Graham, Carolyn; And Others


Clark County School District, Las Vegas, Nev.

[67]

136p.

EDRS Price MF-$0.65 HC-$6.58

*Curriculum Guides, *Elementary School Curriculum, *Elementary School Mathematics, *Geometry, Grade 1, Grade 2, Grade 3, Grade 4, Grade 5, Grade 6, Kindergarten, *Mathematics Curriculum

GRADES OR AGES: K-6. SUBJECT MATTER: Mathematics.

ORGANIZATION AND PHYSICAL APPEARANCE: The introductory material describes the philosophy behind the guide, its purpose, and the way it should be used, and also contains a set of graphs which provide a quick overview of the scope and sequence. The main body of the guide is arranged by grade level in five color-coded sections: 1) number, 2) numeration, 3) operations, 4) geometry, and 5) measurement. Each page is arranged in three columns: content, behavioral objectives, and textbook page coding. The guide is lithographed and spiral bound with a soft cover. OBJECTIVES AND ACTIVITIES: Both are detailed in the behavioral objectives column of the guide. INSTRUCTIONAL MATERIALS: No instructional materials other than the textbooks are listed. STUDENT ASSESSMENT: No specific provisions are made for evaluation. (MRR)
Board of School Trustees

Mr. George W. Wilkinson, President
Mr. Glen C. Taylor, Vice President
Mr. Dell H. Robison, Clerk
Dr. Clare W. Woodbury, Member
Mrs. Helen C. Cannon, Member
Mr. Alick J. Mackie, Member
Mr. C. Donald Brown, Member

Administration

Dr. James I. Mason,
Superintendent

Dr. Clifford J. Lawrence, Associate Superintendent,
Division of Instruction

Mr. Robert Dunsheath, Director
Curriculum Services Department

Mr. Preston T. Bishop, Coordinator
Curriculum Services Office

Mr. John Paul, Associate Superintendent,
Division of Administration

Dr. Henry C. Bozarth, Area Administrator
Western Zone

Mr. Lyal Burkholder, Area Administrator
Clark Zone

Mr. James E. Embree, Area Administrator
Las Vegas and Valley Zones

Mr. Raymond Sturm, Area Administrator
So. Nev. Voc. Tech. Center and Adult
Education

Mr. James Williams, Area Administrator
Rancho Zone
Foreword.

The curricula of our schools have always been in a process of change, but the change usually has not been fundamental. New content was added; some old material was discarded. Sometimes whole courses disappeared and were replaced. But more often than not, the new courses looked much like their predecessors. The curriculum change did not seem to reflect the urgency so evident in the educational problems and controversies in our period of rapid social, political, and technological change. Solving these problems is of the greatest importance to our local, our national, and our world community.

It is in this setting that the new mathematics curriculum guide was forged. It has departed from the usual traditional, evolutionary concept and presents a dynamic new approach to the presentation of mathematics in the elementary schools of the Clark County School District. It is to the tribute of many that this guideline has become a reality, and to each of the drafters and participants, I extend the highest commendation from the Board of School Trustees and the administration for their excellent work.

The presentation of this guideline opens the door to a new and exciting environment of change in which we seek to develop the curriculum in each of varied disciplines to fit the needs of the learner, presenting a sequential program of continuous growth and development on a Kindergarten through twelfth grade basis. This has been a significant undertaking in both time and effort, and its results are representative of the extensive talents brought to bear in the creation of this mathematics curriculum guide.

James J. Mason
Superintendent
Acknowledgments

Many different committees and individuals have contributed to the development of the Clark County School District Mathematics Curriculum Guide.

Elementary Mathematics Textbook Adoption Committee

Carolyn Graham, Chairman
John Coe, Secretary
Norman Homer
Robert Hume
Dave Kaul
William Moore
Dallas Owens
Lynn Severance
William Orr Jr. High
Basic Elementary
Marion Cahlan
James Cashman Jr. High
Rex Bell
J. T. McWilliams
Ruby Thomas
Rex Bell

Curriculum Task Force

Carolyn Graham, Chairman
Virginia Gilbert
Richard Hilts
Thad Major
Mabel Schoenke
George Stanger
William Orr Jr. High
Valley High
Halle Hewetson
Vegas Verdes
Twin Lakes
Tom Williams

Herbert R. Steffens, Mathematics Consultant
State Department of Education, Carson City, Nevada

The following people coded the textbook pages to the Mathematics Curriculum Guide:

Robert Dietiker
Patricia Sturm
Adrian Bao
Carolyn Creekmore
Darrell Morrow
Don Creekmore
John F. Miller
Rex Bell
Bonanza
Bonanza
Park Village
John F. Miller
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Grade 6
During the spring of 1967, an in-service course (Education 499-799) was conducted in cooperation with Nevada Southern University. The participants reviewed the work of the Curriculum Task Force, criticized the behavioral objectives, and suggested changes, deletions, and additions.

**Instructional Staff**

**Mr. Malcol Graham, Chairman, Mathematics Department:**
Nevada Southern University

Dr. Virginia Gilbert  
Curriculum Associate, Math  
Valley High

Mr. Herbert Steffens  
Mathematics Consultant  
State Department of Education

Mr. Paul Anderson  
Personnel Assistant  
Education Center

Mrs. Carolyn Graham  
Math Coordinator  
William Orr Jr. High

Mr. Val Arredondo  
Math Dept., Valley High

Mrs. Mabel Schoenke  
Twin Lakes Elementary

Mr. Kenneth McKinley  
Park Village Elementary

Mrs. Pauline Giles  
Ruby Thomas Elementary

**Participants**

**Clark Zone**

Joyce E. Daeschner  
Basic Elementary  
Doris Hancock  
Boulder City Elem.

Don L. Estes  
Boulder City Elem.

Lavonne K. Estes  
C. T. Sewell

Janie Greco  
Basic Elementary  
C. T. Sewell

Gary Hafen  

John K. Hill  
Virgin Valley

Ann B. Hughes  
Virgin Valley

Elwin I. Jones  
Rex Bell

Kathleen M. Koch  
Park Village

Mary A. Mooney  
Park Village

Darrell W. Morrow  
Doris Hancock

Maureen Osguthorpe  

Sally L. Smith  
Vegas Verdes

Olga Sommers  
Vegas Verdes

Patricia A. Sturm  
Vegas Verdes

Robert Throckmorton  
Overton Elem.

Emma Whipple  

Matt Kelley  

C. T. Sewell

Rex Bell

Las Vegas Zone

Kim L. Adams  
Mountain View

L. Estes, Anderson  
Kit Carson

Ted A. Borg  
John S. Park

William L. Bugg  
Indian Springs

Betty D. Carter  
Kit Carson

Dorothy L. Dotte  
Crestwood

Gladiolus L. Ferraro  
North Ninth

June F. Florin  
John S. Park

Mountain View

Kit Carson

Sunset Acres

Earl R. McKie  
Sunset View

Emogene D. Vance  
Indio Springs

Joyce E. Williams  
Sunset View

L. Estes, Winterheimer  
Crestwood

Searchlight

Earl R. McKie

Mayfair

Ruth F. Morris

Crestwood

Carl Partridge

Kathleen M. Koch

Ira J. Earl

Earl R. McKie

Earl R. McKie

Mountain View

Crestwood

Sunset View

Sunset View

Sunset View

Sunset View
Janice L. Allen
Janice Anderson
Mary A. Arnett
Connie Arrnowsmith
Beverly A. Ballif
Darrel F. Booth
Yvonne L. Carraway
Lorraine J. Crowe
Elzie Donaldson
Roland L. Fagan
James Graff
Robert L. Green
Glade Cowan Hales
Larriane W. Hall
Helen J. Stewart
C. C. Ronnow
Nellis
Lois Craig
C. P. Squires
C. C. Ronnow
Lois Craig
Ray Herron
Walter Bracken
J. E. Manch
Tom Williams
J. E. Manch
J. E. Manch
Jo Mackey
Jack Edwin Holmes
Norman C. Hamer
June S. Huntsman
Curklin E. Jackson
Thelma J. Krick
Barbara B. Kubik
Andrew A. Martinez
Audrey R. Meinke
Helen C. Mills
Katherine Mitchell
Mary R. McDonald
V. Jean Newell
Pauline A. Norman
Robert H. Pearce
Van Tobel
Marion Cahlan
Lincoln
Nellis
C. P. Squires
Quannah McCall
Lincoln
Tom Williams
Walter Bracken
Lois Craig
Walter Bracken
J. E. Manch
C. P. Squires
Marion Cahlan
Margaret Richardson
Shirley Satterfield
Charles Seegmiller
Dulcie D. Simms
Gary Splitterger
George L. Stanger
Ruth A. Stringer
LaMar W. Terry
Paul M. Thompson
Ruth P. Warren
Sharon B. Widdison
Alton D. Willard
Paul S. Winder
Jo Mackey
Lincoln
Marian Cahlan
Jim Bridger
Tom Williams
C. P. Squires
Lincoln
C. C. Ronnow
Walter Bracken
Quannah McCall
J. D. Smith
Ray Herron

Evelyn M. Bozarth
Nadine D. Brooks
Don Creekmore
Robert C. Dietiker
Leah F. Foscarini
Ronald Gutzman
Rehta J. Hawkins
Gertrude I. Jordan
Ruby Thomas
J. M. Ullam
John F. Miller
Jane F. Martin
Sharon L. Martin
Ray L. Neilson
Joyce B. Savoill
Bernadine G. Shown
Eva Clyde Simmons
Mary Alice Slade
Lucille M. Lehman
J. M. Ullam
Ruby Thomas
Sharon L. Martin
Joyce B. Savoill
Bernadine G. Shown
Eva Clyde Simmons
Mary Alice Slade

Cornelius Baughn
Margene L. Bayles
Isabelle Berndt
Adrian Boi
Earl C. Brunner
Roger M. Bryan
Kenneth E. Carter
Teddie E. Cennane
Betty B. Coogan
Carolyn Creekmore
John K. Dailey
Caroly L. Deck
Patricia Dworzack
West Charleston
Red Rock
O. K. Adcock
Bonanza
Highland
E. W. Griffith
Rose Warren
Rose Warren
O. K. Adcock
Bonanza
C. V. T. Gilbert
West Charleston
J. T. McWilliams
Richard A. Erbe
Harold R. George
William H. Gleen
Helen B. Goulte
Marilee J. Hill
Lucilene Howard
Eva Kathryn Howell
Elmer E. Hughes
Virginia Y. Kunz
Gerald D. Martin
Robert N. Norman
Doris E. Okelberry
Robert Onken
Bertha Ronzone
Rose Warren
Substitute
Vail Pitman
Ruth Fyfe
C. V. T. Gilbert
Bonanza
Ruth Fyfe
Twain Lakes
Paul Culley
West Charleston
Vail Pitman
Paul Culley
Norman M. Parker
Janet O. Petersen
Emily N. Popay
Mary M. Rader
Fran R. Rickwartz
Arthur B. Sadler
Barbara Schneider
Arlene L. Smith
Elinore B. Stevens
Janet G. Tark
Gwen Truscott
Glynn Vassar
Barbara
Peggy
Twin Lakes
Val Pittman
Peggy
Highgate
F. M. Fye
C. H. T. Boyer
O. R. Atteser
O. R. Atteser
E. E. Smith
E. E. Smith
Preface

PHILOSOPHY

In developing a consistent philosophy to give direction to mathematics instruction for all students in the public schools, it is necessary to consider the following questions:

1. Why should mathematics be taught?
2. What mathematics should be taught when and to whom?
3. How should mathematics be taught?

It is obvious that the answers to questions #2 and #3 depend on the answer to #1; and that the second question has to do with the selection, scope, and sequence of content; and that the last question deals with methodology.

Question #1 is the "hard" one, because the answer requires that certain assumptions about the nature of man and what constitutes the "good life" be made explicit. For example, if it is assumed that control of the environment by man is desirable, then it logically follows that mathematics should be taught since it enables man to describe and predict physical phenomena. Of course, man exists at a point in time and space, so these assumptions change from time to time and from place to place.

The complete development of such a deductive philosophical system is beyond the scope of these introductory remarks. A simple statement of beliefs must suffice.

Every individual should be limited in his "life choices" by his own unique set of "original" equipment, such as physique, intelligence, and health. Insofar as possible, he should be the master, not the slave, of the routines and decisions which shape his life. Education, including mathematics education, is the key to this mastery. In an age of increasing specialization, the elementary school is becoming the last fortress of general education. The mathematics which is taught at this level must be aimed at keeping doors open for children. Whether or not a student elects more mathematics in secondary school, he should leave the elementary school with a powerful tool--mathematical literacy--with which to chip away his piece of the "good life."
Purposes of the Guide

This guide was written to define an instructional program in mathematics for elementary students. Its purpose is to serve as a framework within which schools may design a mathematics program appropriate to their students, staff, and facilities.

