Sketching and Describing Cross Sections

Example 3 Describing Three-Dimensional Figures Formed by Transformations

Note: This section was new to students.

Chapter 11

Probability

Chapter 11 dealt with probability. It had 7 sections in it.

11-1 Probability

Vocabulary

Example 1 Determine the Likelihood of an Event

Example 2 Using Complements

Note: This section was also introduced in 12-1 of Course 1.

11-2 Experimental Probability

Vocabulary

Formula:
\[ \text{probability} \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}} \]
Example 1 Sports Application
Example 2 Weather Application

*Note:* This section was also introduced in 12-2 in *Course 1.*

### 11-3 Problem Solving Skill: Make a List to Find Sample Spaces

**Vocabulary**
- *sample space*
- *Fundamental Counting Principle*

Example 1 Problem Solving Application
Example 2 Using a Tree Diagram to Find a Sample Space

*Note:* This section was also introduced in 12-3 of *Course 1.*

### 11-4 Theoretical Probability

**Vocabulary**
- *theoretical probability*

**Formula:**

\[
\text{probability} = \frac{\text{number of ways the event can occur}}{\text{total number of equally likely outcomes}}
\]

Example 1 Finding Theoretical Probability
Example 2 School Application

*Note:* This section was also introduced in 12-4 of *Course 1.*

### 11-5 Probability of Independent and Dependent Events

**Vocabulary**
- *independent events*
- *dependent events*

Example 1 Determining Whether Events Are Independent or Dependent
Example 2 Finding Probability of Independent Events
Example 3 Finding the Probability of Dependent Events

*Note:* This section was new to students, but the section didn’t mention “with or without replacement” when students solved probability of independent and dependent events.

### 11-6 Combinations

**Vocabulary**
- *combination*

Example 1 Using a Table to Find Combination

How many different combinations of two books are possible from Mrs. Logan’s list
of five books?

There are 10 different combinations of two books on Mrs. Logan’s list of five books.

Example 2  Problem Solving Application

Note: This section was new to students regarding combination. The book didn’t mention the formula: \( n \text{C}r \) or \( \frac{n \text{P}r}{r} \).

11-6 Permutations

Vocabulary  
permutation  factorial

Example 1 Using a List to Find Permutation

Example 2 Using the Fundamental Counting Principle to find the Number of Permutation

Example 3 Using Factorials to Find the Number of Permutations

Note: This section was new to students in Course 2.

Chapter 12

Multi-Step Equations and Inequalities

Chapter 12 dealt with multi-step equations and inequalities. It had 8 sections including an extension section.

12-1 Solving Two-Step Equations

Example 1 Solving Two-Step Equations Using division

A)  \( 2n + 5 = 13 \rightarrow 2n + 5 - 5 = 13 - 5 \rightarrow 2n = 8 \rightarrow n = 4 \)
B)  \( 19 = -3p - 8 \)

Example 2  Solving Two-Step Equations Using Multiplication

A)  \( 8 + \frac{m}{4} = 17 \)
B)  \( 3 = \frac{u}{6} - 12 \)

Example 3 Fitness Application

Note: This section was also introduced in 2-4 of Course 1.

12-2 Solving Multi-Step Equations

Example 1 Combining Like Terms to Solve Equations
Solve $7n - 1 - 2n = 14 \rightarrow 5n - 1 = 14 \rightarrow 5n = 15 \rightarrow n = 3$

Example 2 Using the Distributive Property to Solve Equations

Solve $3(z - 1) + 8 = 14$

Example 3 Problem Solving Application

Note: This section was also introduced in 11-8 of Course 1. More exercises should be included regarding the combination of like terms; especially more exercises should be added with integers, decimals, and fraction.

12-3 Solving Equations with Variables on Both sides

Example 1 Using Inverse Operations to Group Terms with Variable

A) $6m = 4m + 12 \rightarrow 6m - 4m = 4m + 12 \rightarrow 2m = 12$

B) $-7x - 198 = 5x \rightarrow -7x + 7x - 198 = 5x + 7x \rightarrow -198 = 12x$

Example 2 Solving Equations with Variables on Both Sides

A) $5n = 3n + 26$

B) $19 + 7n = -2n + 37$

C) $\frac{5}{9}x = \frac{4}{9}x + 9 \rightarrow \frac{5}{9}x - \frac{4}{9}x = \frac{4}{9}x - \frac{4}{9}x + 9 \rightarrow \frac{1}{9}x = 9 \rightarrow (9)\frac{1}{9}x = (9)9 \rightarrow x = 81$

Note: This section was new to students.

12-4 Inequalities

Vocabulary inequality algebraic inequality solution set compound inequality

Example 1 Writing Inequality

A) There are at least 25 students in the auditorium.
   Number of students $\geq 25$ (“At least” means greater than or equal to.)

B) No more than 150 people can occupy the room.
   Room capacity $\leq 150$ (“No more than” means less than or equal to.)

Example 2 Graphing Simple Inequality

A) $x > -2$

B) $-1 \geq y$

A compound inequality is the result of combining two inequalities. The words and and or are used to describe how parts are related.

$x > 3$ or $x < -1 \rightarrow x$ is either greater than 3 or less than -1
-2 < y and y < 4 → y is both greater than -2 and less than 4. y is between -2 and 4.

Example 3 Graphing Compound Inequalities

Note: This section was also stated in the extension section of Chapter 2 of Course 1.

12-5 Solving Inequalities by Adding or Subtracting

Example 1 Solving Inequalities by Adding

A) x – 12 > 32
B) -14 ≥ y – 8

Example 2 Solving Inequalities by Subtracting

A) C + 9 < 20
B) -2 < x + 16

Example 3 Weather Application

Note: This section was new to students in Course 2.

12-6 Solving Inequalities by Multiplying or Dividing

Example 1 Solving Inequalities by Multiplying

A) \( \frac{x}{11} < 3 \) → (11) \( \frac{x}{11} < (11) 3 \) → x < 33
B) 4.8 ≤ \( \frac{r}{-16} \)

Example 2 Solving Inequalities by Diving

A) 4x > 9 → \( \frac{4x}{4} > \frac{9}{4} \) → x > \( \frac{9}{4} \), or 2\( \frac{1}{4} \)

Note: This section was new to students in Course 2.

12-7 Solving Two-Step Inequalities

Example 1 Solving Two-Step Inequalities

A) \( \frac{x}{5} - 15 < 10 \) → \( \frac{x}{5} - 15 + 15 < 10 + 15 \) → \( \frac{x}{5} < 25 \) → (5) \( \frac{x}{5} < (5)25 \) → x < 125
B) 42 ≤ \( \frac{y}{-9} \) + 10
C) 3x – 12 ≥ 9
D) 10 > -4y + 6

Note: This section was new to student. However, if students knew how to solve equations, it would not be difficult to solve problems with two-step inequalities.
**Extension  Solving for a Variable**

Example 1 Solving for Variable in Formulas

Solve \( d = rt \) for.

\[
\begin{align*}
\frac{d}{t} &= \frac{rt}{t} \\
\frac{d}{t} &= r
\end{align*}
\]

*Note:* This section was new to student. This was a good section. Many exercises were shown on page 711. It would be a pity if the teaching of this extension section was skipped. Some students knew, for example, how to find areas of circles, but they did not know how to find a radius if the area of a circle was given; they did not know how to find a height of a cone if the volume of the cone was given, *etc.* This section was very important. Unfortunately, the compilers of the textbook placed the section at the end of the book (it was suspected that the section was never taught because of the extension).
F. Table 2B

(Mathematics Course 2)

Mathematics Course 2 was analyzed. The following mini-tables were shown to see whether the contents of each chapter were overlapped in each grade (Course 1, Course 2, and Course 3). For example, when 1-1 Numbers and Patterns were shown in Mathematics Course 2 below, it meant 1-1 Numbers and Patterns section in Course 2 was also introduced or mentioned in Mathematics Course 1 or even in Course 3. They were somewhat related.

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G. Mathematics Course 3

In Course 3 Mathematics Textbook, there were 14 chapters which contained 111 sections including 3 extension sections. Mathematics Course 3 had 912 pages long. Systematical analyses were made of every section in each chapter to find whether or not the contents were “a mile wide and an inch deep.” Great details were also indicated in Table 3B (on page 166). From Table 3B, many of contents were seen being repeated or overlapped in each grade. The writer did not type all of the examples or explanation that was shown to be repeated or re-taught in the following statement. Table 3B was clearly shown which content was to be taught or to be re-taught, etc. It was found that about 20% of the contents were new. Course 3 was intended for 8th graders. Unfortunately, many contents were re-taught in 8th grade instead of being revisited. Some of typical examples of repetition or overlapping were stated in the following. For example:

In Course 3:

1-1 Variables and Expressions

Vocabulary variable coefficient algebraic expression constant evaluate substitute

Example 1 Evaluating Algebraic Expressions with One Variable

D) $x + 5$ for $x = 11$

E) $2a + 3$ for $a = 4$

F) $4(3 + n) - 2$ for $n = 0, 1, 2$

Example 2 Evaluating Algebraic Expressions with Two Variables

B) $5x + 2y$ for $x = 13$ and $y = 11$

C) $2.5p - 4q$ for $p = 12$ and $q = 6.5$
This section was also introduced in 2-1 of *Course 1* and 1-7 of *Course 2*. Unfortunately, it was found that negative integers were not introduced. The book was intended for 8th graders who already learned integers. Why did the compilers not make examples with negative integers?

In *Course 1*:

**2-1 Variables and Expressions**

Vocabulary *variable* *constant* *algebraic expression*

Example 1 Evaluating Algebraic Expressions

\[ \frac{w}{3} \text{ when } w = 55, \quad 4 \times n + 6^2 \]

Example 2 Evaluating Expressions with Two Variables

\[ l \times w \text{ for } l = 4 \text{ and } w = 2 \]

In *Course 2*:

**1-7 Variables and Algebraic Expressions**

Vocabulary *variable* *constant* *algebraic expression* *evaluate*

Example 1 Evaluating Algebraic Expressions

Evaluate \( n + 7 \) for each value of \( n \).

C) \( n = 3 \quad n + 7 \quad 3 + 7 = 10 \)

Example 2 Evaluating Algebraic Expressions Involving Order of Operations

G) \( 3x - 2 \text{ for } x = 5 \quad 3(5) - 2 \quad 15 - 2 = 13 \)

H) \( n \div 2 + n \text{ for } n = 4 \quad 4 \div 2 + 4 \quad 2 + 4 = 6 \)
Example 3 Evaluate $\frac{3}{n} + 2m$ for $n = 3$ and $m = 4$. 

$$\frac{3}{3} + 2(4) \quad 1 + 8 = 9$$

Amazingly, *Variables and Expressions*, and *Equations and Their Solutions* were taught and re-taught from *Course 1* through *Course 3* as shown in Table 1B (on page 44), Table 2B (on page 108), and Table 3B (page 166). Since students learned variables and algebraic expressions in 2-1 of *Course 1* before, why weren’t there any examples involved in using integers in algebraic expressions in Chapter 11 of *Course 1*? Moreover, “Adding Integers” was repeated in 11-4 of *Course 1*, 2-2 of *Course 2*, and 1-4 of *Course 3*. “Subtracting Integers” was repeated in 11-5 of *Course 1*, 2-3 of *Course*, and 1-5 of *Course 3*. “Multiplying Integers” was repeated in 11-6 of *Course 1*, 2-4 of *Course 2*, and 1-6 of *Course 3*. “Multiplication Equations” was repeated in 2-7 of *Course 1*, 1-12 of *Course 2*, and 1-8 of *Course 3*, etc. From Table 3B, there were a lot of content areas repeated or overlapped. *Course 3* was intended for 8th graders. Some of the contents were taught in previous grades as seen from Table 3B on page 166.
H. Table 3A

(Mathematics Course 3)

Table 3A showed Mathematics Course 3 Textbook, where there were 14 chapters which contained 111 sections including 3 extension sections. Mathematics Course 3 had 912 pages long. The writer didn’t copy all the examples or explanation from each section. Additional comments were also made on some sections or chapters. The writer gave a Note at the end of some sections in a chapter.