Specifically, this curriculum guide is intended to:

1. Identify and classify the major mathematical concepts and topics considered in the elementary school and to indicate the scope and sequence of content in grades Kindergarten through Six.

2. Provide for articulation among and within the elementary schools of the District.

3. Relate the three newly adopted textbook series to the topics outlined in the guide.

4. Provide for a smooth transition from the present mathematics textbooks to the newly adopted series.

Some writers describe "curricular" considerations involving what the ends of education should be, and as "instructional" those considerations involving the means by which those ends are accomplished. This curriculum guide is restricted to the ends, rather than the means. However, the most critical phase of the entire curriculum planning process consists of the teacher's own efforts to develop plans to implement these objectives for the pupils he teaches.

It is hoped that this guide will be of practical value to the teacher in teaching elementary mathematics to children in Clark County.
USE OF THE GUIDE...

The meaning of certain terms and the organization of the various sections must be made clear in order for this guide to achieve its purpose. In the following exposition, the terms, Strand, Behavioral Objective, and Textbook Page Coding, will be discussed in some detail and the overall organization of the guide will be outlined.

Strands

A strand is a "big" topic (or idea, concept, or theme) of mathematics which students study every year that they are in elementary school, from Kindergarten through Grade Six. The word "strand" is used because it suggests that the topics weave throughout the elementary grades and together form the fabric or material of the elementary mathematics program.

The following six strands were selected to give form and continuity to this curriculum guide:

1. Number
2. Numeration
3. Operations
4. Geometry
5. Measurement
6. Problem Solving (see discussion below)

These topics are considered at every grade level and, with the exception of problem solving, specific content items are listed and ordered under each topic.

PROBLEM SOLVING

While problem solving is not mathematical content in the same sense as NUMBER or OPERATIONS, it is an important strand in the elementary mathematics curriculum. There are two aspects of problem solving: 1) the development of a problem solving facility, and 2) the application of mathematics.

The development of a problem solving facility does not depend upon memorization of established procedures for solving all problems, but rather, upon developing a strategy for attacking problems. Success in problem...
solving depends upon the student's ability to interpret the situation, to translate it into a mathematical problem, and to interpret the results.

Through solving a varied assortment of problems, the student can be expected to develop an appreciation and understanding of the applicability of mathematics to the real world. The specific applications of mathematics covered in the texts are not themselves as important as the broader concept that mathematics is applicable to a large number and wide variety of real problems arising daily in the personal and professional lives of people.

This strand is not developed in the guide, as are the other strands, because of the general nature of the goals. However, the adopted texts contain abundant problems and applications throughout, and indeed, the in- and out-of-school lives of the students provide many rich opportunities for problem solving.

**Behavioral Objectives**

This guide goes far beyond a mere listing of strands and related content items. For each content item, a specific objective (or objectives) has been written in terms of observable student behavior. The behavioral objective states clearly what behavior or action is expected of the student; under what conditions or circumstances this action is expected to occur; and to what extent or degree the student is expected to perform the desired action. A sample behavioral objective for the strand of NUMBER - GRADE ONE is printed below:

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVE</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARDINAL NUMBERS 0 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order relations</td>
<td>1. Given two numbers such as 47 and 95, the student can order the numbers by saying: &quot;47 is less than 95,&quot; and by writing: 47 &lt; 95.</td>
<td>95-106</td>
<td>94-103</td>
<td></td>
</tr>
</tbody>
</table>

The "given" part establishes the circumstances under which the student is expected to perform, and the verb phrase "can order" indicates the action. This particular behavioral objective can be translated into several test items for a first grade student, each progressively more difficult. For example:

1. Can you tell me which is more (or less) - - - 47 or 95?
2. I am going to write the names for two numbers on the board. Point to the greater (larger) number and read it.

3. The numerals for two numbers are on the flannel board. Choose one of the order symbols, < or >, and place it between the numerals and then read the number sentence.

4. Put a ring around the correct symbol, < or >, which will make 95 ___ 47 a true number sentence.

Since behavioral objectives have to do with the observable actions of children, words which describe internal behavior, such as "understand" and "know", are not used. The question is: What does a child do who "understands" place value?

The action words that are most frequently used in this guide are identify, distinguish, name, construct, order, describe, state, and demonstrate. The meaning of these words is clear to most teachers with the exception of "name". To name means to supply the correct name orally or in writing for a class of objects or sets. For example:

"Name the sum of 27 and 48."

The student is expected to determine the sum by computing, and to say or write: 75.

The behavioral objectives were written with the typical or average student in mind. Therefore, it is felt that from 75% to 80% of the children in a typical class should be able to accomplish all the objectives for their particular grade level. Some students can undoubtedly accomplish much more. However, only adequate trial and testing will establish the level of performance possible.

Behavioral objectives are not a panacea for educational problems. They are useful to the extent that they point out the destination so that teachers can concern themselves with selecting and planning the most efficient routes.

**Textbook Page Coding**

Pages of the three newly adopted textbook series which relate to the content and behavioral objectives are listed on the right side of each page under the initials, AW, S, and ABC (see the sample behavioral objective above for illustration). AW refers to the Addison-Wesley texts, S to the L. W. Singer series, and AbC to the American Book Company series.
Teachers are urged to explore all three series for ideas on presentations and applications regardless of which texts are available to students.

**Organization**

A set of graphs immediately follows these introductory remarks. A graph has been prepared for each strand to provide a quick overview of the scope and sequence of content from Kindergarten through Grade Six. The graphs are color coded by strand in order as follows:

1. Number - Green
2. Numeration - Pink
3. Operations - Yellow
4. Geometry - Blue
5. Measurement - Buff

The section on content, behavioral objectives, and textbook page coding follows the graphs and forms the bulk of the guide. This part of the guide is organized by grade level merely as a matter of convenience. Every teacher realizes that a particular grade level designation may have very little meaning for a particular student. For this reason, the strands are also color coded by paper color, so that it is possible to quickly refer to a strand on any grade level. For example: a third grade teacher may wish to examine the objectives for the strand OPERATIONS for Grades Two and Four. Since all of the OPERATIONS strand is on yellow paper, she can simply flip to the yellow sections which precede and follow the third grade yellow section.

This type of organization has the advantage of making spiraling explicit. Spiraling means that a topic is considered many times during the elementary school years. Ideally, different approaches to and applications of a topic are presented several times during a school year and, as the years go by and the students mature, the level of rigor is gradually increased.

This curriculum guide is not now, and never will be, “finished”. A curriculum should be a viable thing, constantly reflecting the changing needs and values of the society which creates it. Those of us who worked on the guide sincerely hope that it will be useful to teachers and that it will become a kernel for additional study and work in mathematics education in Clark County.
## SETS

Collections, one-to-one correspondence, equivalent and non-equivalent sets, empty set, and subsets

Finite and infinite sets

## WHOLE NUMBERS (CARDINALS)

Abstracting the concept of whole number from equivalent sets

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>1,000,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>1,000,000,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>infinity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Order relations

Even and odd numbers

Prime and composite numbers

## RATIONAL NUMBERS

Abstracting the concept of rational number from models and from sets of equivalent fractions

One-half, one-third, one-fourth

Halves, thirds, fourths (i.e., $3/4$)

$\frac{a}{b}$ (denominators of $2 - 12$)

$\frac{a}{b}$ (denominators of $1, 2, 3, 4 \ldots$)

Order relations
INTEGERS

IRRATIONAL NUMBERS (π)

ORDINAL NUMBERS

<table>
<thead>
<tr>
<th>First</th>
<th>third</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>tenth</td>
</tr>
<tr>
<td>-</td>
<td>twentieth</td>
</tr>
<tr>
<td>-</td>
<td>beyond</td>
</tr>
</tbody>
</table>

Intuitive Development

Standard Grade Level Content

Maintain Concepts and Skills

Optional
NUMERATION

A NUMBER HAS MANY NAMES

WHOLE NUMBERS

Numerals for numbers

<table>
<thead>
<tr>
<th>Numeral for numbers</th>
<th>0</th>
<th>-</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>999</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>9,999</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>999,999</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>999,999,999</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>beyond</td>
<td></td>
</tr>
</tbody>
</table>

Place value (positional value of digits and expanded numeral form)

through

- 99
- 999
- 9,999
- 99,999
- 999,999
- 999,999,999
- beyond

Prime factorization

Roman numerals

through

- XV (15)
- L (50)
- C (100)
- M (1000)

Non-decimal numeration
RATIONAL NUMBERS

1/2, 1/3, 1/4

Halves, thirds, fourths (i.e. 3/4)

\[ \frac{a}{b} \] (denominators of 2 - 12)

\[ \frac{a}{b} \] (denominators of 1, 2, 3, 4 ...)

Equivalent fractions

Improper fractions and mixed numerals

Decimal notation through thousands

- hundred thousandths

Percent notation

INTEGERS (NOTATION)

IRRATIONAL NUMBERS (\pi)

OTHER NOTATION

Rounding

Exponential notation

Scientific notation

Intuitive Development

Standard Grade Level Content

Maintain Concepts and Skills

Optional
OPERATIONS

WHOLE NUMBERS

Addition and Subtraction

Definition

Inverse relationship

Basic facts

Discovery through sums of 18
Immediate recall through sums of 10
Immediate recall through sums of 18

Properties

Commutative property of addition
Associative property of addition
Identity element for addition (0)

Algorithms

Column addition and subtraction without regrouping
Column addition and subtraction with regrouping (numbers appropriate to grade level)

Multiplication and Division

Definition

Inverse relationship

Basic facts

Discovery through products of 81
Immediate recall through products of 45
Immediate recall through products of 81
OPERATIONS

Properties

- Commutative property of multiplication
- Associative property of multiplication
- Identity element for multiplication (1)
- Multiplicative property of 0
- Distributive property of multiplication over addition

Algorithms

- Factors of 10, 100...
- One-digit factors and divisors
- Two or more digit factors or divisors

Other Operations

- Averaging
- Greatest common factor
- Least common multiple
- Exponentiation

RATIONAL NUMBERS

Addition and Subtraction

- Definition
- Inverse relationship

Properties

- Commutative property of addition
- Associative property of addition
- Identity element for addition (0)
Algorithms

Fraction Notation
Like denominators
Unlike denominators
Mixed numerals
Decimal Notation

Multiplication and Division
Definition
Inverse relationship
Properties
Commutative property of multiplication
Associative property of multiplication
Identity element for multiplication (1)
Multiplicative inverses (reciprocals)
Distributive property of multiplication over addition

Algorithms
Fraction Notation
Multiplication – common fractions
Multiplication – mixed numerals
Division – common fractions and mixed numerals
Decimal Notation (whole number divisors)
Percent Notation
INTEGERS

Addition and Subtraction

Definition

-4-

OPERATIONS

Intuitive Development

Standard Grade Level Content

Maintain Concepts and Skills

Optional
GEOMETRY

GEOMETRIC FIGURES

Identifying and Naming Plane Figures

As sets of points

Point

Path (curve)

Line (including number line)

Line segment

Ray

Angle

Polygon

Triangle

Quadrilateral

Parallelogram

Square

Rectangle

Rhombus

Pentagon, hexagon, octagon

Circle
GEOMETRY

Identifying and Naming Space Figures

As sets of points
- Point
- Plane
- Polyhedron
- Prism
- Pyramid
- Sphere
- Cylinder
- Cone

PROPERTIES

- Length
- Perimeter
- Area
- Volume
- Parallel lines
- Perpendicular lines
- Congruence
- Symmetry
### ConstrucTions

- Line segment
- Circle
- Triangle
- Angle
- Line segment bisector
- Angle bisector
- Perpendicular lines
- Parallel lines

#### Intuitive Development

### Standard Grade Level Content

### Maintain Concepts and Skills

### Optional
MEASUREMENT

CONCEPTS OF MEASUREMENT

Process of measuring
Arbitrary selection of unit
Approximate nature of measurement (precision)

MEASUREMENT OF PHYSICAL PROPERTIES (standard units)

Length
  Perimeter
  Circumference
Area
Volume
  Liquid measure
Time
Weight
Temperature
Money
Angle
Speed

RENAMING MEASURES

Comparison of units (e.g., 1 inch < 1 foot)
Conversion of units (e.g., 6 quarts = 1 1/2 gallons)

COMPUTATIONS WITH MEASURES (appropriate to the grade level)

Intuitive Development
Standard Grade Level Content
Maintain Concepts and Skills
Optional
CONTENT

SETS

Collections

1. Given a verbal description of a set, the student can distinguish between members of the set and things which are not members.

One-to-one correspondence

2. Given two equivalent sets (objects or pictures), the student can demonstrate a one-to-one matching between members of the sets by constructing lines or by physically associating the objects.

Equivalent and non-equivalent sets

3. The student can distinguish between pairs of sets whose members can be matched one-to-one and pairs of sets whose members cannot be matched one-to-one.

4. Given two non-equivalent sets, the student is able to identify the set which has more members and the set which has fewer members.

One-more pattern--sets with cardinal numbers of 1 - 10

5. Given ten non-equivalent sets, the student can arrange the sets in order. For example:

   X
   XX
   XXX, etc.

Empty set

6. The student can describe verbally a set which has no members, such as the set of all live tigers in the classroom!

CARDINAL NUMBERS

0 - 10

7. The student can count the members of a set by simultaneously saying the number names (one to ten) in order and matching each number name to a unique member of the set.

BEHAVIORAL OBJECTIVES

TEXTBOOK PAGES

AW | S | ABC
---|---|---
1 - 9 | Charts i, i) - 41 | 2, 3, 4, 5
17-19, 21-24, 26 | | 42 - 71
27-30, 39, 43, | | Chart 12
49, 53, 59, 63 | | 13-15, 23, 24
| | 10
| | 70, 72

For example:

X
XX
XXX, etc.
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUMBER - KINDERGARTEN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Given a set with zero to ten members, the student can name how many objects are in the set by saying the number name or by selecting the correct numeral.</td>
<td>33,34,36-39, 41-43,45,46, 48,49,51-53, 55,56,58,59, 61-63,65,66, 68,70,72</td>
<td>42-71</td>
<td></td>
<td>Charts 8, 9, 10, 11</td>
</tr>
<tr>
<td>Order relations between numbers 0 - 10</td>
<td></td>
<td></td>
<td>17</td>
<td>Chart 12</td>
</tr>
<tr>
<td>9. Given two numbers (verbal or written numerals) such as seven and three, the student can order them by saying: &quot;Seven is greater than three&quot; or &quot;Three is less than seven.&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ORDINAL NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First through third</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Given a sequence of objects, people, etc., the student can identify the second object in the sequence.</td>
<td></td>
<td></td>
<td>2,9-12</td>
<td>Chart 15</td>
</tr>
</tbody>
</table>
## NUMERATION - KINDERGARTEN

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WHOLE NUMBERS 0 - 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Given a set of objects or pictures, the student can identify and name orally the numeral for the cardinal number of the set.</td>
<td>32-34, 36-39, 41-43, 45-46, 48-49, 51-53, 55, 56, 58, 59, 61-63, 65, 66, 68, 70, 72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Given a verbal or written numeral such as 7, the student can construct and identify sets containing 7 members.</td>
<td>27-32, 35, 36, 40, 44, 50, 54, 60, 64, 69, 71</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## OPERATIONS - KINDERGARTEN

### CONTENT

**WHOLE NUMBERS**

**Addition and Subtraction**

<table>
<thead>
<tr>
<th>Definition of addition (through sums of 10)</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Given two disjoint sets of physical objects, the student can unite the sets and name the cardinal number of the new set thus formed.</td>
</tr>
<tr>
<td></td>
<td>2. Given two numbers such as 3 and 2, the student can design a simple experiment involving the union of two disjoint sets to determine and name the sum of the numbers.</td>
</tr>
<tr>
<td></td>
<td>3. Given a set of 7 objects, the student can identify and remove a subset with 3 members and name the cardinal number of the remaining subset.</td>
</tr>
<tr>
<td></td>
<td>4. Given a set of 5 objects, the student can construct a set of 9 objects and name how many more objects were needed to construct the second set.</td>
</tr>
</tbody>
</table>

### TEXTBOOK PAGES

<table>
<thead>
<tr>
<th></th>
<th>AW</th>
<th>S</th>
<th>A&amp;B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>39, 41-43,</td>
<td>45, 46, 49,</td>
<td>51-53, 55,</td>
</tr>
<tr>
<td></td>
<td>56, 59,</td>
<td>61-63, 65,</td>
<td>66, 70, 72,</td>
</tr>
</tbody>
</table>

Note: Pages are not listed for Singer and American Book because of revisions and time.
GEOMETRY - KINDERGARTEN

CONTENT

GEOMETRIC FIGURES

Plane figures
Circle
Square
Rectangle
Triangle

BEHAVIORAL OBJECTIVES

1. Given models of circles, squares, rectangles, and triangles (wire, paper or flannel cutouts, pencil or chalk outlines), the student can identify, name orally, and distinguish among these plane geometric figures.

TEXTBOOK PAGES

AW  S  ABC

2, 12, 14 - 16,
21, 22, 24, 34,
37, 46, 50, 52,
54, 56, 58, 60,
62
# MEASUREMENT - KINDERGARTEN

## CONTENT

## CONCEPTS OF MEASUREMENT

<table>
<thead>
<tr>
<th>Length</th>
<th>Behavior</th>
<th>Textbook Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison</td>
<td>Textbook</td>
<td>Pages 3-6</td>
</tr>
</tbody>
</table>

1. Given a set of objects or pictures of objects, the student can compare them and identify and name the longest, shortest, tallest, and widest.
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SETS</strong></td>
<td><strong>Collections</strong></td>
<td>1. Given a verbal description of a set, the student can distinguish between members of the set and things which are not members.</td>
<td>1-13</td>
<td>1-5</td>
</tr>
<tr>
<td><strong>One-to-one correspondence</strong></td>
<td>2. Given two equivalent sets (objects or pictures), the student can demonstrate a one-to-one matching between members of the sets by constructing lines or by physically associating the objects.</td>
<td>3-13</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equivalent and non-equivalent sets</strong></td>
<td>3. Given two sets (objects, pictures, verbal description), the student can identify them as equivalent or non-equivalent, and if non-equivalent, tell which set has more and which has fewer members.</td>
<td>1, 2, 9-12, 95, 6-11, 30-32, 96, 73</td>
<td>vi, vii, xiii, xiv, 3, 5, 24, 25, 30, 57</td>
<td></td>
</tr>
<tr>
<td><strong>One-more pattern</strong></td>
<td>4. Given ten non-equivalent sets, the student can arrange the sets in order. For example: X, XX, XXX, etc.</td>
<td>14, 36, 40</td>
<td>24, 27</td>
<td></td>
</tr>
<tr>
<td><strong>Empty set</strong></td>
<td>5. The student can describe verbally a set which has no members, such as the set of all grandfathers in the classroom!</td>
<td>37, 39-42, 41, 42, 69, 116</td>
<td>4, 5, 1, 36, 57, 81, 179</td>
<td></td>
</tr>
<tr>
<td><strong>Subsets</strong></td>
<td>6. Given a set, such as all students in the classroom, the student can identify a subset, such as the boys with brown eyes.</td>
<td>23, 25, 27, 31, 33, 109, 110</td>
<td>47-51, 53-64, 71-74, 77, 78, 95, 96, 107-110</td>
<td>15, 18, 24, 27, 42, 50, 57, 58, 62, 82, 83, 115</td>
</tr>
<tr>
<td><strong>CARDINAL NUMBERS</strong></td>
<td>7. Given a set, the student can count (see Kindergarten -- objective #7) the members and name how many things are in the set.</td>
<td>15-35, 38-44, 46-52, 58, 59, 71-74, 77, 78, 94, 95, 145, 151</td>
<td>iv, v, ix, xiv, xi, xvi, 1, 7, 11, 13, 15-18, 24, 27, 42, 50, 57, 58, 62, 82, 83, 115</td>
<td></td>
</tr>
</tbody>
</table>
### NUMBER - GRADE ONE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order relations</td>
<td>8. Given two numbers such as 47 and 95, the student can order them by saying: &quot;47 is less than 95,&quot; and by writing $47 &lt; 95$.</td>
<td>95-106, 174</td>
<td>192, 210, 230, 240, 287, 288, 289</td>
<td>29, 73, 79, 97, 103, 115, 123, 126</td>
</tr>
<tr>
<td>&lt; , &gt; , =</td>
<td>9. Given appropriate materials (paper regions, Cuisenaire rods, etc.) the student can identify and construct models for one-half, one-third, and one-fourth. For example:</td>
<td>303-306</td>
<td>224, 225</td>
<td>138, 139, 197</td>
</tr>
<tr>
<td>RATIONAL NUMBERS</td>
<td>10. Given a sequence of objects, events, etc., the student can identify the position in space or time of a particular object or event by saying: &quot;This (object) is fourth&quot; or &quot;This (event) happened second.&quot;</td>
<td>1, 2</td>
<td>138, 139, 230, 231</td>
<td>viii, x, 2, 19, 37, 42, 85</td>
</tr>
<tr>
<td>One-half</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-third</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-fourth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORDINAL NUMBERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First through tenth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AV</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------</td>
<td>----</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td>NAMES FOR NUMBERS</td>
<td>1. The student can identify and name different numerals for the same number. For example: $5 = 4 + 1 = 3 + 2 = 7 - 2$, etc.</td>
<td>151, 163, 165, 163, 186, 195, 204, 213, 219, 220, 222, 233, 249-254, 267</td>
<td>161-171, 240, 241, 254-263, 267</td>
<td>58, 73, 78, 104, 105, 131, 142, 172, 186</td>
</tr>
<tr>
<td>WHOLE NUMBERS</td>
<td>2. The student can identify, name, read, and write numerals for whole numbers.</td>
<td>43-52, 61-65, 67, 69, 71-75, 77-79, 85, 86, 88-92</td>
<td>39-42, 46-59, 71, 72, 74, 95, 150, 212, 213</td>
<td>v, ix, 4, 5, 11, 13, 18, 24, 25, 27, 30-33, 39, 42, 48, 50, 52, 57-59, 73, 84, 103, 114, 123, 133, 140, 169, 198</td>
</tr>
<tr>
<td></td>
<td>3. The student can read and write number words one through ten.</td>
<td>53</td>
<td>116-118, 220-222</td>
<td>ix, 11, 13, 14, 62, 82, 101, 103, 114, 123, 133, 140, 169, 195, 198</td>
</tr>
<tr>
<td>Place value--two-digit numerals</td>
<td>4. Given a numeral such as 73, the student can identify, name, and distinguish the numerals that are in the ones and tens places.</td>
<td>59-70, 93, 94, 100-102, 255-258</td>
<td>145-149, 152, 180, 233</td>
<td>127-130, 132-135, 143, 144, 146, 147, 149, 162, 163, 165, 169-171, 189, 192, 193</td>
</tr>
<tr>
<td>Expanded notation</td>
<td>5. Given a numeral such as 54, the student can write the expanded numeral $(50 + 4)$.</td>
<td>59-70, 93, 94, 100-102, 255-238</td>
<td>145-149, 152, 180, 233</td>
<td>127-130, 132-135, 143, 144, 146, 147, 149, 162, 163, 165, 169-171, 189, 192, 193</td>
</tr>
</tbody>
</table>
6. Given a model of one-third, the student can identify and name a numeral (fraction) for the rational number associated with the model. For example:

\[ \frac{1}{3} \]
## OPERATIONS - GRADE ONE

### CONTENT

#### WHOLE NUMBERS

**Addition and Subtraction**

**Definition of addition**
1. Given an addition problem such as \( 5 + 7 = \_\_\_ \), the student can design a simple experiment involving the union of two disjoint sets to determine and name the sum of the numbers.

**Definition of subtraction**
2. Given a subtraction problem such as \( 14 - 8 = \_\_\_ \), the student can construct a set of 14 objects, remove a subset with 8 members, and name the cardinal number of the remaining subset.
3. Given a problem such as \( 6 + \_\_\_ = 15 \), the student can construct a set of 15 objects, remove a subset with 6 members, and name the cardinal number of the remaining subset.

**Inverse relationship**
4. The student can demonstrate by using sets or a number line that subtracting 2 from 9 "undoes" adding 2 to 7.

### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
</table>

**DO**

<table>
<thead>
<tr>
<th>UNDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000000</td>
</tr>
<tr>
<td>0000000</td>
</tr>
</tbody>
</table>

\[ \text{DO: } 0000000, \quad 00 \quad \frac{7 + 2 = 9}{\_\_\_} \]

\[ \text{UNDO: } 0000000, \quad 00 \quad \frac{9 - 2 = 7}{\_\_\_} \]
BEHAVIORAL OBJECTIVES

5. Given an addition or subtraction combination such as 4 + 6 or 9 - 5, the student can immediately name the sum or difference and use sets or a number line to prove his result.