Chapter 1

Principles of Algebra

Chapter 1 had 9 sections. It dealt with principles of algebra.

1-2 Variables and Expressions

Vocabulary variable coefficient algebraic expression constant evaluate substitute

Example 1 Evaluating Algebraic Expressions with One Variable
   G) $x + 5$ for $x = 11$
   H) $2a + 3$ for $a = 4$
   I) $4(3 + n) - 2$ for $n = 0, 1, 2$

Example 2 Evaluating Algebraic Expressions with Two Variables
   D) $5x + 2y$ for $x = 13$ and $y = 11$
   E) $2.5p - 4q$ for $p = 12$ and $q = 6.5$

Note: This section was also introduced in 2-1 of Course 1 and 1-7 of Course 2. Unfortunately, it was found that negative integers were not introduced. The math book was intended for 8th graders who already learned integers. Why did the compilers not make examples with negative integers?

1-3 Algebraic Expressions

Example 1 Translating Word Phrases into Math Expressions
Example 2 Translating Math Expression into word Phrases
Example 3 Writing and Evaluating Expressions in word Problems
Example 4 Writing a word Problem from a Math Expression

Note: This section was also stated in 2-1 of Course 1 and 1-7 of Course. In this section a table of addition, subtraction, multiplication and division was constructed regarding word phrases and expression. That would help students review what they learned from previous grades.

1-4 Integers and Absolute Value

Vocabulary

integer  opposite  additive inverse  absolute value

Example 1 Sports Application
A) Use <, > or = to compare Trevor’s and Julie’s scores
   Trevor’s score is 3, and Julie’s score is -2.
B) List the golfers in order from the lowest score to the highest.
   The score are -5, 3, 4, and -2.

Example 2 Ordering Integers
Write the integers 7, -4, and 3 in order form least to greatest.

Example 3 finding Additive Inverse
Find the additive inverse of each integer.
A) 8 → -8  B) -15 → 15  C) 0 → 0

Example 4 Evaluating Absolute-Value Expressions
A) \(|-9| + |7| \rightarrow |-9| = 9 \quad |7| = 7 \rightarrow 9 + 7 = 16
B)

Note: This section was also stated on page 762 of Course 1 an in 2-1 in Course 2.

1-5 Adding Integers

Example 1 Using a Number Line to Add Integers
Use a number line to find each sum.
A) 3 + (-7)  B) -2 + (-5)

Example 2 Using Absolute Value to Add Integers
A) \(-4 + (-6)\)  B) 8 + (-8)  C) -5 + 11

Example 3 Evaluating Expressions with Integers
Evaluate \(b + 11\) for \(b = -6\)

Note: This section was also introduced in 11-4 of Course 1, 2-1 and 2-4 of Course 2.
1-6 Subtracting Integers

Example 1 Subtracting Integers
A) \(-7 - 7\)  
B) \(2 - (-4)\)  
C) \(-13 - (-5)\)

Example 2 Evaluating Expressions with Integers
Evaluate each expression for the given value of the variable.
A) \(6 - t\) for \(t = -4\)  
B) \(-4 - s\) for \(s = -9\)  
C) \(-3 - x\) for \(x = 5\)

Note: This section was also introduced in 11-5 of Course 1 and 2-3 of Course 2.

1-7 Multiplying and Dividing Integers

Example 1 Multiplying and Dividing Integers
A) \(5(-8)\)  
B) \(-\frac{95}{9}\)  
C) \(12(-3)\)  
D) \(\frac{32}{-8}\)

Example 2 Using the Order of Operations with Integers
Simplify.
A) \(-3(2-8)\)  
B) \(5(-7-2)\)  
C) \(-2(14-6)\)

Note: This section was also introduced in 11-6 and 11-7 of Course 1 and 2-4 of Course 2.

1-8 Solving Equations by Adding or Subtracting

Vocabulary  
- equation
- inverse operation

Example 1 Determining Whether a Number Is a Solution of an Equation.
Determine whether Value of \(x\) is a solution of the equation.
\(x - 7 = 13; x = 12\) or \(20\)
Substitute each value for \(x\) in the equation.

Example 2 Solving Equations Using Addition and subtraction Properties.
Solve.
A) \(6 + t = 28\)  
B) \(m - 8 = -14\)  
C) \(15 = w + (-14)\)

Example 3 Problem solving Application

Note: This section was also introduced in 2-5, 2-6 of Course 1 and 1-11 of Course 2.

1-9 Solving Equations by Multiplying or Dividing

Example 1 Solving Equations Using division
Solve and check.
A) \(8x = 32\)  
B) \(-7y = -91\)

Example 2 solving Equations Using Multiplication
Solve $\frac{h}{-3} = 6$.

Example 3 Money Application
Example 4 Solving a Simple Two-Step Equation
Solve $2x + 1 = 7$

Note: This section was also stated in 2-7 and 2-8 of Course 1 and 1-12 of Course 2.

1-10 Introduction to Inequalities

Vocabulary inequality algebraic inequality solution set

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Example 1 Completing an Inequality
Compare. Write < or >.
A) $13 - 9 \underline{\quad} 6$  
B) $2(8) \underline{\quad} 10$
(Note: There is a good table shown for the set of all solution.)

Example 2 Solving and Graphing Inequalities
A) $x + 7 < -10$  
B) $t - 11 \leq -3$  
C) $z + 6 \geq -3$

Note: This section was also stated in an extension section of Chapter 2 of Course 1, 12-4, 12-5, 12-6, and 12-7 of Course 2.

Chapter 2
Rational Numbers

Chapter 2 had 8 sections. It dealt with rational numbers.

2-1 Rational Numbers

Vocabulary rational number relatively prime

Example 1 Simplifying Fractions
Simply.
A) $\frac{9}{55}$  
B) $-\frac{24}{32}$

Example 2 Writing Decimals as Fractions
Example 3 Writing Fractions as Decimals

Note: This section was also introduced in 2-11 of Course 2.
2-2 Comparing and Ordering Rational Numbers

Vocabulary least common denominator (LCD)

Example 1 Comparing Fractions by Finding a Common Denominator
Compare. Write <, >, or =

Example 2 Comparing by Using Decimals
Compare. Write <, >, or =

Note: This section was also introduced in 4-7 of Course 1, 2-11 of Course 2. Examples of negative fractions and decimals were added to this section.

2-3 Adding and Subtracting Rational Numbers

Example 2 Using a Number Line to Add Rational Numbers
A) -0.4 + 1.3  B) \( \frac{7}{8} + (\frac{3}{8}) \)

Example 3 Adding and Subtracting Fractions with Like Denominator

Note: This section was also introduced in 4-8 of Course 1, 3-7, 3-8 and 3-9 of Course 2. Negative fractions were added to this section.

2-4 Multiplying Rational Numbers

Example 1 Multiplying a Fraction and an Integer
Example 2 Multiplying Fractions
Example 3 Multiplying Decimals

Note: This section was also introduced in 5-8 of Course 1 and 3-10 of Course 2. Negative fractions and decimals were added to this section.

2-5 Dividing Rational Numbers

Vocabulary reciprocal

Example 1 dividing Fractions
Example 2 Dividing Decimals
Example 3 Evaluating Expressions with Fractions and Decimals
A) \( \frac{7.2}{n} \) for \( n = -0.24 \)B) \( \frac{5}{2.4} \) for \( m = \frac{3}{4} \)
Note: This section was also introduced in 5-9 of Course 1 and 3-11 of Course 2. Negative fractions and decimals were introduced to this section.

2-6 Adding and Subtracting with Unlike Denominators

Example 1 Adding and Subtracting Fractions with Unlike Denominators

Example 2 Evaluating Expressions with Rational Numbers
Evaluate \( n - \frac{11}{16} \) for \( n = \frac{1}{3} \)

Note: This section was also introduced in 5-3, 5-4 of Course 1 and 3-12 of Course 2. Negative numbers were added to it.

2-7 Solving Equations with Rational Numbers

Example 1 Solving Equations with Decimals
\[
A) \quad y - 17.5 = 11 \quad B) \quad -4.2p = 12.6 \quad C) \quad \frac{t}{7.5} = 4
\]

Example 2 Solving Equations with Fractions
\[
A) \quad x + \frac{1}{3} = -\frac{4}{9} \quad B) \quad x - \frac{1}{8} = \frac{9}{16} \quad C) \quad \frac{3}{5}w = \frac{3}{16}
\]

Example 3 Solving Word Problems Using Equations

Note: This section was also stated in 2-5, 2-6 of Course 1 and 3-6 of Course 2. Negative numbers were added to it.

2-8 Solving Two-Step Equations

Example 1 Problem solving Application

Example 2 Solving Two-Step Equations
\[
\frac{r + 7}{4} = 5
\]

Note: This section was also introduced in 2-8 of Course 1, 2-5 and 12-1 of Course 2. Students had trouble in solving two-step equations.

Chapter 3

Graphs, Functions, and Sequences

Chapter 3 dealt with functions and sequences. It had 6 sections in it.
3-1 Ordered Pairs

Vocabulary  ordered pair

Example 1 Deciding whether an Ordered pair Is a Solution of an Equation
Determine whether each ordered pair is a solution of $y + 3x + 2$.
A) $(2, 5)$ → is not a solution.  B) $(3, 11)$ → is a solution.

Example 2 Creating a Table of Ordered pair Solutions
Use the given values to make a table of solutions.

Note: This section was also stated in 11-10 of Course 1 and 4-4 of Course 2.

3-2 Graphing on a Coordinate Plane

Vocabulary  coordinate plane  x-axis  y-axis quadrant  x-coordinate  y-coordinate  origin
graph of an equation

Example 1 Finding the Coordinate and Quadrants of Points on a Plane
Example 2 Graphing Points on a Coordinate Plane
Example 3 Graphing an Equation of a Line

Note: This section was also stated in 6-6 and 11-3 of Course 1, 14-1 and 4-2 of Course 2.

3-3 Interpreting Graphs and Tables

Example 1 Matching situations to Tables
Example 2 Matching situations to Graphs
Example 3 Creating a Graphing of a Situation

Note: This was also introduced in 4-3 of Course 2.

3-4 Functions

Vocabulary  function input output domain range  vertical line

Example 1 Finding Different Representations of a Function
Make a table and a graph of $y = 2x + 1$
Example 2 Identifying Functions
Note: This section was also introduced in 11-9 of Course 1 and 4-4 of Course 2.

3-5 Equations, Tables, and Graphs

Example 1 Using Equations to Generate Different Representations of Data
Example 2 Using Tables to Generate different Representations of Data
Example 3 Using Graphs to Generate Different Representations of Data

Note: This section was also introduced in 11-10 of Course 1 and 4-5 of Course 2. In this section data was used to make a table or graph. Students had trouble in this part.

3-6 Arithmetic Sequences

Vocabulary sequence term arithmetical sequence common difference

Example 1 Finding the Common Difference in an Arithmetic Sequence
Example 2 Finding Missing Terms in an Arithmetic Sequence
Example 3 Identifying functions in Arithmetic Sequences
Example 4 Travel application

Note: This section was also stated in 1-7 of Course 1 and 4-5 of Course 2. The compiler should have added the formula \( a_n = a_1 + (n-1)d \) for arithmetical sequence here. 13-2 (Terms of Geometric Sequences) of Course 3 should be moved here, because arithmetical sequences and geometric sequences were mentioned before in Course 1 and Course 2. They should be put together.

Chapter 4
Exponents and Roots

Chapter 4 dealt with exponents and roots. There were 8 sections in it.

4-1 Exponents

Vocabulary exponential form exponent base power

Example 1 Writing Exponents

D) \( 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 5^7 \)
E) \( (-4) \cdot (-4) \cdot (-4) = (-4)^3 \)
F) \( 8 \cdot 8 \cdot 8 \cdot 8 \cdot p \cdot p \cdot p = 8^4 p^3 \)
Example 2 Evaluating Power
B) \(3^4\)  B) \(12^2\)  C) \((-8)^3\)  D) \(-2^3\)

Example 3 Using the Order of Operations
Evaluate \(x - y(z \cdot y^2)\) for \(x = 20, y = 4,\) and \(z = 2\)

Example 4 Geometry Application
The number of diagonal of a \(n\)-sided figure is \(\frac{1}{2}(n^2 - 3n)\). Use the formula to find the number of diagonals for a 6-sided figure.

\[\frac{1}{2}(n^2 - 3n) \rightarrow \frac{1}{2}(6^2 - 3 \cdot 6) \rightarrow \frac{1}{2}(36 - 18) = 9\]

*Note:* This section was also stated in 1-3 of *Course 1* and 1-2 of *Course 2.*

4-2 Look for a Pattern in Integers Exponents

Example 1 Using a Pattern to Evaluate Negative Exponents
A) \(10^{-4}\)

Example 2 Evaluating Negative Exponents
A) \((-2)^{-3}\)  B) \(6^{-4}\)

Example 3 Using the Order of Operations
Evaluate \(2 + (-7)^0 - (4 + 2)^2 \rightarrow 2 + (-7)^0 - 6^2 = 2 + 1 - \frac{1}{36} = 2\frac{35}{36}\)

*Note:* This section was also mentioned in the extension section of Chapter 2 in *Course 2.*

4-3 Properties of Exponents

Example 1 Multiplying Powers with the Same Base
A) \(5^4 \cdot 5^3 = 5^{4+3} = 5^7\)  C) \(16 \cdot 16^{-7} = 16^{1+(-7)} = 16^{-6}\)

Example 2 Dividing Powers with the Same Base
A) \(\frac{10^8}{10^5} = 10^{8-5} = 10^3\)

Example 3 Raising a Power to a Power
A) \((7^5)^2 = 7^{5 \cdot 2} = 7^{10}\)  C) \((2^{-7})^2 = 2^{-7 \cdot 2} = 2^{-14}\)  D) \((12^{10})^{-6} = 12^{10 \cdot (-6)} = 12^{-60}\)

*Note:* This section was new to students. How to multiply and divide powers with the same bases was introduced. How to raise a power to a power was also introduced.
4-4 Scientific Notation

Vocabulary  
*scientific notation*

Example 1 Translating Scientific Notations to Standard Notation  
Write each number in standard notation.  
A)  $3.12 \times 10^9 = 3,120,000,000$  
B)  $4.7 \times 10^{-4} = 4.7 \times \frac{1}{10,000} = 0.00047$

Example 2 Translating Standard Notation to Scientific Notation  
Write 0.0000003 in scientific notation  
$3 \times 10^{-7}$

*Note:* This section was also introduced in 3-4 of *Course 1*. Negative exponents were also mentioned in the extension section of Chapter 11 in *Course 1*, 1-4 and the extension section of Chapter 2 in *Course 2*.

4-5 Squares and Square Roots

Vocabulary  
*principal square root*  
*perfect square*

Example 1 Finding the Positive and Negative Square Roots of a Number  
A)  $81 \rightarrow \sqrt{81} = 9 \quad -\sqrt{81} = -9$

Example 2 Computer Application

Example 3 Evaluating Expressions Involving Square Roots  
Evaluate each expression.  
A)  $3\sqrt{25} + 4 = 3(5) + 4 = 15 + 4 = 19$  
B)  $\sqrt{\frac{16}{4}} + \frac{1}{2} = \sqrt{4} + \frac{1}{2} = 2 + \frac{1}{2} = 2\frac{1}{2}$

*Note:* This section was also mentioned in 9-7 of *Course 2*.

4-6 Estimating Square Roots

Example 1 Estimating Square Roots of Numbers  
Example 2 Problem Solving Application  
Example 3 Using a Calculator to Estimate the Value of a Square Root

*Note:* This section was also introduced in 9-7 of *Course 2*.
4-7 The Real Numbers

Vocabulary  irrational number  real number  density property

Example 1 Classifying Real Numbers
Example 2 Determining the Classification of All Numbers

A) $\sqrt{15}$ irrational  B) $\frac{3}{0}$ undefined, so not a real number
B) $\frac{1}{\sqrt{9}}$ rational  D) $\sqrt{-13}$ not a real number

Example 3 Applying the Density Property of Real Numbers

Note: This section was also introduced in 2-11 of Course 2. What was introduced in Course 1 and Course 2 were also put together here.

4-8 The Pythagorean Theorem

Vocabulary  Pythagorean Theorem  leg  hypotenuse

Example 1 Finding the Length of a Hypotenuse
Example 2 Finding the Length of a Leg in a Right Triangle
Example 3 Using the Pythagorean Theorem for Measurement

Chapter 5
Ratios, Proportions, and Similarity

Chapter 5 dealt with proportions and similarity. There were 8 sections in it.

5-1 Ratios and Proportions

Vocabulary  ratio  equivalent ratio  proportion

Example 1 Finding Equivalent Ratio
Example 2 Determine Whether Two Ratios Are in Proportion

Note: This section was also introduced in 7-1 of Course 1 and 5-1 of Course 2. The compilers did not show another way (in the example) to determine whether two ratios were in proportion just by using cross product when Example 2 above was introduced.
5-2 Ratios, Rates, and Unit Rates

Vocabulary  rate  unit rate  unit price

Example 1 Finding Unit Rates
\[
\frac{120 \text{ words}}{3 \text{ minutes}} = \frac{40 \text{ words}}{1 \text{ minute}}
\]
Mike can type 40 words in one minute.

Example 3 Estimating Unit Rates
Example 4 Finding Unit Prices to Compare Costs

Note: This section was also introduced in 7-1 and 7-2 of Course, and 5-2 of Course 2.

5-3 Dimensional Analysis

Vocabulary  conversion factor

\[
\frac{1 \text{ ft}}{12 \text{ in.}} = \frac{12 \text{ in.}}{12 \text{ in.}} = 1
\]

Example 1 Finding Conversion Factor
A) Ounces to pounds \(\frac{1 \text{ lb}}{16 \text{ oz}}\)  B) Kilometers to meters \(\frac{1000\text{m}}{1 \text{ km}}\)

Example 2 Using Conversion Factors to Solve Problems
\[
\frac{22 \text{ gal}}{1 \text{ yr}} \cdot \frac{4 \text{ qt}}{1 \text{ gal}} = 88 \text{ qt per year}
\]

Example 3 Problem Solving Application

Note: This section was also introduced 9-1 and 9-3 of Course 1, and 5-6 of Course 2. It was also stated in the extension section of Chapter 5 in Course 2.

5-4 Solving Proportion

Vocabulary  cross product

Example 1 Using Cross Products to Identify Proportions
Example 2 Solving Proportions Using Unit Price
Example 3 Solving Proportions Using Equivalent Fractions
Example 4 Business Application
Example 5 Physical Science Application

Note: This section was also introduced in 7-3 of Course 1 and 5-5 of Course 2.
5-5 Similarity and Scale

Vocabulary  similar congruent angles scale factor

   Example 1 Identifying Similar Figures
   Example 2 using Scale Factors to Find Missing Dimensions

Note: This section was also introduced in 7-5 and 7-6 of Course 1 and 5-7, 5-8, and 5-9 of Course 2.

5-6 Dilations

Vocabulary  dilation center of dilation

   Example 1 Identifying Dilations
   Example 2 Dilating a Figure
   Example 3 Using the Origin as the Center of Dilation

Note: This section was also introduced in 7-6 of Course 1 regarding scale drawings. It was also mentioned in the extension section of Chapter 8 in Course 2.

5-7 Indirect Measurement

Vocabulary  indirect measurement

   Example 1 Geography Application
   Example 2 Problem Solving Application

Note: This section was also mentioned in 7-3 of Course 1 and 5-5 and 5-4 of Course 2. That could be introduced in “Proportion Sections.”

5-8 Scale Drawings and Scale Models

Vocabulary  scale drawing scale scale model reduction enlargement

   Example 1 Using Proportions to Find Unknown Scales.
   Example 2 Life Science Application
   Example 3 Finding Unknown Dimensions Given Scale Factors
   Example 4 Life Science Application
Chapter 6
Percents

Chapter 6 dealt with percents. There were 7 sections in it.

6-1 Relating Decimals, Fractions and Percents

Vocabulary  percent

Example 1 Finding Equivalent Ratios and Percents

\[
25\% = \frac{25}{100} = \frac{1}{4} \quad 1\frac{1}{5} = 1.2 = 120\% \quad 66\frac{2}{3}\% = 0.66\bar{6} = \frac{2}{3}
\]

Example 2 Comparing Fractions, Decimals, and Percents

Compare. Write <, >, or =

Example 3 Ordering Fractions, Decimals, and Percents

Example 4 Physical Science Application

Note: This section was also introduced in 3-1, 4-4, 4-7, and 7-8 of Course 1 and 2-11 of Course 2.

6-2 Estimate with Percents

Vocabulary  estimate  compatible numbers  benchmark

Example 1 Estimating with Percents

A) 24% of 44  \rightarrow 24\% \approx 25\% \approx \frac{1}{4} \quad \frac{1}{4} \cdot 44 = 11 \quad 24\% of 44 is about 11.

B) 36% of 20  \rightarrow 36\% \approx 35\% \approx 25\% + 10%

\rightarrow 35\% \cdot 20 = (25\% + 10\%) \cdot 20 = 5 + 2 \quad 36\% of 20 is about 7.

Note: This section was also introduced in 4-9 of Course 1 and 6-3 of Course 2.

6-3 Finding Percents

Example 1 Finding the Percent One Number Is of Another

What percent of 144 is 64?

Example 3 Finding the Percent of a Number
Note: This section was also introduced in 7-9 of Course 1 and 6-4 of Course 2. The compiler should add the formula \( \frac{is}{of} = \frac{\%}{100} \) to the section.

6-4 Finding a Number when the Percent is Known

Example 1 Finding a Number When the Percent is Known
42 is 5% of what number? \( \rightarrow 42 = 5\% \cdot n \)

Note: This section was also introduced in 7-9 of Course 1 and 6-5 of Course 2. The compilers should add the following. For example:

Finding a Per Cent of a Number

What number is 75% of 900?

\[ n = 0.75 \cdot 900 \]

Finding What Per Cent a Number is of Another?