6. Given an addition or subtraction combination such as 7 + 8 or 16 - 9, the student can use sets or a number line to determine and name the sum or difference.

7. The student can identify and name sums, differences, and missing addends in problems written in both horizontal and vertical notation. For example:

   14 - 8 = _______  8 - _______ - 6 = 4
       4 + 7 = _______ + 10 3 + _______ = 12

8. Given a problem such as 14 _______ 6 = 8, the student can identify and name the missing operational sign.

Properties

9. The student can demonstrate by using sets or a number line that
   7 + 4 = 11 and 4 + 7 = 11.

10. The student can demonstrate by using sets or a number line that:
    (7 + 2) + 8 = 9 + 8 = 17 and
    7 + (2 + 8) = 7 + 10 = 17.

* Immediately is defined as 5 seconds or less.
Identity element for addition

11. Given problems such as $0 + 14 = \underline{}$; $9 - \underline{} = 9$; $7 - 7 = \underline{}$; and $32 + \underline{} = 32$; the student can name the sums, differences, and missing addends and use sets or a number line to prove his results.

Algorithms

Column addition and subtraction (two-digit numerals) without regrouping

12. The student can name the sums and differences for problems such as $2 \underline{}$ and $37$. $61 \underline{} +14$ $-13$ $153-156$, $160,181$, $235-237$
GEOMETRY - GRADE ONE

CONTENT

GEOMETRIC FIGURES

Plane figures
- Circle
- Square
- Rectangle
- Triangle
- Line segment
- Line (number line)

PROPERTIES

Length
- 2. Given models of line segments of different lengths, the student can identify the longest and shortest.

CONSTRUCTIONS

Circle
- 3. Given a pegboard and rubber bands, the student can construct a square, rectangle, and triangle.

Square

Rectangle

Triangle
- 4. The student can make rough pencil and/or chalk drawings (outlines) of circles, squares, rectangles, and triangles.

BEHAVIORAL OBJECTIVES

AW S ABC

1. Given models of circles, squares, rectangles, triangles, line segments, and a number line (wire, paper or flannel cutouts, pencil or chalk outlines), the student can identify, name, and distinguish among these plane geometric figures.

2. Given models of line segments of different lengths, the student can identify the longest and shortest.

3. Given a pegboard and rubber bands, the student can construct a square, rectangle, and triangle.

4. The student can make rough pencil and/or chalk drawings (outlines) of circles, squares, rectangles, and triangles.

2, 8, 21, 26, 38, 42, 108, 118, 125, 136, 169, 180, 187, 205, 225, 250, 285, 286, 276, 277, 281, 284
MEASUREMENT - GRADE ONE

CONTENT

BEHAVIORAL OBJECTIVES

CONCEPTS OF MEASUREMENT

Process of measuring:

length
Selection of unit (arbitrary)
Counting

1. Given an object with the property of length, such as a pencil, and a varied set of objects with which to measure the pencil, the student can select a suitable unit of length and measure the pencil by counting the number of units needed to match the length of the pencil.

307-308

MEASUREMENT OF PHYSICAL PROPERTIES

Length
Ruler
Inch
Centimeter

2. The student can measure small objects or pictures of objects to the nearest whole unit using both arbitrary units and a ruler.

307-310
226-228, 266
274, 275

Volume
Liquid measure
Cup
Pint
Quart

3. Based on experiences with cups, pints, and quarts, the student can compare and order these liquid measures. For example: 3 cups is (more, less) than 1 pint.

311, 312
223
94

Time
Clock
Hour
Calendar
Day
Week
Month

4. Given a clock, or clock face, the student can tell time on the hour.

172-175, 141, 143
217-219, 148, 178, 185
266
196

Weight

5. Given a set of objects, the student can compare them and identify and name the heaviest and lightest.

94
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong>&lt;br&gt;Thermometer&lt;br&gt;Degree (F.)</td>
<td>6. Based on experiences with reading scales on a thermometer, the student can record temperatures inside and outside the classroom and answer questions such as: Is it warmer inside or outside the classroom?</td>
</tr>
</tbody>
</table>
| **Money**<br>Penny<br>Nickel<br>Dime | 7. The student can identify and name pennies, nickels, and dimes and state the value, in cents, of each coin.  
8. Given a set of pennies and/or nickels, the student can determine and name the total value, in cents, of the coins. |
## Number - Grade Two

### Behavioral Objectives

<table>
<thead>
<tr>
<th>Sets</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collections</td>
<td>1. Given a verbal description of a set, the student can distinguish between members of the set and things which are not members.</td>
<td>1-10</td>
<td>1-13, 161-171, 2, 26, 28-30, 2i7, 229, 251, 33, 78-82 2i1, 263-265, 275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Given two equivalent sets (objects or pictures), the student can demonstrate a one-to-one matching between members of the sets by constructing lines or by physically associating the objects.</td>
<td>1-4</td>
<td>4-7</td>
<td>26, 28-29</td>
</tr>
<tr>
<td></td>
<td>3. The student can describe familiar physical situations in which a one-to-many matching occurs. For example: one hand to five fingers or two wheels to one bicycle.</td>
<td></td>
<td>275-276</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Given two sets (objects, pictures, verbal description), the student can identify them as equivalent or non-equivalent, and if non-equivalent, tell which set has more and which has fewer members.</td>
<td>1-4, 53-54, 1-13</td>
<td>251-260, 269-270</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. The student can describe verbally a set which has no members, such as the set of children in the classroom with green hair!</td>
<td>1-13</td>
<td>1-13</td>
<td>29, 32, 75</td>
</tr>
<tr>
<td></td>
<td>6. Given a set, such as all students in the classroom, the student can identify a subset, such as the girls with blond hair.</td>
<td>124-136</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>CARDINAL NUMBERS</td>
<td>RATIONAL NUMBERS</td>
<td>ORDINAL NUMBERS</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>BEHAVIORAL OBJECTIVES</td>
<td>11-14, 16-17, 14-19, 22-41, 26, 30, 49,</td>
<td>22, 26, 53-54, 48-49, 83, 128, 130</td>
<td>89, 91, 95, 142, 183, 196, 203, 219</td>
<td></td>
</tr>
<tr>
<td></td>
<td>175, 251-260, 263-264, 269-270, 274, 277-278</td>
<td>289-306</td>
<td>118-119</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>152-153, 171,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>199-201, 203, 237</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>116-119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. The student can group the members of a given set by ones, twos, fives, and tens and determine by counting how many members are in the set.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Given a mathematical sentence such as 15 + 12 = 30, the student can write the missing relation symbol.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Given models of 1/3, 2/3, 3/3, etc., the student can identify and name the rational numbers associated with the models.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Given a sequence of objects, events, etc., the student can identify the position in space or time of a particular object or event by saying: &quot;This (object) is fourth&quot; or &quot;This (event) happened second.&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**NUMERATION - GRADE TWO**

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
</table>
| NAMES FOR NUMBERS | 1. The student can identify, name, read, and write many different names for the same number. For example: 
123 = 100 + 20 + 3 = 90 + 20 + 13 = 130 - 7, etc. |
| WHOLE NUMBERS 0 - 999 | 2. The student can identify, name, read, and write numerals for whole numbers. |
| | 3. The student can read and write number words through twenty. |
| Place value--three-digit numerals | 4. Given a numeral such as 307, the student can identify, name, and distinguish the numerals that are in the ones, tens, and hundreds places. |
NUMERATION - GRADE TWO

CONTENT

BEHAVIORAL OBJECTIVES

Expanded notation

5. Given a numeral such as 586, the student can write the expanded numeral \((500 + 80 + 6)\).

6. Given a model of three-fourths, the student can identify, name, read, and write a numeral (fraction) for the rational number associated with the model.

For example:

\[
\frac{3}{4}
\]
OPERATIONS - GRADE TWO

WHOLE NUMBERS

Addition and Subtraction

Definition
1. Given an addition or subtraction problem such as \( 5 + 7 = \) or \( 14 - 8 = \), the student can design a simple experiment involving sets or a number line to determine and name the sum or difference of the numbers.

2. Given two sets, the student can compare the sets by matching the members and write a subtraction equation to express the difference between the cardinal numbers of the sets. For example:

\[
\begin{array}{c}
12 \\
8 \\
difference
\end{array}
\]

\[12 - 8 = 4\]

Inverse relationship
3. Given a set model, the student can write two addition and two subtraction equations to describe the physical situation. For example:

\[
\begin{array}{c}
\bigcirc \bigcirc \bigcirc \bigcircle \bigcircle \bigcircle \bigcircle \\
\bigcirc \bigcirc \bigcircle \bigcircle \bigcircle \bigcircle
\end{array}
\]

\[
\begin{array}{c}
DO \\
\text{UNDO}
\end{array}
\begin{array}{c}
6 + 7 = 13 \\
13 - 7 = 6
\end{array}
\begin{array}{c}
7 + 6 = 13 \\
13 - 6 = 7
\end{array}
\]

Basic facts
Through sums of 18
4. Given an addition or subtraction combination such as \( 7 + 8 \) or \( 16 - 9 \), the student can immediately name the sum or difference and use sets or a number line to prove his result.

* Immediately is defined as 5 seconds or less.
OPERATIONS - GRADE TWO

BEHAVIORAL OBJECTIVES

5. The student can identify and name sums, differences, missing addends, and missing operational signs in problems written in both horizontal and vertical notation. For example:

\[ 14 + 9 = 23 \]
\[ 16 - 8 = ____ + 8 = 24 \]
\[ -8 + 7 = ____ + 8 = 10 \]
\[ 4 + 7 = ____ + 3 = 12 \]

6. Given a set model, the student can write two addition equations to describe the physical situation. For example:

\[ \circ \circ \circ \circ \circ \circ \]
\[ r + 3 = 8 \]
\[ 3 + 5 = 8 \]

7. The student can solve equations such as \[ 2 + 6 = 6 + ____ \] and \[ 4 + ____ = ____ + 4 \].

8. Given a set model, the student can write an addition equation using parentheses to describe the physical situation. For example:

\[ (3 + 2) + 4 = 9 \]
\[ 3 + (2 + 4) = 9 \]

9. The student can solve equations such as \[ (2 + 3) + 4 = ____ + 4 = \] and \[ (7 + 4) + 2 = ____ + (4 + 2); \] and \[ 3 + (\ ? + 1) = ____ \].
OPERATIONS - GRADE TWO

CONTENT

BEHAVIORAL OBJECTIVES

10. The student can demonstrate his understanding of the grouping principle of addition by solving equations such as

\[ 7 + 8 = 10 + \_ = \square. \]

Identity element

11. The student can solve equations such as \( 0 + 14 = \_ \); \( 9 - \_ = 9 \); \( 7 - 7 = \_ \); \( 32 + \_ = 32 \); \( 27 + \_ = 27 - \_ \); and \( 120 + 0 = \_ \).

Column addition and subtraction (three-digit numerals) without regrouping

12. The student can name the sums, differences, and missing digits for problems such as:

\[ \begin{array}{c|c|c|c}
141 & 247 & 2 & 7 \\
22 & -123 & +1 & 5\square & -2 & 1\\n+413 & & & & & 9 & 8 \\
\end{array} \]

Column addition and subtraction (two-digit numerals) with regrouping

13. The student can name the sums and differences for problems such as:

\[ \begin{array}{c|c|c|c|c|c}
34 & 52 & -58 & -35 & 128 & 295\\
\end{array} \]

(Note: Any of the following algorithms may be used:)

\[ \begin{array}{c|c|c|c|c|c|c}
OPERATIONS - GRADE TWO

CONTENT

Multiplication and Division

Definition of multiplication (one-digit factors)

14. Given several equivalent disjoint sets, the student can unite the sets and name the cardinal number of the new set thus formed.

15. Given a multiplication problem such as \(4 \times 3\), the student can design a simple experiment involving the union of 4 equivalent disjoint sets each with 3 members to determine and name the product of the numbers. For example:

\[
\begin{array}{cccc}
O & O & O & X & X & X & W & W & W & Z & Z & Z
\end{array}
\]

16. The student can solve equations such as \(2 \times 3 = \_\_\_ + 3\) and \(5 + 5 + 5 + 5 = \_\_\_ \times 5\) and use sets to prove his results.

Definition of division (two-digit factors)

17. Given a set of 15 objects, the student can partition the set into equivalent disjoint subsets each having 3 members and name how many such subsets can be formed.

Basic facts

18. Given a multiplication combination such as \(3 \times 2\), the student can use sets or a number line to determine and name the product.