What per cent of 5 is 2?

\[ n \cdot 5 = 2 \]

Finding a Number Given is Per Cent

72 is 9% of what number?

\[ 72 = 0.09 \cdot n \]

Note: These three types of per cent problems were essential to those students who were confused with the formula \( \frac{is}{of} = \frac{\%}{100} \) because some students did not know how to set up an equation with the formula \( \frac{is}{of} = \frac{\%}{100} \). The writer found that students were confused with the “is” or “of” in the formula \( \frac{is}{of} = \frac{\%}{100} \). These three types of solving percent problems could help some students overcome the difficulty using the formula \( \frac{is}{of} = \frac{\%}{100} \).
6-5 Percent Increase and Decrease

Vocabulary percent change percent increase percent decrease

Example 1 Finding Percent Increase or Decrease

\[
\frac{\text{amount of increase}}{\text{original amount}} = \frac{9}{36} = 0.25 = 25\%
\]

From 36 to 45 is a 25% increase.

Example 3 Using Percent Increase or Decrease to Find Prices

Note: This section was also introduced in 7-10 of Course 1 and 6-6 of Course 2.

6-6 Applications of Percents

Vocabulary commission rate sales tax

Example 1 Multiplying by Percents to Find Commission Amounts
Example 2 Multiplying by Percents to Find Sales Tax Amounts
Example 3 Using Proportions to Find the Percent of Earnings
Example 4 Dividing by Percents to Find Total Sales

Note: This section was also introduced in 7-10 of Course 1 and 6-6 of Course 2.

6-7 Simple Interest

Vocabulary interest simple interest principal rate of interest

Formula: \( I = p \cdot r \cdot t \)

\( I = \text{simple interest} \quad p = \text{principal} \quad r = \text{rate of interest} \quad t = \text{time} \)

Example 1 Finding Interest and total Payment on a Loan
Example 2 Determining the Amount of Investment Time
Example 3 Computer Total Savings
Example 4 Finding the Rate of Interest

Note: This section was also introduced in the extension section of Chapter 1 in Course 1 and 6-7 of Course 2.
Chapter 7

Foundations of Geometry

Chapter 7 dealt with foundations of geometry. There were 9 sections in it.

7-1 Points, Lines, Planes, and Angles

Vocabulary: point, line, plane, segment, ray, angle, right angle, acute angle, obtuse angle, complementary angles, supplementary angles, congruent angles, vertical angles

Example 1 Naming Points, Lines, Planes, Segments, and Rays
Example 2 Classifying Angles
Example 3 Finding the Measures of Vertical Angles

Note: This section was also introduced in 8-1 of Course 1 and 8-1 of Course 2.

7-2 Parallel and Perpendicular Lines

Vocabulary: parallel lines, perpendicular lines, transversal

Example 1 Identifying Congruent Angles formed by a Transversal
Corresponding angles, alternate interior angles, alternate exterior angles

Example 2 Finding Angle Measures of Parallel Lines cut by Transversals

Note: This section was also introduced in 8-4 of Course 1 and 8-3 of Course 2.

7-3 Angles in Triangles

Vocabulary: Triangle Sum Theorem, acute triangle, right triangle, obtuse triangle, equilateral triangle, isosceles triangle, scalene triangle

Example 1 Finding Angles in Actual, right, and Obtuse Triangles

A) Find $x^0$ in the acute triangle.
$63^0 + 42^0 + x^0 = 180^0$

Example 2 Finding Angles in Equilateral, isosceles, and Scalene Triangles
Example 3 Finding Angles in a Triangle That Meets Given Conditions
Note: This section was also introduced in 8-2, 8-3, and 8-5 of Course 1 and 8-3 of Course 2.

7-4 Classifying Polygons

Vocabulary polygon regular polygon trapezoid parallelogram rectangle rhombus square

Example 1 Finding Sums of the Angle Measures in Polygons
   A) Find the sum of a the angle measures in each figure
      Divide the sum of the angle measures in a quadrilateral.

Example 2 Finding the Measure of Each Angle in a Regular Polygon
Example 3 Classifying Quadrilaterals

Note: Example A above was a good example because it showed how to find the angle measures. However, this section was also introduced in 8-6 and 8-7 of Course 1, and 8-5, 8-6, 8-7, and 8-8 of Course 2.

7-5 Coordinate Geometry

Vocabulary slope rise run

slope = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}}

Example 1 Finding the Slope of a Line
Example 2 Finding Perpendicular and Parallel Lines
Example 3 Using Coordinates to classifying Quadrilaterals
Example 4 Finding the Coordinates of a Missing Vertex

Note: This section was also introduced in 5-3 of Course 2.

7-6 Congruence

Vocabulary correspondence

Example 1 Writing Congruence Statements
Example 2 Using Congruence Relationships to Find Unknown Values

Note: This section was also introduced in 8-9 of Course 1 and 8-9 of Course 2.
7-7 Transformation

Vocabulary  transformation translation rotation center of rotation reflection image

Example 1 Identifying Transformation
Example 2 Graphing Transformations
Example 3 Describing Graphing of Transformation

Note: This section was also introduced in 8-10 of Course 1 and 8-10 of Course 2.

7-8 Symmetry

Vocabulary  line symmetry line of symmetry rotational symmetry

Example 1 Drawing Figures with Line symmetry
Example 2 Drawing Figures with Rotational Symmetry

Note: This section was also introduced in 8-11 of Course 1 and 8-11 of Course 2.

7-9 Tessellations

Vocabulary  tessellation regular tessellation

Example 1 Creating a Tessellation
Example 2 Creating a Tessellation by Transforming a Polygon

Note: This section was mostly new to students although it was introduced in Chapter 8 (p.498) of Course 2 regarding “Create Tessellations.”

Chapter 8
Perimeter, Area, and Volume

Chapter 8 dealt with perimeter, area, and volume. There were 11 sections including an extension section.

8-1 Perimeter and Area of Rectangles & Parallelograms

Vocabulary perimeter areas

Example 1 Finding the Perimeter of Rectangles and Parallelograms
Example 2 Using a Graph to Find Area
Example 3 Finding Area and Perimeter of a Composite Figure

*Note:* This section was also introduced in 9-7 of *Course 1*, and 9-2, 9-3, and 9-4 of *Course 2*. It would be good if more examples on composite figures were added for students to practice, because some students had difficulty solving problems.

**8-2 Perimeter and Area of Triangles and Trapezoids**

Example 1 Finding the Perimeter of Triangles and Trapezoids  
Example 2 Finding a Missing Measurement  
Example 3 Multi-Step Application

*Note:* This section was also introduced in 9-7, 10-2, and 10-4 of *Course 1*, and 9-2 and 9-4 of *Course 2*.

**8-3 Circles**

Vocabulary  *circle radius diameter circumference*

Example 1 Finding the Circumference of a Circle  
Example 2 Finding the Area of a Circle  
Example 3 Finding Area and Circumference on a Coordinate Plane  
Physical Science Application

*Note:* This section was also introduced in 10-5 of *Course 1*, 9-2 and 9-5 of *Course 2*.

**8-4 Drawing Three-Dimensional Figures**

Vocabulary  *face edge vertex orthogonal views*

Example 1 Identifying Vertices, Edges, and Faces  
Example 2 Drawing a Figure When Given Different Perspectives  
Example 3 Drawing different Perspectives of a Figure

*Note:* This section was also introduced in 10-6 of *Course 1* and 10-1 of *Course 2*.

**8-5 Volume of Prisms and Cylinders**

Vocabulary  *cylinder prism*
Example 1 Finding the Volume of Prisms and Cylinders
Example 2 Exploring the Effects of Changing Dimensions
Example 3 Music Application
Example 4 Finding the Volume of Composite Figures

Note: Example 4 above was a good example, but this section was also introduced in 10-7 and 10-8 of Course 1 and 10-2 of Course 2.

8-6 Volume of Pyramids and Cones

Vocabulary    pyramid   cone

Example 1 Finding the Volume of Pyramids and Cones
Example 2 Exploring the Effects of Changing Dimensions
Example 3 Social Studies Application
Example 4 Using a Calculator to Find Volume

Note: This section was also introduced in 10-2 and 10-2 of Course 2.

8-7 Surface Area of Pyramids and Cones

Vocabulary    Surface area   lateral face   lateral surface

Example 1 Finding Surface Area
Example 2 Exploring the Effects of changing Dimensions
Example 3 Art Application

Note: This section was also stated in 10-9 of Course 1 and 10-4 of Course 2.

8-8 Surface Area of Pyramids and cones

Vocabulary    slant height   regular pyramid   right cone

Example 1 Finding surface Area
Example 2 Exploring the Effect of Changing Dimension
Example 3 Life Science application

Note: This section was also introduced in 10-9 of Course 1 and 10-4 of Course 2.
8-9 Sphere

Vocabulary  \textit{sphere hemisph}ere  \textit{great circle}

Example 1 Finding the Volume of a Sphere
\[ V = \frac{4}{3} \pi r^3 \]
Example 2 Finding Surface Area of a sphere
Example 3 Comparing Volumes and Surface Areas

Note: This section was new to students.

8-10 Scaling Three-Dimensional figures

Vocabulary  \textit{capacity}

Example 1 Scaling Models That Are Cubes
Example 2 Scaling Models That Are Other Solid Figures
Example 3 Business application

Note: This section was also mentioned in 10-5(Changing Dimension) of Course 2.

Extension Symmetry in Three Dimensions

Vocabulary  \textit{bilat}eral \textit{symmetry}

Example 1 Identifying Symmetry in a Solid Figure
Example 2 Drawing a Cross Section

Note: This section was also mentioned in the extension section in Chapter 10 of Course 2.

Chapter 9
Data and Statistics

Chapter 9 dealt with data and statistics. There were 8 sections in it.

9-1 Samples and Surveys

Vocabulary \textit{population sample random sample systematic sample stratified sample voluntary-response sample biased sample}
Example 1 Identifying Sampling Methods
Example 2 Identifying Biased Samples

Note: This section was also mentioned in 7-8 of Course 2. There is a good table to show how to use each method above.

9-2 Organizing Data

Vocabulary line plot stem-and-leaf plot back-to back stem-and-leaf plot Venn diagram

Example 1 Organizing data in Line Plots
Example 2 Reading Stem-and-leaf Plots
Example 3 Organizing Data in Back-to-Back Stem-and-Leaf Plots
Example 4 Organizing Data in Venn Diagram

Note: This section was also introduced in 7-1, 7-5, and 7-6 of Course 2 except that Example 3 above was new.

9-3 Measures of Central Tendency

Vocabulary mean median mode range outlier

Example 1 Finding Measures of Central Tendency and Range
Example 2 Choosing the Best Measure of Central Tendency
Example 3 Business Application

Note: This section was also introduced in 7-2 of Course 2.

9-4 Variability

Vocabulary variability quartile box-and-whisker

Example 1 Finding Measures of Variability
Example 2 Making a Box-and-Whisker Plot
Example 3 Comparing Data Sets Using Box-and-Whisker Plots

Note: This section was also mentioned in 7-5 of Course 2.
9-5 Displaying Data

Vocabulary  double-bar graph  frequency table  histogram  double-line graph

Example 1 Displaying Data in a Double-Bar-Graph
Example 2 Displaying Data in a Histogram
Example 3 Displaying Data in a Line Graph

Note: This section was also mentioned in 7-1, 7-3, and 7-6 of Course 2.

9-6 Misleading Graphing and statistics

Example 1 Identifying Misleading Graphs
Example 2 Identifying Misleading Statistics

Note: This section was also introduced in 6-8 of Course 1 and 7-10 of Course 2.

9-7 Scatter Plots

Vocabulary  scatter plot  correlation  line of best fit

Example 2 Identifying the Correlation of Data
Example 3 Using a Scatter Plot to Make Predictions

Note: This section was also introduced in 7-9 of Course 2.

9-8 Choosing the Best Representation of Data

Example 1 Selecting a Data Display
Example 2 Problem solving Application

Note: This section was also introduced in 6-10 of Course 1 and 7-7 of Course 2.

Chapter 10 Probability

Chapter 10 dealt with probability. There were 9 sections in it.

10-1 Probability

Vocabulary  experiment  trial  outcome  sample space  event  probability  impossible  certain
Example 1 finding Probabilities of Outcomes in a Sample Space
Give the probability for each outcome.
A) The weather forecast shows a 30% chance of snow.
P(snow) = 30% = 0.3

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Snow</th>
<th>No Snow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The probabilities must add to 1, so the probability of no snow is p(no snow) = 1 – 0.3 = 0.7, or 70%.

Example 2 finding Probabilities of Events
Example 3 Problem Solving Application

*Note:* This section was also introduced in 12-1 of *Course 1* and 11-1 of *Course 2.*

10-2 Experimental Probability

Vocabulary *experimental probability*

Example 1 Estimating the Probability of an Event
Example 2 Safety Application

*Note:* This section was also introduced in 12-2 of *Course 1* and 11-2 of *Course 2.*

10-3 Use a Simulation

Vocabulary *simulation random numbers*

Example 1 Problem solving application

*Note:* This section was new to students.

10-4 Theoretical Probability

Vocabulary *theoretical probability equally likely fair mutually exclusive disjoint events*

Example 1 Calculating Theoretical Probability
Example 2 Calculating Probability for Two Fair Number Cubes
Example 3 Altering Probability
Example 4 Finding the Probability of Mutually Exclusive Events
Note: Example 3 was new to students, but this section was also introduced in 12-4 of Course 1 and 11-4 of Course 2.

10-5 Independent and Dependent Events

Vocabulary  
- compound event
- Independent events
- dependent events

Example 1 Classifying Events as Independent or Dependent
Example 2 Finding the Probability of Independent Events
Example 3 Finding the Probability of Dependent Events

Note: This section was also introduced in 11-5 of Course 2.

10-6 Making Decisions and Predictions

Example 1 Using Probability to Make Decisions and Predictions
Example 2 Deciding Whether a Game is Fair

Note: This section was also mentioned in 12-1 of Course 1 and 11-1 of Course 2.

10-7 Odds

Vocabulary  
- odds in favor
- odds against

Example 1 Finding Odds
Example 2 Converting Odds to Probability
Example 3 Converting Probabilities to Odds

Note: This section was new to students. It should be introduced in 7th grade.

10-8 Counting Principles

Vocabulary  
- Fundamental Counting Principle
- tree diagram
- Addition counting Principle

Example 1 Using the Fundamental Counting Principle
Example 2 Using a Tree Diagram
Example 3 Using the Addition Counting Principle

Note: This section was also introduced in 12-3 of Course 1 and 11-3 of Course 2.
10-9 Permutations and Combinations

Vocabulary

**factorial**  
**permutation**  
**combination**

Permutations 

\[ _nP_r = \frac{n!}{(n-r)!} \]

Example 1 Evaluating Expressions Containing Factorials

Example 2 Finding Permutation

B) Find the number of ways the 7 swimmers can finish first, second, and third.

\[ 7P_3 = \frac{7!}{(7-3)!} = 210 \]

Combinations 

\[ _nC_r = \frac{nPr}{r!} = \frac{n!}{r!(n-r)!} \]

*Note:* This section was introduced in 11-7 of *Course 2*.

Chapter 11

**Multi-Step Equations and Inequalities**

Chapter 11 dealt with multi-step equations and inequalities. There were 6 sections in it.

11-1 Simplifying Algebraic Expression

Vocabulary

**term**  
**like term**  
**equivalent expression**  
**simplify**

Example 1 Combining Like Terms to Simplify

Example 2 Combining Like Terms in Two-Variable Expressions

Example 3 Using the distributive Property to Simplify

Simplify \( 6(y + 8) - 5y \)

Example 4 Combining Like Terms to Solve algebraic Equations

Solve \( 9x - x = 136 \)

*Note:* This section was also introduced in 1-9, 12-1 and 12-2 of Course.

11-2 Solving Multi-Step Equations

Example 1 Solving Equations That Contain Like Terms

Solve \( 3x + 5 + 6x - 7 = 25 \)

Example 2 Solving Equations That Contain Fractions (No negative involved)
11-3 Solving Equations with Variables on Both Sides

Example 1 Solving Equations with Variables on Both Sides
A) \(2a + 3 = 3a\)  
B) \(3v - 8 = 7 + 8v\)

Example 2 Solving Multi-Step Equations with Variables on Both Sides

11-4 Solving Inequalities by Multiplying or dividing

Example 1 Solving Inequalities by Multiplying or Dividing
Solve and Graph.
A) \(24 > \frac{h}{5}\)  
B) \(-7x \geq 42\)

Example 2 Problem solving Application

11-5 Solving Two-Step Inequalities

Example 1 Solving Two-Step Inequalities
Solve and graph.
A) \(7y - 4 > 24\)  
B) \(-2x + 4 \leq 3\)

Example 2 Solving Inequalities That Contain Fractions

11-6 Systems of Equations

Vocabulary: system of equations, solution of a system of equation

Example 1 Solving systems of Equations
A) \(y = x + 3\)  
\(y = 2x + 5\)

Example 2 Solving systems of Equations by Solving for a Variable
B) \(3x + y = 8\)  
\(6x + 2y = 16\)
Note: This section was new to students. It was hard for students to solve word problems involving system of equation. More word problems should be included in this section so that students could practice them.

Chapter 12
Graphing Lines

Chapter 12 dealt with graphing lines. There were 8 sections including an extension section in it.

12-1 Graphing Linear Equations
Vocabulary  linear equation

Example 1 Graphing Equations
A) \( y = 3x - 4 \)
B) \( y = -x^2 \)
C) \( y = -\frac{3x}{4} \)
d) \( y = -3 \)

Example 2 Physical Science application

Note: This section was also introduced in 4-2 and 4-6 of Course 2.

12-2 Slope of a Line

Slope = \( \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{change in } y}{\text{change in } x} \)

\[ \rightarrow \frac{y_2 - y_1}{x_2 - x_1} \]

Example 1 Finding Slope, Given Two Points
Example 2 Identifying Constant and Variable Rates of Change in Graphs

Note: This section was also introduced 5-3 of Course 2, but no \( \frac{\text{rise}}{\text{run}} \) is indicated on Page 633.

12-3 Using Slopes and Intercepts

Vocabulary  x-intercept  y-intercept  slope-intercept form

Example 1 Finding x-intercepts and y-intercepts to Graph Linear Equations

\[ 3x + 4y = 12 \rightarrow x = 4 \quad y = 3 \]

\[ y = mx + b \quad (m \text{ is slope and } b \text{ is y-intercept}) \]

Example 2 Using Slope-Intercept Form to Find Slopes and y-intercepts

A) \( y = x \quad y = 1 \quad x + 0 \)
The slope of the line \( y = x \) is 1 and the y-intercept is 0.
B) \( 8x = 5y \)
C) \(3x + 7y = 9\)

Example 4 Writing Slope-Intercept Form

Writing the equation of the line that passes through (-3, 1) and (2, -1) in slope-intercept form.

Find the slope.

\[
\frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 1}{2 - (-3)} = -\frac{2}{5}
\]

Substitute either point and the slope into the slope-intercept form and solve for \(b\).

\[
y = mx + 6 \quad \rightarrow\quad -1 = -\frac{2}{5}(2) + b \quad \rightarrow\quad -1 = \frac{4}{5} + b \quad \rightarrow\quad b = -\frac{1}{5}
\]

**Note:** This section was also mentioned in 4-1 and 5-3 of *Course 2*.

**12-4 Point-slope Form**

Vocabulary *point-of-slope*

The **point-slope form** of an equation of a line with slope \(m\) passing through \((x_1, y_1)\) is \(y - y_1 = m(x - x_1)\).

Point on the line \((x_1, y_1)\) Point-slope form \(y - y_1 = m(x - x_1)\)

Example 1 Using Point-Slope Form to Identify Information about a Line

Use the point-slope form of each equation to identify a point the line passes through and the slope of the line

A) \(y - 9 = \frac{2}{3}(x-21)\)

\[
y - y_1 = m(x - x_1)
\]

\[
y - 9 = \frac{2}{3}(x-21)
\]

\[
m = \frac{2}{3} \quad (x_1, y_1) = (21, 9)
\]

The line defined by \(y - 9 = \frac{2}{3}(x-21)\) has a slope \(\frac{2}{3}\), and passes through the point \((21, 9)\).

Example 2 Writing the Point-Slope form of an Equation

A) the line with slope -2 passing through \((4, 1)\)

\[
y - y_1 = m(x - x_1)
\]

\[
y - 1 = -(x-4)
\]

The equation of the line with slope -2 that passes through \((4, 1)\) in point-slope form is \(y - 1 = -2(x -4)\)

Example 3 Medical Application

**Note:** This section was new to students.
12-5 Direct Variation

Vocabulary  
*direct variation  constant of proportionality*

Algebra  
\[ y = kx \quad k = \frac{y}{x} \]

Example 1 Determining Whether a Data Set Varies directly *(Seems new?)*

Example 2 Finding Equations of Direct Variation

A)  
\[ y \text{ is } 48 \text{ when } x \text{ is } 3 \rightarrow y = kx \quad 48 = k \cdot 3 \rightarrow 16 = k \rightarrow y = 16x \]

B)  
\[ y \text{ is } 15 \text{ when } x \text{ is } 10 \rightarrow \frac{3}{2} = k \rightarrow y = \frac{3}{2}x \]

Example 3 Physical Science Application

Note: This section was new to students.

12-6 Graphing Inequalities in Two Variables

Vocabulary  
*boundary line  linear inequality*

Example 1 Graphing Inequalities

A)  
\[ y > x + 3 \quad B) \ y \leq x + 1 \quad C) \ 6y + 3x \leq 12 \text{ (Seems new?)} \]

Note: This section was new to students.

12-7 Lines of Best Fit

Example 1 Finding a Line of Best Fit

Example 2 Sports Application

Note: This section was also mentioned in 7-9 of Course 2. It was also mentioned on Page 420 in *Course 2*.

Extension Solving systems of Equations by Graphing

Example 1 Using a Graphing to Solve a System of Linear Equations *(Seems new?)*

\[ 3x + y = 5 \]
\[ y - x = 1 \]

Example 2 Graphing a system of Linear Equations to Solve a Problem

Note: This extension was new to students.
Chapter 13
Sequences and Functions

Chapter 13 dealt with sequences and functions. There were 7 sections in it.

13-1 terms of Arithmetic Sequences

Example 1 Identifying Arithmetic Sequences
Formula: \[ a_n = a_1 = (n-1)d \]
Example 2 Finding a given Term of an Arithmetic Sequences
Example 3 Consumer Application

Note: This section was also mentioned in 1-7 of Course 1 and 4-5 of Course 2.

13-2 Terms of Geometric Sequences

Vocabulary: geometry sequence common ratio

Example 1 Identifying Geometric Sequences
Formula: \[ a_n = a_1 r^{n-1} \]
Example 2 Finding a Given Term of a Geometric Sequence

Note: This section was also introduced in 4-5 of Course 2.