For example:

\[
\begin{array}{cccccccc}
& & 2 & & 2 & & 2 \\
0 & & 1 & & 2 & & 3 & & 4 & & 5 & & 6 & & 7 & & 8 \\
\end{array}
\]

\(3 \times 2 = 6\)

Properties

19. The student can demonstrate by using sets or a number line that \(3 \times 4 = 12\) and \(4 \times 3 = 12\).
OPERATIONS – GRADE TWO

CONTENT

Identity element for multiplication

BEHAVIORAL OBJECTIVES

20. The student can demonstrate by using sets or a number line that $1 \times 6 = 6$ and $6 \times 1 = 6$. For example:

- 6 sets of 1
- $6 \times 1 = 6$

- 1 set of 6
- $1 \times 6 = 6$

21. The student can solve equations such as $5 \times 0 = \_\_\_$ and $0 \times 7 = \_\_\_$.
GEOMETRY - GRADE TWO

CONTENT

GEOMETRIC FIGURES

Plane figures
- Circle
- Square
- Rectangle
- Triangle
- Line segment
- Line (number line)

Space figures
- Cylinder
- Cone

PROPERTIES

Simple closed plane figures

Length

BEHAVIORAL OBJECTIVES

1. Given models of circles, squares, rectangles, triangles, line segments, and a number line (wire, paper or flannel cutouts, pencil or chalk outlines), the student can identify, name, and distinguish among these plane geometric figures.

2. Given models of cylinders and cones (wood or plastic solids, rolled paper, etc.), the student can identify, name, and distinguish between these space figures.

3. Given a set of plane figures, the student can distinguish the simple closed figures and identify the inside and outside regions. For example:

4. The student can demonstrate his understanding of the concept of length by drawing a line segment of given length (whole units).
CONSTRUCTIONS

5. Given a pegboard and rubber bands, the student can construct a square, rectangle, triangle, and line segment.

6. The student can make rough pencil and/or chalk drawings (outlines) of circles, squares, rectangles, triangles, and line segments.

7. Using a straightedge, the student can draw a "recognizable" square, rectangle, and triangle.

8. Using a ruler, the student can construct a line segment of given length. For example:

   Draw a line segment 5 inches long.

9. Using a ruler, the student can construct a number line and label the points with the whole numbers.
# Measurement - Grade Two

## Concepts of Measurement

Process of measuring:
- Length
- Selection of unit (arbitrary)
- Counting

1. Given an object with the property of length, the student can select a suitable unit of length and measure the object by counting the number of units needed to match the length of the object.

## Measurement of Physical Properties

### Length
- Ruler
- Inch, foot
- Centimeter

2. The student can measure a given line segment or object to the nearest whole unit.

### Volume
- Liquid measure
- Cup, pint, quart, gallon

3. Using a measuring cup, the student can measure the capacity of a given container to the nearest whole unit.

### Time
- Clock
- Hour, half-hour
- Calendar
- Day, week, month

4. Using a clock, the student can tell time on the hour and half-hour.

### Weight
- Balance
- Scales
- Pound

5. Given two objects and using a simple balance, the student can determine and name which is heavier and which is lighter.

6. Using simple scales, the student can determine and name the weight of a given object to the nearest pound.
MEASUREMENT - GRADE TWO

BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermometer</td>
</tr>
<tr>
<td>Degree (F.)</td>
</tr>
</tbody>
</table>

7. Based on experiences with reading scales on a thermometer, the student can record temperatures inside and outside the classroom and answer questions such as:

Is it cooler (colder) or warmer (hotter) today than yesterday?

8. The student can identify and name pennies, nickels, dimes, quarters, and half dollars and state the value, in cents, of each coin.

9. Given a set of coins (pennies, dimes, quarters, etc.), the student can determine and name the total value of the coins in both cent notation and decimal notation (e.g., 97¢ and $0.97).

<table>
<thead>
<tr>
<th>MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penny</td>
</tr>
<tr>
<td>Nickel</td>
</tr>
<tr>
<td>Dime</td>
</tr>
<tr>
<td>Quarter</td>
</tr>
<tr>
<td>Half dollar</td>
</tr>
</tbody>
</table>

10. The student can express the relationships between units of measure appropriate to the grade level and can rename a measure in other units. For example:

1 foot is (longer, shorter) than 1 inch.

1 quart = ____ pints.

1 half dollar = ____ dimes.

RENAMING MEASURES

Comparison of units
Conversion of units

For example:

1 foot is (longer, shorter) than 1 inch.

1 quart = ____ pints.

1 half dollar = ____ dimes.
### NUMBER - GRADE THREE

#### CONTENT

### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Collections</th>
<th>1. Given a description of a set, the student can distinguish between members of the set and things which are not members.</th>
<th>26 - 30, 2, 4</th>
<th>30, 32, 33, 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-to-one correspondence</td>
<td>2. Given two equivalent sets (objects or pictures), the student can demonstrate a one-to-one matching between members of the sets by constructing lines or by physically associating the objects.</td>
<td>200 - 201, 94,</td>
<td>34, 38, 39, 157 - 159</td>
</tr>
<tr>
<td>One-to-many correspondence</td>
<td>3. The student can describe familiar physical situations in which a one-to-many matching occurs. For example: one foot to five toes or one coat to two sleeves.</td>
<td></td>
<td>202</td>
</tr>
<tr>
<td>Equivalent and non-equivalent sets</td>
<td>4. Given two sets (objects, pictures, verbal description), the student can identify them as equivalent or non-equivalent, and if non-equivalent, tell which set has more and which has fewer members.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty set</td>
<td>5. The student can describe verbally a set which has no members, such as the set of all native Martians in the classroom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsets</td>
<td>6. Given a set, such as all students in the classroom, the student can identify a subset, such as the students wearing tennis shoes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARDINAL NUMBERS 0 - 10,000</td>
<td>7. The student can determine the cardinal number of a given set. 175, 189</td>
<td>70, 11, 66, 74, 10, 11, 66, 74, 134-135, 137-139</td>
<td>38-40, 91-92, 138, 159-160, 130, 224</td>
</tr>
<tr>
<td></td>
<td>8. Given a number, the student can identify the numbers which precede and follow it.</td>
<td>44, 61, 95, 172, 207, 211, 266</td>
<td>11, 7-9, 44, 112, 149, 259, 287</td>
</tr>
</tbody>
</table>
CONTENT

BEHAVIORAL OBJECTIVES

9. Given a set of whole numbers, the student can write them in order from least to greatest and vice versa.

10. The student can write the symbols $<$, $>$, $=$, $\neq$ to express the relationship between two given numbers.

RATIONAL NUMBERS

11. The student can construct and identify models for rational numbers.

12. Given a set of 12 objects, the student can construct a model for $7/12$ by grouping the members of the set into subsets.

For example:

\[
\begin{array}{cccccc}
0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0
\end{array}
\]

13. Given models of two rational numbers named with fractions having the same numerators or the same denominators, the student can write the symbols $<$, $>$, $=$, $\neq$ to express the relationship between them.

For example:
14. Given a sequence of objects, events, etc., the student can identify the position in space or time of a particular object or event by saying: "This (object) is fourth" or "This (event) happened second."
## NUMERATION - GRADE THREE

### CONTENT

#### NAMES FOR NUMBERS

1. The student can identify, name, read, and write many different names for the same number. For example: $14 = 10 + 4 = XV = 2 \times 7 = 20 - 6$, etc.

#### WHOLE NUMBERS 0 - 9,999

2. The student can identify, name, read, and write numerals for whole numbers.

3. The student can read and write number words through nine hundred ninety-nine.

#### Place value--

4. Given a numeral such as 8073, the student can identify, name, and distinguish the numerals that are in the ones, tens, hundreds, and thousands places.

5. Given a numeral, the student can name the place value for each digit.

#### Expanded notation

6. Given a numeral such as 4444, the student can write the expanded numeral $(4000 + 400 + 40 + 4)$.

7. Given a numeral such as 12, the student can write the Roman numeral XII.

8. Given a numeral such as XIV, the student can write the Arabic numeral 14.
9. Given a model of three-eighths, the student can identify, name, read, and write a numeral (fraction) for the rational number associated with the model. For example:

\[
\begin{array}{c}
\square \ \\
\square \square \square \ \\
\square \ \\
\square \square \square \square \square \square \square \square \\
3/8
\end{array}
\]
## OPERATIONS - GRADE THREE

### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>AW</th>
<th>S</th>
<th>ASC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WHOLE NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Addition and Subtraction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>1.</td>
<td>22-27,</td>
<td>10</td>
</tr>
<tr>
<td>1. Given an addition or subtraction problem such as 5 + 7 = _____ or 14 - 8 = _____, the student can design a simple experiment involving sets or a number line to determine and name the sum or difference of the numbers.</td>
<td>48-49</td>
<td>13-15,</td>
<td>10</td>
</tr>
<tr>
<td>2. Given an addition equation such as 13 + 24 = 37, the student can write the two related subtraction equations, 37 - 24 = 13 and 37 - 13 = 24.</td>
<td>92</td>
<td>31,190</td>
<td></td>
</tr>
<tr>
<td>3. Given an addition equation with a missing addend such as _____ + 61 = 157, the student can write the related subtraction equation, 157 - 61 = ____.</td>
<td>52,56,65,</td>
<td>20,64,94,</td>
<td>33-34,163,</td>
</tr>
<tr>
<td>5. Given any single-digit addition or subtraction combination, the student can immediately name the sum or difference.</td>
<td>109,163</td>
<td>62,94</td>
<td>103,121,129,</td>
</tr>
<tr>
<td>6. The student can solve equations such as 17 + _____ = 32 + 17 and _____ + 16 = 16 + ____.</td>
<td>60,63,66,</td>
<td>217,222,</td>
<td>22,42,163,</td>
</tr>
<tr>
<td>7. Given a problem such as 8 + 49 + 1 = ____, the student can indicate the grouping of addends which will make the addition easiest by enclosing the 49 and 1 in parentheses. For example: 8 + (49 + 1) = 58, 134,184,186</td>
<td>180,186,</td>
<td>223</td>
<td>255</td>
</tr>
</tbody>
</table>

*Immediately is defined as 5 seconds or less.*
OPERATIONS - GRADE THREE

BEHAVIORAL OBJECTIVES

8. Given a problem such as \(5 + 7 + 2 + 3 = \) ___, the student can demonstrate how to find the sum in the easiest way by rearranging the addends.

9. The student can solve equations such as \(41 + \boxed{___} = 41; 37 - \boxed{___} = 37 - \boxed{___}; 17 - \boxed{___} = 0; \) and \(53 - \boxed{___} = 53\).

Algorithms

10. The student can name the sums, differences, and missing digits for problems such as:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2405</td>
<td>5673</td>
<td>7(\square)6</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>-4052</td>
<td></td>
<td>2 (\square)4</td>
</tr>
<tr>
<td>301</td>
<td></td>
<td>-4012</td>
<td></td>
</tr>
</tbody>
</table>

11. The student can name the sums and differences for problems such as:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>453</td>
<td>694</td>
<td>570</td>
<td>803</td>
</tr>
<tr>
<td>+439</td>
<td>+19</td>
<td>-147</td>
<td>-227</td>
</tr>
</tbody>
</table>

12. The student can identify and name sums, differences, missing addends, and missing operational signs in problems written in both horizontal and vertical notation.
OPERATIONS - GRADE THREE

CONTENT

BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Multiplication and Division</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition of multiplication</strong></td>
<td>13. Given a multiplication problem such as $4 \times 7 = \underline{\phantom{114}}$, the student can design a simple experiment involving the union of 4 equivalent disjoint sets each with 7 members to determine and name the product of the numbers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>114, 122, 124, 36-37, 56</td>
<td>15, 29, 36-38, 148</td>
</tr>
<tr>
<td></td>
<td>14. The student can solve equations such as $3 \times 7 = 7 + \underline{\phantom{114}}$, and $8 + 8 + 8 + 8 = \underline{\phantom{114}} \times 8$ and use sets or skip count to prove his results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Definition of division</strong></td>
<td>15. Given a set of 21 objects, the student can partition the set into equivalent disjoint subsets each having 3 members and name how many such subsets can be formed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>134-135, 137-138</td>
<td>92, 224</td>
</tr>
<tr>
<td></td>
<td>16. Given a set of 21 objects, the student can partition the set into 3 equivalent disjoint subsets and name how many members are in each subset.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>281</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17. Given a division problem such as $36 \div 9 = \underline{\phantom{114}}$, the student can design a simple experiment involving set partition (see objectives #15 and #16 above) to determine and name the quotient.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OPERATIONS – GRADE THREE

CONTENT

BEHAVIORAL OBJECTIVES

18. The student can repeatedly subtract 6 from 18 until there is a remainder of 0, name how many times the 6 can be subtracted, and write the related division equation. For example:

\[
\begin{array}{c}
18 \\
- 6 \\
- 6 \\
- 6 \\
12 \\
0
\end{array}
\]

6 can be subtracted from 18 3 times

\[
18 \div 6 = 3
\]

Inverse relationship

19. The student can demonstrate by using sets or a number line that dividing 15 by 3 "undoes" multiplying 5 by 3.

DO

\[
\begin{array}{c}
5 \\
\times 3 \\
15
\end{array}
\]

UNDOD

\[
\begin{array}{c}
5 \\
\div 3 \\
15
\end{array}
\]

Basic facts

20. Given a multiplication or division combination such as 4 x 8 or 24 ÷ 6, the student can immediately* name the product or quotient and use sets or a number line to prove his result.

\[
\begin{array}{c}
4 \\
\times 8 \\
32
\end{array}
\]

\[
\begin{array}{c}
24 \\
\div 6 \\
4
\end{array}
\]

Through products of 45 (one-digit factors)

21. Given a multiplication or division combination such as 7 x 7 or 72 ÷ 9, the student can use sets or a number line to determine and name the product or quotient.

Through products of 81 (one-digit factors)

22. The student can identify and name products, quotients, missing factors, and missing operational signs in problems written in both horizontal and vertical notation.

Properties

Commutative property of multiplication

23. The student can demonstrate by using sets or a number line that 6 x 4 = 24 and 4 x 6 = 24.

*Immediately is defined as 5 seconds or less.
### OPERATIONS - GRADE THREE

#### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. The student can solve equations such as (7 \times 2 = _ _ _ \times 7) and (_ _ _ \times 8 = a \times _ _ _).</td>
<td>117, 123, 129, 142, 181, 187</td>
<td>218-219, 222-223, 298</td>
<td></td>
</tr>
<tr>
<td>Associative property of multiplication</td>
<td>185, 187</td>
<td>231-236, 238, 298</td>
<td>175, 207, 240, 255, 259</td>
</tr>
<tr>
<td>25. The student can solve equations such as ((2 \times 3) \times 4 = _ _ _ \times _ _ _ \times _ _ _) and (8 \times (1 \times 3) = _ _ _).</td>
<td>128, 132, 136</td>
<td>48-49, 156</td>
<td></td>
</tr>
<tr>
<td>Identity element for multiplication</td>
<td>133, 136, 164</td>
<td>46-47</td>
<td></td>
</tr>
<tr>
<td>26. The student can solve equations such as (1 \times 18 = _ _ _); (4 \times _ _ _ = 4); (12 \div 12 = _ _ _); (14 \div 1 = _ _ _); and (3 \times _ _ _ = 3 \div _ _ _.)</td>
<td>194</td>
<td>277-282</td>
<td></td>
</tr>
<tr>
<td>27. Given a multiplication combination such as (7 \times 6), the student can use the distributive property of multiplication over addition to determine and name the product.</td>
<td>199, 204, 208, 210, 234, 235</td>
<td>266, 289, 304</td>
<td></td>
</tr>
<tr>
<td>28. The student can demonstrate by using sets that: (3 \times (2 - 4) = (3 \times 2) + (3 \times 4) = 6 + 12 = 18)</td>
<td>0 0 0 0 0 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. The student can solve equations such as (7 \times 6 = (3 \times 6) + (4 \times 6) = 18 + 24 = 42)</td>
<td>0 0 0 0 0 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note: See illustration in margin.)
OPERATIONS - GRADE THREE

BEHAVIORAL OBJECTIVES

30. The student can name the products and quotients for problems such as:

\[ 7 \times 1 = \quad 7 \times 4 = \quad 7 \times 10 = \quad 7 \times 100 = \]
\[ 360 \div 1 = \quad 3600 \div 10 = \quad 3600 \div 100 = \]
\[ 3600 \div 9 = \quad 3600 \div 90 = \quad 3600 \div 900 = \]

31. The student can name the products for problems such as:

\[ 132 \times 3 = 132 \times 4 = 132 \times 7 = 132 \times 6 = \]

(Note: Any of the following algorithms may be used):

\[ 100 + 30 + 2 = 132 + 132 + 132 \]
\[ \times 7 \times 7 \times 7 \]
\[ 700 + 210 + 14 = 924 + 924 + 924 \]
\[ 210 + 924 + 924 = 924 + 924 + 924 \]

32. The student can name the quotients for problems such as:

\[ 8 \div 240 = 9 \div 666 = 7 \div 308 = 5 \div 625 = \]
OPERATIONS - GRADE THREE

CONTENT

BEHAVIORAL OBJECTIVES

32. (continued)
(Note: Any of the following algorithms may be used:)

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>237</td>
<td>284, 285</td>
<td>272-276, 290</td>
</tr>
<tr>
<td>258-261, 264, 266-274, 283, 285, 289</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RATIONAL NUMBERS

Addition

Definition of addition (fractions with the same denominators)

33. Given a model (region or number line) for the addition of two rational numbers, the student can determine and name the sum. For example:

33 3
2 + 1 = 3

1 1
3 5

1 1
4 4

1 1
5 5

2 + 1 = ___

2 5

5 5

5 5
### GEOMETRY - GRADE THREE

#### CONTENT

**GEOMETRIC FIGURES**

Plane figures
- **Point**
- **Line**
- **Line segment**
- **Ray**
- **Path (curved line)**

Angle
- **Right angle**

Quadrilateral
- **Square**
- **Rectangle**

Triangle

Circle
- **Center**
- **Radius**
- **Diameter**
- **Chord**

Space figures
- **Cube**
- **Sphere**
- **Cylinder**
- **Cone**

#### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Objective</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Given a verbal description of a precise location in the classroom, the student can locate and identify the point.</td>
<td>46, 47, 76, 77</td>
<td>100, 176</td>
<td>49, 114</td>
</tr>
<tr>
<td>For example: Where is the place where the floor and these two walls meet?</td>
<td>4-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Given models of the plane geometric figures named on the left (wire, paper or flannel cutouts, pencil or chalk outlines), the student can identify, name, and distinguish among them.</td>
<td>178</td>
<td>49, 99, 116, 121, 123</td>
<td></td>
</tr>
<tr>
<td>3. Given models of cubes, spheres, cylinders, and cones (wood or plastic solids, rolled paper, etc.), the student can identify, name, and distinguish among these space figures.</td>
<td>2-5, 20-21</td>
<td>33, 63, 132, 171</td>
<td>122-25</td>
</tr>
</tbody>
</table>
GEOMETRY - GRADE THREE

CONTENT

BEHAVIORAL OBJECTIVES

PROPERTIES

Length

4. The student can demonstrate his understanding of the concept of length by drawing a line segment of given length.

150

5. Given a set of plane figures, the student can distinguish the simple closed figures and identify the inside and outside regions.

Area

6. The student can demonstrate his understanding of the concept of area by covering an interior (inside) region with unit regions (areas).

CONSTRUCTIONS

Plane geometric figures

7. The student can make rough pencil and/or chalk drawings (outlines) of the plane figures named under GEOMETRIC FIGURES on the previous page.

Line

8. Using a straightedge, the student can construct models for lines, line segments, rays, and angles and label them in the following way:

A

\[ \overrightarrow{AB} \]

Ray

Angles

9. Using a straightedge and folded paper, the student can construct a right angle.

\[ \angle ABC \]

Circle

10. Given the center and radius and using a compass, the student can construct a circle.

\[ \text{Center} \]

\[ \text{Radius} \]
## Measurement - Grade Three

### Behavioral Objectives

<table>
<thead>
<tr>
<th>Concept of Measurement</th>
<th>Behavioral Objective</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process of measuring: length, area, volume</td>
<td>1. Given an object or picture of an object with the property of length, area, or volume and a set of unit lengths, areas, and volumes, the student can select a suitable unit and count to measure the property of the object.</td>
<td>174, 64-65</td>
</tr>
<tr>
<td>Selection of unit (arbitrary)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Measurement of Physical Properties

<table>
<thead>
<tr>
<th>Concept</th>
<th>Behavioral Objective</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>2. The student can measure a given line segment or object to the nearest half-unit.</td>
<td>1, 5, 7-15, 176-178, 66-68, 70, 196</td>
</tr>
<tr>
<td>Ruler, yardstick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inch, foot, yard, mile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centimeter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>3. The student can determine and name the area of a given rectangular region by counting the number of area units (square regions) needed to cover the region.</td>
<td>1, 16-19, 25, 52-55, 144, 145, 147, 184, 185, 283</td>
</tr>
<tr>
<td>Square units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>4. The student can determine and name the volume of a given right rectangular space figure by counting the number of volume units (cubes) needed to fill the space.</td>
<td>5, 20-21, 25</td>
</tr>
<tr>
<td>Cubic units</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid measure</td>
<td>5. The student can measure the capacity of a given container to the nearest whole unit.</td>
<td>22, 23, 195, 79, 80</td>
</tr>
<tr>
<td>Ounce, cup, pint, quart, gallon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>6. Using a clock, the student can tell time to the nearest minute.</td>
<td>217, 183-188, 71-75, 81, 82, 85, 121, 161, 287, 295</td>
</tr>
<tr>
<td>Clock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hour, half-hour, quarter-hour, minute</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Measurement - Grade Three

## Behavioral Objectives

<table>
<thead>
<tr>
<th>Content</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scales</td>
<td>100</td>
<td>194</td>
<td>77,78</td>
</tr>
<tr>
<td>Ounce, pound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>94</td>
<td>80</td>
<td>83</td>
</tr>
<tr>
<td>Thermometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree (F.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Money</strong></td>
<td>78-80, 108, 117, 204</td>
<td>59, 91-93, 166-170</td>
<td>1-4, 167, 169, 171, 198-199, 206-211, 267</td>
</tr>
<tr>
<td>United States coins and bills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Renaming Measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison of units</td>
<td>227, 276</td>
<td>175, 177, 178, 192-195, 286</td>
<td>76, 79-80, 99, 287, 295</td>
</tr>
<tr>
<td>Conversion of units</td>
<td></td>
<td>310</td>
<td></td>
</tr>
<tr>
<td>1 pound weighs (more, less) than 8 ounces.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 feet = ____ yards and ____ feet.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Computations with Measures

<table>
<thead>
<tr>
<th>Content</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addition and Subtraction</strong></td>
<td>215, 230</td>
<td>179</td>
<td>69, 77-80, 84, 85, 99</td>
</tr>
<tr>
<td>The student can compute with measures appropriate to the grade level, assign the proper unit to the result, and rename if necessary. For example:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 quarts + 5 quarts = 8 quarts = 2 gallons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 cents - 38 cents = 12 cents = $.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### NUMBER - GRADE FOUR

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETS (Review and maintain concepts and skills.)</td>
<td>AW</td>
</tr>
</tbody>
</table>

#### Collections

1. Given a description of a set, the student can distinguish between members of the set and things which are not members.  
2. Given two equivalent sets (objects or pictures), the student can demonstrate a one-to-one matching between members of the sets by constructing lines or by physically associating the objects.

#### One-to-one correspondence

3. The student can describe familiar physical situations in which a one-to-many matching occurs. For example: one notebook to three rings or one cat to four paws!

#### Empty set

4. Given two sets (objects, pictures, descriptions), the student can identify them as equivalent or non-equivalent.

5. The student can identify and describe sets which have no members. For example: The set of all living people 200 years old or older has no members.

#### Subsets

6. Given a set, the student can identify and describe a subset. For example: Fords are a subset of the set of all automobiles.

#### WHOLE NUMBERS 0 – 1,000,000

7. The student can determine the cardinal number of a given set. For example: The set of all living people 200 years old or older has no members.