13-3 Other Sequences

Vocabulary: first differences second difference Fibonacci sequence

Example 1 Using First And Second differences
Example 2 Finding a Rule given Terms of a Sequence
Example 3 Finding Terms of a Sequence given a Rule
Example 4 Using the Fibonacci Sequence

Note: This section was new to students, but the compilers should add to it how to build formulas from finding differences.

13-4 Linear Functions

Vocabulary: linear function function notation
The linear function \( f(x) = mx + b \) has a \textit{slope} of a \( m \) and a \( y \)-intercept of \( b \).

Example 1 Identifying Linear Functions
Determine whether \( f(x) = 2x - 2 \) is linear. It has a slope of 2 and a \( y \)-intercept of -2

Example 2 Writing the Equation for a linear Function
Example 3 Physical Science Application

\textit{Note:} It was found that some students had difficulty writing a rule for linear function. This section was also partially introduced in 4-6 of \textit{Course 2}.

13-5 Exponential Functions

Vocabulary \textit{exponential function } \textit{exponential growth } \textit{exponential decay}

Example 1 Graphing Exponential functions
Example 2 Using an Exponential Growth Function
Example 3 Using Exponential Decay Function

\textit{Note:} This section was also mentioned in the extension section of Chapter 4 in \textit{Course 2}.

13-6 Quadratic Functions

Vocabulary \textit{quadratic function } \textit{parabola}

\[ f(x) = ax^2 + bx + c \quad \text{The } y\text{-intercept is } c. \]

The graph of all quadratic functions have the same basic shape, called a \textit{parabola}.

Example 1 Graphing Quadratic Functions
A) \( f(x) = x^2 - 3 \) \quad B) \( f(x) = x^2 + x - 2 \)

Example 2 Astronomy application

\textit{Note:} This section was new to students, but the compilers didn’t mention examples that it was negative when a parabola faced down.

13-7 Inverse Variation

Vocabulary \textit{inverse variation}

An inverse variation is a relationship in which one variable quality increases as another variable quantity decreases. The product of the variable is a \textit{constant}. 
Algebra: \( y = \frac{k}{x} \quad xy = k \quad (k \neq 0 \text{ and } x \neq 0) \)

Example 1  Identifying Inverse Variation
Example 2  Graphing Inverse Variations
Create a table. Then graph each inverse variation function.
A) \( f(x) = \frac{1}{x} \)  B) \( f(x) = \frac{-2}{x} \)

Example 3  Music Application

Note: This section was new to students. More word problems should be added so that students could practice solving problems.

Chapter 14
Polynomials

Chapter 14 dealt with polynomials. There were 7 sections including an extension section it.

14-1 Polynomials

Vocabulary  monomial polynomial binomial trinomial degrees of a polynomial

Example 1  Identifying Monomials
Example 2  Classifying Polynomials by the Number of Terms
Example 3  Classifying Polynomials by Their Degrees
Example 4  Physics Application

Note: This section was new to students. The table showed students how to distinguish between “monomials” and “Not Monomials.”

14-2 Simplifying Polynomials

Example 1  Identifying Like Terms
Example 2  Simplifying Polynomials by combining Like Terms
Example 3  Simplifying Polynomials by Using the Distributive Property

Note: This section was new to students.

14-3 Adding Polynomials

Example 1  Adding Polynomials Horizontally
Example 2  Adding Polynomials Vertically
14-4 Subtracting Polynomials

Example 1 Finding the Opposite of a Polynomial
Example 2 Subtracting Polynomials Horizontally
Example 3 Subtracting Polynomials Vertically

14-5 Multiplying Polynomials by Monomials

Example 1 Multiplying Monomials
Example 2 Multiplying a Polynomial by Monomial
Example 3 Problem solving Application

14-6 Multiplying Binomials

Vocabulary  \( FOIL \)

Example 1 Multiplying Two Binomials
A) \((p+2) (3-q)\)
Example 2 Multi-Step
Example 3 Special Products of Binomials
A) \((x-3)^2\)  B) \((a+b)^2\)  C) \((n+3) (n-3)\)

Special Products of Binomials
\[(a+b)^2 = a^2 + 2ab + b^2\]
\[(a-b)^2 = a^2 - 2ab + b^2\]
\[(a+b) (a-b) = a^2 - b^2\]

Extension  Dividing Polynomials by Monomials

Example 1 Dividing Monomials by Monomials
A) \(\frac{12x^7}{2x^3} \rightarrow 6x^{7-3} \rightarrow 6x^4\)
Example 2 Dividing Polynomials by Monomials
A) \((x^4 + 3x^3 - 5x^2) \div x^2\)

\[
\frac{x^4 + 3x^3 - 5x^2}{x^2} = \frac{x^4}{x^2} + \frac{3x^3}{x^2} - \frac{5x^2}{x^2} = x^2 + 3x - 5
\]

Example 3 Factoring Polynomials
A) \(3x^3 + 9x^5 - 6x^2 \rightarrow \) The GCF is \(3x^2 \rightarrow 3x^2( x + 3x^3 - 2)\)

*Note:* This section was new to students.
I. Table 3B
(Mathematics Course 3)

Mathematics Course 3 was analyzed. The following mini tables were shown to see whether or not the contents of each chapter were overlapped in each grade (Course 1, Course 2, and Course 3). For example, when 1-1 Variables and Expressions was shown in Mathematics Course 3, it meant that 1-1 Variable and Expressions was also introduced or mentioned in 1-7 Variables and Algebraic Expressions in Mathematics Course 2 and in 2-1 Variables and Expressions in Mathematics Course 1. They were somewhat related.

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### Chapter 3 Graphs, Functions, and Sequences

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### J. Examples of Circles

The writer used examples of Circle to see how Course 1, Course 2, and Course 3 mathematics textbooks dealt with Circles and how Chinese 6th grade mathematics textbook dealt with Circles. The following were excerpts from the mathematics textbooks of the two countries. All Note in each section was added from the writer’s point of view based on the information obtained from each mathematics textbook. The Chinese was translated by the writer.

#### Circles

<table>
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<th>Course 1 (6th Grade Math Text Book)</th>
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<td><strong>9-8 Circles and Circumference (p.520)</strong></td>
<td><strong>Chapter 4 Circles (p.55)</strong></td>
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<tr>
<td><strong>Note:</strong> The section seemed to be taught in the second semester.</td>
<td><strong>Note:</strong> The section was taught in the first semester of 6th grade.</td>
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<tr>
<td><strong>Example 1</strong> Naming Parts of a Circle</td>
<td><strong>Circles</strong></td>
</tr>
<tr>
<td>Name the circle, a diameter, and three radii.</td>
<td><strong>Example 1</strong> Introduction of a center, radius, and diameter of a circle.</td>
</tr>
<tr>
<td>[Diagram of a circle with labeled parts: O, a, b, c]</td>
<td><strong>Note:</strong> 1) There were exercises given to “Find the center of a circle and the diameter” when a circle was inscribed in a square and <em>vise versa</em>.</td>
</tr>
<tr>
<td>( \frac{c}{d} = \pi )</td>
<td>2) There were exercises used to “Find the axis of symmetry, given the two circles of different sizes and find the axis symmetry on the coordinate plane (p.59, p.61).</td>
</tr>
<tr>
<td><strong>Example 2</strong> Architecture Application</td>
<td>3) There were exercises given to “Find the radius or diameter of a circle, given the circle inscribed in a square with a side length of 10cm, etc” (p.60).</td>
</tr>
<tr>
<td>( C = \pi d )</td>
<td><strong>Example 3</strong> Using the Formula for the Circumference of a Circle</td>
</tr>
<tr>
<td><strong>Note:</strong> “How to find a radius or diameter when the circumference is given” was found in exercises on p.522.</td>
<td>( C = \pi d )</td>
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</table>
### 10-5 Area of Circles (p.558)

**Example 1** Estimating the Area of a Circle

**Example 2** Using the Formula for the Area of a Circle

\[ A = \pi r^2 \]

*Note:* There were exercises used to find the area of a circle, given the radius or diameter, but there were NO exercises used to find a radius or diameter in the section when the area of a circle was given.

### Course 2 (7th Grade Math Text Book)

#### 8-4 Properties of Circles (p.460)

**Example 1** Identifying Parts of Circles

Name the parts of circle \( p \).

A. Radii  B. diameter  C. chords

*Note:* “A central angle of a circle is an angle formed by two radii” was introduced here.

**Example 2** PROBLEM SOLVING APPLICATION

*Note:* “How to find the central angle measure of a section” was introduced. As compared with *Course 1*, only “How to find a central angle measure” was new to students in this section. There were exercises used to name the parts of the circle (radii, diameters, chords).

### 9-5 Area of Circles (p.538)

*Note:* The section seemed to be taught in

**Example 2 Circumference**

\[ C = \pi d \quad \text{or} \quad C = 2\pi r \]

*Note:* 1) There were exercises given to find circumference of a circle, given radius or diameter.

2) There were exercises given to “Find the perimeter of a rectangular figure” when several circles, given the radius, were inscribed in the rectangle (p. 66).

3) Find the radius from the circle with maximum size cut from the given square with its perimeter of 100cm.

**Example 3 Area of a Circle**

\[ S = \pi r^2 \]

*Note:* Exercises were given to “Find the area of a circle, given the radius, diameter, or circumference.” Exercises were given to “Find the shaded area” when a circle was inscribed in some certain figures or some figures inscribed in a circle.

### Organize and Review

*Note:* What had been taught from above was put together along with some word problems. Interestingly enough, one of the word problems was (p.74) as follows:

*A square and a rectangle each has the same area of 1,225 cm\(^2\). The area of a circle is 1,256 cm\(^2\). Which one has the biggest perimeter? Which one has the*
the second semester.

**Example 1** Finding the Area of a Circle  
Same as in *Course 1*

**Example 2** Social Studies Application  
\[ A = \pi r^2 \]

**Example 3** Measurement Application  
\[ A = \pi r^2 \]

*Note:* There were exercises used to find the area or circumference of a circle, given the radius or diameter, and used to find the radius, given the area, but there were no exercises to find the area, given the circumferences.

*Course 3 (8th Grade Math Text Book)*  
8-3 Circles (p.400)

**Example 1** Finding the Circumference of a Circle  
*Note:* Same as *Course 1* and *Course 2*.

**Example 2** Finding the Area of a Circle  
*Note:* Same as *Course 1* and *Course 2*.

**Example 3** Finding Area and Circumference on a Coordinate Plane  
*Note:* The section was new to students.

**Example 4** Physical Science Application  
*Note:* In this section, there were exercises used to find the radius of each circle, given the area of a circle, and find the circumference and area of each circle, given the radius or diameter.

**smallest perimeter? If you find the three figures have the same area, can you find the size relationships of their perimeters among the three figures?**

Note: The above word problem was a good example to put together what had been taught about *Circles*. Students not only reviewed what they studied about *circles* but also reviewed what they studied about finding the perimeter and the area of a rectangle and square, respectively. Students will also find a radius of the circle whose area is 1,256cm². After the radius is found, it is easy to find the diameter and then find the circumference. They will find each perimeter of the three figures above. Now students can find which one has the biggest perimeter and which one has the smallest perimeter.
From the above-mentioned examples of *Circles*, the contrast between the same grade math textbooks of the two countries clearly showed that *Course 1*, *Course 2*, and *Course 3* math textbooks were found an inch deep and a mile wide. The same content area, *Circles*, was spread all through 3 courses, while the Chinese math textbook put *Circles* in the same chapter which was taught at the first semester of 6th grade and *Circles* (regarding how to find *radius, diameter, area, and circumference*) would be never taught in a specific section in upper grades and only revisited or reviewed. Chinese math exercises were much more complicated and difficult besides the exercises just to find the radius or the diameter or the circumference or the area of a circle. In Chinese math textbook, for instance, you would see such examples in the chapter of *Circles* as 1) “Find the radius of a circle, given the circle inscribed in a square with a side length of 10cm.” 2) “Find the radius from the circle with maximum size cut from the given square with its perimeter of 100cm.” 3) As seen above, “A square and a rectangle each has the same area of 1,225 cm². The area of a circle is 1,256 cm². Which one has the biggest perimeter? Which one has the smallest perimeter? If you find the three figures have the same area, can you find the size relationships of their perimeters among the three figures?”