For example: The set of all living people 200 years old or older has no members.
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUMBER - GRADE FOUR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CONTENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Order relations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Given a number, the student can identify the numbers which precede and follow it.</td>
<td>70-71</td>
<td>61, 64, 69, 75, 114, 163, 228</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. The student can identify and name odd and even numbers.</td>
<td>220-221</td>
<td>300</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td><strong>RATIONAL NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denominators of 1, 2, 3, 4...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Given a set of whole numbers, the student can write them in order from least to greatest and vice versa.</td>
<td>294</td>
<td>2-3, 19, 21, 34-35, 53, 68, 44-45, 75, 99, 66, 90-91, 118, 103-105, 115, 268, 325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. The student can write the symbols $&lt;$, $&gt;$, $=$, $\neq$ to express the relationship between two given numbers.</td>
<td>33, 86-89, 260, 214</td>
<td>129, 148, 162, 178, 237, 243, 278, 293, 301, 323</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ORDINAL NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beyond twentieth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Given a set of 12 objects, the student can construct a model for 5/6 by grouping the members into subsets.</td>
<td>248-249, 251, 253</td>
<td>77-79, 81, 83-85, 192</td>
<td>185-187</td>
<td></td>
</tr>
<tr>
<td>For example:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[0 0 0 0 0 0]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[0 0 0 0 0 0]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Order relations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Given two rational numbers such as 3/5 and 4/7, the student can name them with like fractions and write the symbols $&lt;$, $&gt;$, $=$, $\neq$ to express the relationship between them.</td>
<td>296, 304, 311, 328</td>
<td>86, 193, 195, 211, 236</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ORDINAL NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beyond twentieth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Given a situation involving a number, the student can identify the number as cardinal or ordinal (or neither).</td>
<td>36-37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For example:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am fifth in line. (Ordinal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have five cats. (Cardinal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I drive a Ford Galaxie 500.    (Neither Cardinal nor Ordinal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAMES FOR NUMBERS</td>
<td>1. The student can identify, name, read, and write many different names for the same number. For example: (12 = 7 + 5 = 27 - 15 = 3 \times 4 = 48 \div 4 = 11 + \frac{1}{2} + \frac{1}{2}).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHOLE NUMBERS</td>
<td>2. The student can identify, name, read, and write numerals for whole numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 999,999</td>
<td>26-45, 72, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22-23, 29, 38-39, 154-157, 159-161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-20, 24-33, 52, 54, 81, 89, 117, 169, 229-232, 268, 270</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-9, 55, 117, 219-221, 224-225, 226, 229</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Given a numeral such as 467,304, the student can write the words: four hundred sixty-seven thousand, three hundred four.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 36, 38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>154, 157, 159-161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16-17, 49-50, 89, 325</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27, 29, 31, 33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27, 29, 31, 33, 74, 82, 312</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59, 152, 155, 156, 159, 217, 222, 265</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24-25, 27-28, 75, 87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place value--six-digit numerals</td>
<td>4. Given a base ten (decimal) numeral, the student can identify and name the place value for each digit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>154, 156, 159-160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14, 19-20, 53, 117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Given a numeral such as 473,245, the student can write the expanded numeral in the following way: (473,245 = (4 \times 100,000) + (7 \times 10,000) + (2 \times 1000) + (4 \times 100) + (5 \times 1)).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>27, 29, 31, 33, 74, 82, 312</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59, 152, 155, 156, 159, 217, 222, 265</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24-25, 27-28, 75, 87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded notation</td>
<td>6. Given a numeral such as 52, the student can write the Roman numeral LII.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>154, 156, 159-160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14, 19-20, 53, 117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roman numerals through L</td>
<td>6. Given a numeral such as 52, the student can write the Roman numeral LII.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>154, 156, 159-160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14, 19-20, 53, 117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Given a Roman numeral such as LVI, the student can write the Arabic numeral 56.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28, 30, 204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>154, 156, 159-160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14, 19-20, 53, 117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>168</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AV</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------</td>
<td>----</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td><strong>RATIONAL NUMBERS</strong></td>
<td>Denominators of 1, 2, 3, 4,...</td>
<td>8. Given a model of three-eighths, the student can identify, name, read, and write a numeral (fraction) for the rational number associated with the model.</td>
<td>240-259, 262-263, 265, 268, 278, 282-293, 296-299, 307, 310</td>
<td>76-81, 83-85, 86-90, 204, 206, 179-182, 187, 192-193</td>
</tr>
<tr>
<td></td>
<td>Equivalent fractions</td>
<td>9. Given a fraction such as 3/5, the student can identify, name, and distinguish the numerator and the denominator.</td>
<td></td>
<td>258-259, 262, 299</td>
</tr>
<tr>
<td></td>
<td>Equivalent fractions</td>
<td>10. Given a fraction such as 7/8, the student can write a set of fractions which are equivalent to 7/8. For example: 7/8 = 14/16 = 14/24 = 28/32 = etc.</td>
<td>252-257, 259, 264, 266-271, 278-279, 284-286, 289-293, 297, 302</td>
<td>87, 192-194, 199, 200-201, 201-203, 226-227</td>
</tr>
<tr>
<td></td>
<td>Equivalent fractions</td>
<td>11. The student can rename a given fraction in simplest form. For example: 12/32 = 3/8.</td>
<td>251, 272-275</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>Improper fractions and mixed numerals</td>
<td>12. Given a model such as ..., the student can identify, name, read, and write the fraction 7/4 and/or the mixed numeral 1 3/4 for the rational number associated with the model.</td>
<td>263, 304</td>
<td>206-207, 192-193</td>
</tr>
<tr>
<td><strong>OTHER NOTATION</strong></td>
<td>Rounding to the nearest 13. Given a numeral such as 4651, the student can round it to ten, hundred, thousand 4650 to the nearest ten, to 4700 to the nearest hundred, and to 5000 to the nearest thousand.</td>
<td></td>
<td>42-43</td>
<td></td>
</tr>
</tbody>
</table>
WHOLE NUMBERS

Addition and Subtraction

Inverse relationship
1. The student can solve equations such as:
   \[207 + \_ = 896\]
   \[150 - \_ = 98\]
   \[\_ + 27 = 4068\]
   \[\_ - 2146 = 9763\]

2. The student can check subtraction problems by addition.

Basic facts
Through sums of 18
3. Given any single digit addition or subtraction combination, the student can immediately name the sum or difference.

Properties
Commutative and associative properties of addition
4. Given an addition problem with three to six addends, the student can demonstrate how to find the sum in the easiest way by renaming and rearranging the addends.

Identity element for addition
5. The student can solve equations such as 409 + \_ = 409;
   \[116 - \_ = 116 + \_; \_ - 3412 = 0; \text{ and } \_ - 0 = 23,809.\]

Algorithms
Column addition and subtraction (five-digit numerals) with and without renaming
6. The student can name the sums and differences for problems such as:
   \[72,048 + 19,969 = 91,904\]
   \[40,001 - 28,973 = 11,028\]

* Immediately is defined as 5 seconds or less.
### OPERATIONS - GRADE FOUR

#### CONTENT

<table>
<thead>
<tr>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other notation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. The student can identify and name sums, differences, missing addends, and missing operational signs in problems written in both horizontal and vertical notation.</td>
<td>49-50</td>
<td>7</td>
<td>42,52</td>
</tr>
</tbody>
</table>

### Multiplication and Division

#### Definition

8. Given a multiplication or division problem such as $7 \times 9 = \underline{}$ or $54 \div 6 = \underline{}$, the student can design a simple experiment involving sets or a number line to determine and name the product or quotient.

9. Given a multiplication or division problem such as $7 \times 9 = \underline{}$ or $54 \div 6 = \underline{}$, the student can demonstrate how to find the product or quotient by repeated addition or subtraction.

#### Inverse relationship

10. Given a set model (rectangular array), the student can write two multiplication and two division equations to describe the physical situation. For example:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   **DO** $4 \times 6 = 24$  
   **UNDO** $24 \div 6 = 4$
OPERATIONS - GRADE FOUR

CONTENT

BEHAVIORAL OBJECTIVES

AW | S | ABC
---|---|---
103-106 | 51, 64-65, 68-124-125, 129-130, 134-135 |
111-113 | 70, 74, 93, 114, 129-130, 134-135 |
115, 128, | 132, 144-145, 139-140 |
186, | 153, 210, 237, 147, 153, |
321-322 | 279, 324, 155-156, 158, 251, |
325

Basic facts

Through products of 81 (one-digit factors) 11. Given a multiplication or division combination such as 9 \times 7 or 42 \div 6, the student can immediately name the product or quotient and use sets or a number line to prove his result.

12. The student can identify and name products, quotients, missing factors, and missing operational signs in problems written in both horizontal and vertical notation.

Properties

Commutative property of multiplication 13. The student can demonstrate by using sets or a number line that 9 \times 6 = 6 \times 9.

14. The student can solve equations such as 27 \times ____ = 3 \times 27 and 443 \times ____ = ____ \times 443.

Associative property of multiplication 15. The student can solve equations such as:

\[ 300 \times 27 = (3 \times ____ ) \times 27 = 3 \times ( ____ \times 27) = 3 \times \text{____} = \text{____}. \]

16. Given a problem such as 7 \times 5 \times 8 = ____ , the student can indicate the grouping of factors which will make the multiplication easiest by enclosing the 5 and 8 in parentheses. For example:

\[ 7 \times (5 \times 8) = 280. \]

Identity element for multiplication 17. The student can solve equations such as 1 \times 453 = ____ ; 32 \times ____ = 32; 27 \div 27 = ____ ; 19 \div 1 = ____ ; and 45 \div ____ = 45 \times ____ .

* Immediately is defined as 5 seconds or less.
### OPERATIONS - GRADE FOUR

#### CONTENT

**Multiplicative property of 0**
18. The student can solve equations such as: $7320 \times 0 = \_ \_ \_ \_ ;
   0 = \_ \_ \_ \_ \times 700; \ 0 \div 7 = \_ \_ \_ \_; \ 0 \times 1 = \_ \_ \_ \_ ;$ and
   \[ 0 \div 1 = \_ \_ \_ \_ \. \]

**Distributive property of multiplication over addition**
19. The student can demonstrate by using sets (rectangular arrays) that:
   \[ 9 \times 7 = (5 \times 7) + (4 \times 7) \quad \text{and} \quad 9 \times 7 = (9 \times 3) + (9 \times 4) \]
   \[ = \ 35 \quad + \ 28 \quad = \ 27 \quad + \ 36 \]
   \[ = \ 63 \quad \quad \quad = \ 63 \]

20. The student can demonstrate by using sets (rectangular arrays) that:
   \[ 3 \times 123 = (3 \times 100) + (3 \times 20) + (3 \times 3) \]
   \[ = \ 300 \quad + \ 60 \quad + \ 9 \]
   \[ = \ 369 \]

21. The student can solve equations such as:
   \[ 72 \times 1478 = (\_ \_ \_ \_ \times 1478) + (\_ \_ \_ \_ \times 1478) \quad \text{and} \quad (40 \times 762) + (8 \times 762) = \_ \_ \_ \_ \times 762. \]

#### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>102,114, 144</td>
<td>60</td>
<td>128</td>
</tr>
<tr>
<td>101,142</td>
<td>127-131, 133,278</td>
<td>154</td>
</tr>
<tr>
<td>132,162-163</td>
<td>141-143, 240,306, 252-233</td>
<td></td>
</tr>
<tr>
<td>143-144, 169</td>
<td>136</td>
<td>144</td>
</tr>
<tr>
<td>136,246, 248,250-251,262</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,202, 206,208, 236,322-323</td>
<td>200,202, 206,208, 236,322-323</td>
<td></td>
</tr>
</tbody>
</table>

**Algorithms**

Factors of 10, 100, and multiples of 10 and 100
22. The student can name the products and quotients for problems such as:

| 1 \times 23 = \_ \_ \_ \_ | 3 \times 23 = \_ \_ \_ \_ | 4900 \div 1 = \_ \_ \_ \_ | 4900 \div 7 = \_ \_ \_ \_ |
| 10 \times 23 = \_ \_ \_ \_ | 30 \times 23 = \_ \_ \_ \_ | 4900 \div 10 = \_ \_ \_ \_ | 4900 \div 70 = \_ \_ \_ \_ |
| 100 \times 23 = \_ \_ \_ \_ | 300 \times 23 = \_ \_ \_ \_ | 4900 \div 100 = \_ \_ \_ \_ | 4900 \div 700 = \_ \_ \_ \_ |

## OPERATIONS - GRADE FOUR

### CONTENT

- **Multiplication** - vertical notation (four-digit factor by two-digit factor) with and without regrouping
- **Long division** (four-digit dividend by two-digit divisor) with and without remainder
- **RATIONAL NUMBERS**
  - Addition and Subtraction
    - **Definition** (fractions with the same denominators)
    - **Problem Solving** by using models and algorithms
      - **Problem Solving** by using models and algorithms

### BEHAVIORAL OBJECTIVES

**AW**

- 23. The student can name the products for problems such as:
  - \(21 \times 34\)
  - \(2976 \times 24\)
  - \(4005 \times 48\)

**S**

- 24. The student can name the quotients and remainders for problems such as:
  - \(9 \div 585\)
  - \(14 \div 1008\)
  - \(98 \div 4673\)
  - \(21 \div 6658\)