![Diagram](image)

*Note: These three figures were shown for Problem 3 above. The figures were not drawn correctly.*

4) There was a wheat field whose length was 100m long and whose width was 50m wide. If an automatic irrigation sprinkler shot the distance of 10m, approximately how many automatic irrigation sprinklers would be needed?(p.74)
In Chinese math textbooks there were listed word problems which students needed to think and apply what was taught to solving the problems. There were no problems with multiple choices. All problems to be solved needed paper and pencil work. That helped teachers to know whether or not students solved problems independently. If the error or mistake was found from students’ paper-and-pencil work, a teacher would see why he/she solved the problem incorrectly. Then discussions were to be carried out in or out class so that students would draw a lesson from the mistakes they made. That was why “No Work, No Credit” was often said to students in some CCSD middle schools.
K. Mathematics Textbooks in Some Foreign Countries

In the past few years, much had been mentioned and discussed about Singapore Math, which referred to the mathematics curriculum in the country, whose students achieved the highest scores in the world since 1995. Why has Singapore been in the number one since 1995? It was because Singapore Math, which built on students’ prior knowledge and experiences with numbers, was coherent, concrete, and logical, and their “students focus intensely on a handful of topics. This is in contrast to the U.S., where many state standards in set forth dozens of topics to be covered in each grade, with too many objectives,…..”6 Most importantly, Singapore Math had uniform standards. The Ministry of Education had the right to determine what would be taught nationwide. “Singapore Math emphasizes the development of strong number sense, excellent mental-math skills, and a deep understanding of place value.”7 In the United States, “math standards are set at the state level and curriculum choices are made by local school districts. States and local district rely on guidelines provided by the National Council for Teachers of Mathematics (NCTM).”8 That is to say, the United States had no its own national math curriculum. In July 2001, the new Compulsory Education Standards for mathematics Curriculum was promulgated by Chinese Ministry of Education. The new curriculum was focused on fostering “students’ interest, innovation, cooperative learning, problem solving and practice”4 and more knowledge was provided of “number and computation, space and geometry, statistics and probability…”, “practical (hands-on) activities and comprehensive applications.”4

It was also found that American math textbooks were thick and covered too many topics; it usually had more than 800 pages. For example, Course 1 had 827 pages, Course 2 had 841 pages, and Course 3 had 912 pages while math textbooks in many countries with higher mathematics achievement had fewer than 300 pages. In Chinese math textbooks (People’s
6th grade Chinese math books had 256 pages long with 13 chapters containing 12 sections while Course 1 had 827 pages long with 14 chapters containing 112 sections. 7th grade Chinese math textbooks (People’s Education Press, Beijing, China 2006) had 341 pages long with 10 chapters containing 20 sections while Course 2 had 841 pages long with 12 chapters containing 112 sections. 8th grade Chinese math textbook (People’s Education Press, Beijing, China 2006) had 332 pages long with 10 chapters containing 30 sections while Course 3 had 912 pages long with 14 chapters containing 111 sections. Like Singapore, China had national math standards. Chinese math emphasized mastery of math concepts and training students to connect different mathematical ideas using words and word problems with prior knowledge. Chinese math also encouraged students to participation in mental math exercises, solving math problems in their heads without pencil and paper. Chinese math textbooks had 90% of the new contents, and materials studied from previous grades were never re-taught, but only revisited combined with what had been taught while in the U.S. math textbook, about 20% of the contents were new (as seen from Course 1, Course 2, and Course 3) and repetitions of what had been taught occurred throughout each grade.

Moreover, why were the U.S. math textbooks so thick as compared with Singapore and Chinese Math books? It was because the U.S. math textbooks contained games, multicolored pictures, puzzles, and activities, all of which rarely challenged students. In Chinese math textbooks contained few pictures related to the lesson and no problems asking students to use a calculator to find the answer. Chinese math textbooks presented materials in a logical sequence throughout grades, and expected mastery of the material before students moved to the next level. In Chinese math textbooks there was no key to the answers at the end of each textbook, thus avoiding students just copying the answers for their assignments. For the teachers’ part, Chinese
math textbooks were not as friendly as most American math textbooks which provided teachers’ solutions and lesson spotlights.

“Japan had a nationally set curriculum,” too. Their math textbooks were not as thick as U.S. math textbooks. The success of education system in producing excellent students was also known to all. Like Chinese students, “by the end of grade 4, students were expected to have mastered the four operations of whole numbers and how to effectively apply them” along with the addition and subtraction of decimals and common fractions, because these skills were essential tools for students to move on to upper grade levels. That was why some of the U.S. 6th graders, 7th graders, and 8th graders had difficulty solving problems with fraction, decimals, and integers because they didn’t lay a solid math foundation in elementary schools. These students were called academic “Swiss Cheese” from the writer’s point of view.
L. Table 4

enVision Math, Nevada Version

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   Stop and Practice

6-4 Algebra: Distributive Property
6-5 Algebra: Order of Operations

Mixed Problem Solving

6-6 Problem Solving  Act It Out and Use Reasoning

Topic 6 Test

Reteaching

Topic 7 Multiplying and Dividing Decimals

Review What You Know!

7-1 Decimals: Multiplying Decimals by 10, 100, or 1000

7-2 Decimals: Multiplying a Decimal by a Whole Number

7-3 Decimals: Estimating the Product of a Decimal and a Whole Number

7-4 Decimals: Multiplying Two Decimals

7-5 Decimals: Dividing Decimals by 10, 100, 1000

7-6 Decimals: Dividing a Decimal by a Whole Number

Stop and Practice

7-7 Decimals: Estimation: Decimals Divided by Whole Numbers

7-8 Decimals: Dividing a decimal by a Decimal

7-9 Problem Solving  Multiple-Step Problems

Stop and Practice

Topic 7 Test

Reteaching
Topic 8 Shapes

Review What You Know!

8-1 Geometry: Basic Geometric Ideas

Algebra Connections

8-2 Geometry: Measuring and Classifying Angles

8-3 Geometry: Polygons

8-4 Geometry: Triangles

8-5 Geometry: Quadrilaterals

8-6 Problem Solving Make and Test Generalizations

Topic 8 Test

Reteaching

Topic 9 Fractions and Decimals

Review What You Know!

9-1 Fractions: Meanings of Fractions

Algebra Connections

9-2 Fractions: Fractions and Division

9-3 Fractions: Mixed Numbers and Improper Fractions

9-4 Fractions: Equivalent Fractions

9-5 Fractions: Comparing and Ordering Fractions and Mixed Numbers

9-6 Fractions: Common Factors and Greatest Common Factor

9-7 Fractions: Fractions in Simplest Form
Mixed Problem Solving

9-8 Number: Tenths and Hundredths

Going Digital

9-9 Number: Thousandths

9-10 Number: Fractions and Decimals on the Number Line

9-11 Problem Solving Writing to Explain

Topic 9 Test

Reateaching

Topic 10 Adding and Subtracting Fractions and Mixed Numbers

Review What You Know!

10-1 Fractions: Adding and Subtracting Fractions with Like Denominators

   Algebra Connections

10-2 Fractions: Common Multiples and Least Common Multiples

10-3 Fractions: Adding Fractions with Unlike Denominators

10-4 Fractions: Subtracting Fractions with Unlike Denominators

10-5 Fractions: Adding Mixed Numbers

10-6 Fractions: Subtracting Mixed Numbers

10-7 Problem Solving Try, Check, and Revise

   Topic 10 Test

   Reteaching
Topic 11 Multiplying Fractions and Mixed Numbers

Review What You Know!

11-1 Fractions: Multiplying Fractions and Whole Numbers

11-2 Fractions: Multiplying Two Fractions

Stop and Practice

11-3 Fractions: Multiplying Mixed Numbers

11-4 Fractions: Relating Division to Multiplication of Fractions

11-5 Problem Solving Draw a Picture and Write an Equation

Topic 11 Test

Reteaching

Topic 12 Perimeter and Area

Review What You Know!

12-1 Measurement: Using Customary Units of Length

12-2 Measurement: Using Metric Units of Length

12-3 Measurement: Perimeter

Enrichment

12-4 Measurement: Area of Squares and Rectangles

12-5 Measurement: Area of Parallelograms

12-6 Measurement: Area of Triangles

12-7 Measurement: circles and Circumference

Enrichment
12-8 Problem Solving Draw a Picture and Make an Organized List

Topic 12 Test

Reteaching

Topic 13 Solids

Review What You Know!

13-1 Geometry: Solids

Going Digital

13-2 Geometry: Relating Shapes and Splods

13-3 Measurement: Surface Area

13-4 Geometry: Views of Solids

13-5 Measurement: Volume

Stop and Practice

13-6 Geometry: Irregular Shapes and Solids

Enrichment

13-7 Problem Solving – Use Objects and Solve a Simple Problem

Topic 13 Test

Reteaching

Topic 14 Measurement Units, Time, and Temperature

Review What You Know!

14-1 Measurement: Customary Units of Capacity

14-2 Measurement: Metric Units of Capacity
14-3 Measurement: Units of Weight and Mass

14-4 Measurement: Converting Customary Units

14-5 Measurement: Converting Metric Units

14-6 Measurement: Elapsed Time

Mixed Problem Solving

14-7 Measurement: Elapsed Time in Other Units

14-8 Measurement: Temperature Change

14-9 Problem Solving – Make a Table

Topic 14 Test

Reteaching

Topic 15 Solving and Writing Equations and Inequalities

Review What You Know!

15-1 Algebra: Solving Addition and subtraction Equations

15-2 Algebra: Solving Multiplication and Division Equations

15-3 Algebra: Inequalities and the Number Line

15-4 Algebra: Patterns and Equations

Stop and Practice

15-5 Problem Solving Draw a Picture and Write an Equation

Algebra Connections

Topic 15 Test

Reteaching
Topic 16 Ratio and Percent

Review What You Know!

16-1 Number: Understanding Ratios

16-2 Number: Understanding Percent

16-3 Number: Percent, Fractions, and Decimals

16-4 Number: Finding Percent of a Whole Number

16-5 Problem Solving – Make a Table and Look for a Pattern

  Topic 16 Test

  Reteaching

Topic 17 Equations and Graphs

Review What You Know!

17-1 Number: Understanding Integers

17-2 Algebra: Ordered Pairs

  Enrichment

17-3 Algebra: Distances on Number Lines and the Coordinate Plane

17-4 Algebra: Graphing Equations

17-5 Problem Solving  Work Backward

  Topic 17 Test

  Reteaching

Topic 18 Graphs and Data

Review What you Know!
18-1 Statistics: Data from Surveys

18-2 Statistics: Bar Graphs and Picture Graphs

18-3 Statistics: Line Graphs

  Go Digital

18-4 Statistics: Stem-and-Leaf Plots

  Enrichment

18-5 Statistics: Histograms

18-6 Statistics: Circle Graphs

  Enrichment

18-7 Statistics: Mean

18-8 Statistics: Median, Mode, and Range

18-9 Problem Solving  Make a Graph

  Topic 18 Test

  Reteaching

Topic 19 Transformations, Congruence, and Symmetry

Review What You Know!

19-1 Geometry: Translations

  Going Digital

19-2 Geometry: Reflections

19-3 Geometry: Rotations

19-4 Geometry: Congruence
19-5 Geometry: Symmetry

Enrichment

19-6 Problem Solving Use Objects

Topic 19 Test

Reteaching

Topic 20 Probability

Review What You Know!

20-1 Probability: Outcomes

20-2 Probability: Writing Probability as a Fraction

Going Digital

20-3 Probability: Experiments and Predictions

20-4 Problem Solving – Solve a Simple Problem

Topic 20 Test

Reteaching

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Credits

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M. Table 5

Chinese 6th Grade Math

(Translated by the Writer)

Semester 1

Table of Contents

Chapters

1. Ordered Pairs
2. Fractions: Multiplication
3. Fractions: Division
4. Circle
5. Percent
6. Statistics
7. Mathematics Wide Angle (Think and Discuss)
8. General Review
M. Table 5
Chinese 6th Grade Math, Continued

(Translated by the Writer)

Semester 2

Table of Contents

Chapters

1. Negative Numbers
2. Cylinders and Cones
   2-1 Cylinders
   2-2 Cones
3. Proportions
   3-1 The Principles of Proportions and Their Relationships
   3-2 The Principles of Direct and Inverse Variations (Proportions)
   3-3 The Applications of Proportions
4. Statistics
5. Mathematics Wide Angle (Think and Discuss)
6. Organization and Review
   6-1 Numbers and Algebra
   6-2 Space and Graphics
   6-3 Statistics and Probability
   6-4 Comprehensive Application
N. Table 6

Chinese 7th Grade Math

(Translated by the Writer)

Semester 1

Table of Contents

Chapters

1. Rational Numbers
   1-1 Positive Numbers and Negative Numbers
   1-2 Rational Numbers
   1-3 Rational Numbers: Addition and Subtraction
   1-4 Rational Numbers: Multiplication and Division
   1-5 Rational Numbers: Power/Exponents/Scientific Notations

2. Integral Expressions: Addition and Subtraction
   2-1 Integral Expressions
   2-2 Integral Expressions: Addition and Subtraction

3. Linear Equations with One Unknown
   3-1 From Arithmetic to Equation
   3-2 How to Solve “Linear Equations with One Unknown (1)
      ---- Combine Like Terms
   3-3 How to Solve “Linear Equations with One Unknown (2)
      ----- Eliminate parentheses and denominators
   3-4 Real World Problems vs. Linear Equations with One Unknown

4. Geometric Relationships
   4-1 Various Geometric Figures
   4-2 Straight Line, Ray, Line Segment
   4-3 Angles
   4-4 Problem Solving Activities: Make a Rectangular Wrapping Box
Table of Contents

Chapters

5. Transversal and Parallel Lines
   5.1. Transversal
      5-1-2 Perpendicular Line
      5-1-3 Corresponding Angles, Alternate Interior Angles, Interior Angles on the
      Same Side
   5.2. Parallel Lines and their Determination
      5-2-1 Parallel Lines
   5.3. The Characteristics of Parallel Lines
      5-3-1 Characteristics of Parallel Lines
      5-3-2 Proposition, Theorem
   5.4. Translation

6. Rectangular Coordinate System
   6-1 Rectangular Coordinate System
   6-2 Read and Think: Basic Application of Coordinate System
   6-3 Instructional Activities: Basic Application of Coordinate System

7. Triangles
   7-1 Line Segments Related to Triangles
      7-1-2 The Altitude and Median of Triangles vs. Angle Bisectors
      7-1-3 The Stability of Triangles
   7-2 Angles Related to Triangles
      7-2-1 The Interior Angles of A Triangle
      7-2-2 The Exterior Angles of A Triangle
   7-3 Polygons and Their Sums of Interior Angles
   7-4 Questions for Study, Tessellations
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O. Table 7
Chinese 8th Grade Math
(Translated by the Writer)

Semester 1

Table of Contents

Chapters

11. Congruent Triangles
   11-1 Congruent Triangles
   11-2 The Determination of Congruent Triangles
   11-3 Characteristics of Angle Bisectors

12. Axis Symmetry
   12-1 Axis Symmetry
   12-2 Symmetric Figures
   12-3 Isosceles Triangles

13. Real Numbers
   13-1 Square Root
   13-2 Cube Root
   13-3 Real Numbers

14. Linear Function
   14-1 Variables and Function
   14-2 Linear Function
   14-3 Analyze System of Equation and Inequality from Function’s Point of View
   14-4 Questions for Study: The Method of the Selection

15. The Multiplication of Integral Expression and Factoring (Polynomials)
   15-1 The Multiplication of Integral Expression
   15-2 Multiplication Formula
   15-3 The Division of Integral Expression
O. Chinese 8th Grade Math, Continued

(Translated by the Writer)

Semester 2

Table of Contents

Chapters

16. Fraction
   16-1 Fraction
   16-2 Algorithm for Fraction
   16-3 Fraction Equations

17. Inverse Proportional Function
   17-1 Inverse Proportional Function
   17-2 Real World Problems vs. Inverse Proportional Function

18. Pythagorean Theorem
   18-1 Pythagorean Theorem
   18-2 Converse Theorem of Pythagorean Theorem

19. Quadrilateral
   19-1 Parallelograms
   19-2 Special Parallelograms
   19-3 Trapezoids
   19-4 Questions for Study, Barycenter

20. Data Analyses
   20-1 Data Representing
   20-2 Variation of Data
   20-3 Questions for Study, Data Analysis for Test of Health Quality
Chapter V
Conclusion

The writer analyzed Mathematics Text Books *Course 1*, *Course 2*, and *Course 3* (Holt, Nevada Edition, 2007) used in some of Clark County Schools District (CCSD) middle schools. It was found that the textbooks were “an inch deep and a mile wide.” Some of the contents were repeated being taught from *Course 1* through *Course 3* as shown in Table 1B (on page 43), Table 2B (on page 107), and Table 3 (on page 166). However, students still did not master them. Therefore, those students became academic “Swiss Cheese” students. U.S. middle school students were still studying what they were supposed to have mastered in elementary schools. They still studied order of operations, four operations of whole numbers, fractions, decimals, basic equations, etc. while students of the same grade in other countries moved on to algebra and geometry and trigonometry topics. “U.S. standards are unfocused and aimed at the lower common denominator. In other words, they are a mile wide and an inch deep.”

From *Course 1*, *Course 2*, and *Course 3*, it was found that many topics were highly repetitive. Professor Schimidth, *et al* pointed out, “The average duration of a topic in US is almost 6 years (!) versus about 3 years in the best-performing countries. Lots of spiraling and reviewing is done. We introduce topics early and then repeat them year after year. To make matters worse, very little depth is added each time the topic is addressed because each year we devote much of the time to reviewing the topic.”

The writer found that some of the elementary schools in CCSD) used *enVision Math* textbook for 5th graders. The writer perused the math book borrowed from his neighbor’s daughter, who studied in a CCSD elementary school. To the writer’s surprise, the *enVision Math*
textbook nearly covered every content that *Course 1, Course 2*, and even *Course 3* had (See Table 4 for the contents of *enVision Math* on page 198). If students completed and mastered that math book by the end of 5th grade in elementary schools, the number of students academic achievement in CCSD middle schools would be much higher because they, from elementary schools, laid a good academic foundation to move on, and their academic life in a middle school would be easier. From the contents of *enVision Math* text book, it was clearly shown that what students were taught in 5th grade. Unfortunately, the writer was told that the *enVision Math* textbook was not used so often in that elementary school. Instead, the teacher selected materials from other math books or other math resources for students to study. The writer thought that *enVision* Math textbook was perfect for 5th graders, because it would help students to move on to upper math study for a middle school and even a high school. *enVision Math* text book had 519 pages long with 20 chapters containing 124 sections. Luckily, the textbook, unlike other textbooks, did not have a key to the answers at the end of the book, thus avoiding students copying the answers while they worked on assignments. It was hoped that students would be taught to the mastery level, because all contents that covered would build the foundation for middle school math and high school math. However, the writer was in doubt whether 5th grade students could be taught to the mastery level because there were still so many chapters to be covered in a year. The contents of the math book was good from the writer’s point of view, but the questions were, “Do the 5th graders have such ability as to use the book if they did not master what was supposed to study in previous grades?” “Can the 5th graders complete and master what the book was designed?” because *enVision* math book covered a lot of contents. If 5th graders were able to complete and master the concept of mathematics set forth in *enVision Math* textbook in a year, they would feel much comfortable to study Pre-algebra or Algebra I in a
middle school, thus eliminating a great amount of repetition, and definitely improving academic
achievement, and dabsolutely raising the academic achievement bar in CCSD. It was wondering
whether or not the district had a “ruler” to measure students’ achievement after enVision math
textbook was used.

Schmidt pointed out that “It is in middle school that American students fall behind their
peers in other countries. They never make up that deficit, and in fact fall further behind in high
school. The only way we could make it up is for the rest of the world to stand still. Then we
would catch up.” Schmidt also made clear that “fixing the problem belies simplistic solutions,
such as imitating the curricula or instructional practices of successful nations or assigning more
homework.”

“The only way to fix the problems inherent in U.S. mathematics and science education is
to adopt system-wide changes.” It was suspected that Course 1, Course 2, and Course 3 were
compiled on the basis of Nevada State math curriculum. If there were some contents
disproportionally or illogically distributed amongst these three math books, then the state math
curricula must be re-written from K-12. Recently, Dr. Keith Rheault, Superintendent of Public
Instruction of Nevada State, announced that Nevada joined with other 48 states and adopted a
draft of Common Core State Standards of English language arts and mathematics. He provided a
video introduction of the rollout of the Common Core State Standards in Nevada. The
Common Core State Standards Initiative pointed out:

The Common Core State Standards provide a consistent, clear understanding of what
students are expected to learn, so teachers and parents know what they need to do to help
them. The standards are designed to be robust and relevant to the real world, reflecting
the knowledge and skills that our young people need for success in college and careers.
With American students fully prepared for the future, our communities will be best
positioned to compete successfully in the global economy.
The Mathematics Standards of the Common Core State Standards were better than the curricula each state or local districts used. The Mathematics Standards showed each grade (K-12) level standards. The writer copied the table of these standards from 5th grade to 8th grade as follows:

5th grade
- Introduction
- Operations & Algebraic Thinking
- Number & Operations – Fractions
- Measurement & Data
- Geometry

6th Grade
- Introduction
- Ratios & Proportional Relationships
- The Number System
- Expressions & Equations
- Geometry
- Statistics & Probability

7th Grade
- Introduction
- Ratios & Proportional Relationships
- The Number System
- Expressions & Equations
- Geometry
- Statistics & Probability

8th Grade
- Introduction
- The Number System
- Expressions & Equations
• Functions
• Geometry
• Statistics & Probability

The Math Standards had 93 pages long. The details of the Common Core State Standards for Mathematics could be found at the following web:

http://corestandards.org/assets/CCSSI_Math%20Standards.pdf

As is known to all, changes/reform would cause infliction of “pains,” but in the long run, the changes/reform would bring great gains. It was hoped that the future state /local mathematics standards would be set forth based on the Common Core State Standards.

In the future studies, examination of U.S. students’ academic math performance and achievement are indicated.
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