**ABC**

- 25. Given a model (region or number line) for the addition or subtraction of two rational numbers, the student can determine and name the sum or difference. (See objective # 33 for Grade Three for examples of models.)
  - 300-302, 328, 88-89, 90-91, 93, 196, 203, 204, 250-251, 253

- 26. Given an addition or subtraction problem such as \(3/8 + 7/8 = \) or \(5/9 - 2/9 = \), the student can name the sum or difference as a proper or improper fraction in lowest terms, or as a mixed numeral, and use regions or a number line to prove his result.
### OPERATIONS - GRADE FOUR

<table>
<thead>
<tr>
<th>Algorithms</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal notation (money)</td>
<td>27. The student can name the sums and differences for problems such as: 68,308,318, 35,37,41, 78-79,84, 320, 153,170, 86,165,249, 191,229, 259</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$ 8.76</td>
<td>$ 1001.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>349.06</td>
<td>$ - 998.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ 23.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## GEOMETRY - GRADE FOUR

### CONTENT

<table>
<thead>
<tr>
<th>GEOMETRIC FIGURES</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plane figures</strong> (as sets of points)</td>
<td>1. The student can draw and name a set of points satisfying given conditions. For example:</td>
</tr>
<tr>
<td>Point</td>
<td>a set of points one inch from a given point is a(n) <strong>circle</strong>.</td>
</tr>
<tr>
<td>Path (curve)</td>
<td>The set of all points contained in two rays with a common endpoint is a(n) <strong>angle</strong>.</td>
</tr>
<tr>
<td>Line</td>
<td></td>
</tr>
<tr>
<td>Line segment</td>
<td></td>
</tr>
<tr>
<td>Ray</td>
<td></td>
</tr>
<tr>
<td><strong>Angle</strong></td>
<td>2. Given models of the plane geometric figures named on the left (wire, paper or flannel cutouts, pencil or chalk outlines), the student can identify, name, and distinguish among them.</td>
</tr>
<tr>
<td>Right angle</td>
<td></td>
</tr>
<tr>
<td><strong>Polygon</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Triangle</strong></td>
<td></td>
</tr>
<tr>
<td>Right triangle</td>
<td></td>
</tr>
<tr>
<td><strong>Quadrilateral</strong> (diagonal)</td>
<td></td>
</tr>
<tr>
<td>Parallelogram</td>
<td></td>
</tr>
<tr>
<td><strong>Square</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rectangle</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Circle</strong></td>
<td></td>
</tr>
<tr>
<td>Center</td>
<td></td>
</tr>
<tr>
<td>Radius</td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td></td>
</tr>
<tr>
<td>Chord</td>
<td></td>
</tr>
</tbody>
</table>

### Behavioral Objectives

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>46-47</td>
<td>46-47, 56</td>
<td>94-97, 101-103, 109-114, 119-</td>
</tr>
<tr>
<td>181, 184,</td>
<td>254, 258,</td>
<td>322</td>
</tr>
<tr>
<td>120, 164, 105</td>
<td>259, 267</td>
<td></td>
</tr>
<tr>
<td>238, 239</td>
<td>255-257</td>
<td>115, 118</td>
</tr>
<tr>
<td>130, 131</td>
<td>43, 48-49,</td>
<td>272-285,</td>
</tr>
<tr>
<td>146, 147</td>
<td>52-53, 57-</td>
<td>302-305</td>
</tr>
<tr>
<td>160, 161</td>
<td>58, 92, 115,</td>
<td>162, 187,</td>
</tr>
<tr>
<td></td>
<td>189, 228, 257,</td>
<td>259-260, 297,</td>
</tr>
<tr>
<td></td>
<td>314, 323, 325</td>
<td></td>
</tr>
<tr>
<td>238, 280</td>
<td>180, 182,</td>
<td>286-288</td>
</tr>
<tr>
<td></td>
<td>183, 186,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>189</td>
<td></td>
</tr>
</tbody>
</table>
GEOMETRY - GRADE FOUR

BEHAVIORAL OBJECTIVES

Space figures
Right rectangular prism
Cube
Sphere
Cylinder
Cone
Pyramid

PROPERTIES

Parallel lines
4. The student can sketch and describe parallel lines. For example: Parallel lines are lines in the same plane that never meet.

Intersecting lines
5. The student can sketch and describe intersecting lines. For example: Intersecting lines are lines that have one point in common.

Simple closed curves
6. Given a set of plane figures, the student can distinguish the simple closed curves and identify the interior and exterior regions.

Perimeter
7. Given a model of a polygon and using a ruler, the student can determine and name the perimeter (length of the closed polygonal path) of the polygon.

AW S ABC
3 184-185, 92, 297-302, 218-219 261-264 305

46, 90 - 91, 162, 130 284-285

46-47, 162, 210

53-56, 271-273, 179, 182, 96, 265 302-303

14-17, 99, 308 50-51, 191, 279 105, 280-282, 324 289-291
### CONTENT

#### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Area</th>
<th>8. Given a model of a simple closed curve, the student can count (estimate if necessary) the number of unit squares needed to cover the interior region.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2, 8-11, 72-73, 202-296, 24-25, 73, 191, 279, 99, 126, 166, 324, 204, 214, 308</td>
</tr>
<tr>
<td>Volume</td>
<td>9. The student can demonstrate his understanding of the concept of volume by filling the interior space of a right rectangular prism (i.e., chalkbox, shoebox, etc.) with unit cubes.</td>
</tr>
<tr>
<td></td>
<td>12-13, 21, 106-107, 25, 73, 171, 191, 279, 294</td>
</tr>
</tbody>
</table>

#### CONSTRUCTIONS

<table>
<thead>
<tr>
<th>Plane geometric figures</th>
<th>10. Using a straightedge, the student can construct models for lines, line segments, rays, angles, and quadrilaterals and label them.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Right triangle</th>
<th>11. Using a straightedge and folded paper, the student can construct a right triangle.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>146-147, 281</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triangle</th>
<th>12. Given the three sides of a triangle and using a straightedge and compass, the student can construct the triangle.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>130-131, 48, 187-188, 190, 259-260, 275, 280, 322</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Circle</th>
<th>13. Given the center and radius and using a string or a compass, the student can construct a circle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center</td>
<td>238, 281, 180-184, 286-287, 302</td>
</tr>
<tr>
<td>Radius</td>
<td></td>
</tr>
</tbody>
</table>
### MEASUREMENT - GRADE FOUR

#### CONTENT

**CONCEPTS OF MEASUREMENT**

<table>
<thead>
<tr>
<th>Process of measuring</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Given a measurable physical property such as length, area, weight, temperature, etc., the student can select a suitable unit and/or measuring device and measure the property. For example: Weight can be measured by using a(n) _________________________________.</td>
<td>3,23-25, 203</td>
<td>106, 171, 173-174, 176, 247</td>
<td>106-108, 296</td>
<td></td>
</tr>
</tbody>
</table>

| Arbitrary selection of unit | | 4-5 | | 167 |
|-----------------------------| | | | |
| 2. The student can name at least two units suitable for naming the measure of a given physical property. For example: The area of a floor can be expressed in square feet, in square yards, or in square vinyl tiles (9" x 9"). | | | | |

| Approximate nature of measurement | | 6 | | |
|-----------------------------------| | | | |
| 3. The student can demonstrate his understanding of the approximate nature of measurement by stating the precision of the measure. For example: The distance between Las Vegas and Boulder City is 30 miles correct to the nearest 5 miles. | | | | |

#### MEASUREMENT OF PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Length</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. The student can use various measuring devices (ruler, yardstick, meter stick) to measure length in whole and fractional parts of units.</td>
<td>2-7, 23-24, 72, 204, 276, 274, 305, 311</td>
<td>51, 176, 269</td>
<td>100, 103-105, 106, 119-120, 154, 281, 263-264, 287</td>
<td></td>
</tr>
</tbody>
</table>
### Measurement - Grade Four

#### Behavioral Objectives

<table>
<thead>
<tr>
<th>Content</th>
<th>Objective</th>
<th>AW (14-17, 25, 73, 99, 308)</th>
<th>S (50-51, 191, 279, 324)</th>
<th>ABC (230-282, 289-291, 302, 304, 326)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter</td>
<td>5. The student can determine and name the perimeter of a given polygon by adding the measures of the sides. (Note: See objective # 7 for GEOMETRY - GRADE FOUR.)</td>
<td>14-17, 25, 73, 99, 308</td>
<td>50-51, 191, 279, 324</td>
<td>230-282, 289-291, 302, 304, 326</td>
</tr>
<tr>
<td>Area--square units related to units of length</td>
<td>6. Given the measure of the base and altitude of a rectangular region in whole units, the student can determine and name the area of the region by multiplication (as the necessary multiplication facts and algorithms are learned). (Note: See objective # 8 for GEOMETRY - GRADE FOUR.)</td>
<td>1-2, 8-11, 18, 21, 25, 73, 99, 126, 166, 204</td>
<td>63, 72-73, 126-128, 191</td>
<td>121, 127, 292-296, 298, 302, 305, 326</td>
</tr>
<tr>
<td>Volume--cubic units related to units of length</td>
<td>7. Given a sketch of a right rectangular space figure, the student can determine and name the volume of the figure by counting the number of volume units (cubes) needed to fill the space. (Note: See objective # 9 for GEOMETRY - GRADE FOUR.)</td>
<td>1-2, 12-13, 21, 25, 73, 171, 294</td>
<td>106-107, 191, 279</td>
<td>167</td>
</tr>
<tr>
<td>Liquid measure</td>
<td>8. The student can name the standard English units of liquid measure and measure the capacity of a given container to the nearest whole unit.</td>
<td>22</td>
<td>174-175, 167</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>9. Using a clock, the student can read and write time to the nearest second and indicate A.M. or P.M.</td>
<td>215, 230-235, 261</td>
<td>164-167, 292</td>
<td>168</td>
</tr>
<tr>
<td>Weight</td>
<td>10. Using a scale, the student can measure the weight of a given object in whole and fractional parts of units. (Note: Students can name the ton as a unit of weight but are not expected to weigh objects that heavy!)</td>
<td>277</td>
<td>171-172</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>11. Using a thermometer calibrated in either Fahrenheit or Centigrade degrees, the student can read the temperature to the nearest degree.</td>
<td>203</td>
<td>247</td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AW</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>----</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td><strong>RENAMEING MEASURES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison of units</td>
<td>12. The student can express the relationships between units of measure appropriate to the grade level and can rename a measure in other units. For example:</td>
<td>5,22-24,72,</td>
<td>165,171,173-</td>
<td>107-108,118,</td>
</tr>
<tr>
<td>Conversion of units</td>
<td></td>
<td>212,261,277,</td>
<td>176,208,229,</td>
<td>120,164,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>308,369</td>
<td>236,303,324,</td>
<td>167-168,170</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>370</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 meter is (longer, shorter) than 1 yard.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3000 pounds = ____ tons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMPUTATIONS WITH MEASURES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13. The student can compute with measures appropriate to the grade level, assign the proper unit to the result, and rename if necessary. For example:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 ft. 8 in. = 12 ft. 20 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 5 ft. 11 in. = 5 ft. 11 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 ft. 9 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## NUMBER - GRADE FIVE

### CONTENT

### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Sets</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finite</td>
<td>1. The student can construct a Venn diagram to show the relationship of whole numbers to rational numbers.</td>
<td>66,67</td>
<td>314-321</td>
<td>109</td>
</tr>
<tr>
<td>Infinite</td>
<td>2. The student can classify a given set as:</td>
<td>312</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Empty</td>
<td>- Finite---has a definite number of members</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Infinite---has an unlimited number of members</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Empty---has no members</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Whole Numbers

<table>
<thead>
<tr>
<th>0-1,000,000,000</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. The student can determine the cardinal number of a given set.</td>
<td>7,55</td>
<td>170-173</td>
<td>42,43,62</td>
</tr>
<tr>
<td></td>
<td>4. Given a number, the student can identify the numbers which precede and follow it.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. The student can identify and name odd and even numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Given a number greater than 1000, the student can verbalize his notion of the quantity involved.</td>
<td>5-8</td>
<td>170-175</td>
<td>42-45</td>
</tr>
<tr>
<td></td>
<td>- For example: &quot;A million dollars is having a thousand dollars in each of a thousand banks!&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Prime and Composite Numbers

<table>
<thead>
<tr>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Given a whole number greater than 1 and less than 100, the student can classify the number as:</td>
<td>170-173</td>
<td>41-43</td>
<td></td>
</tr>
<tr>
<td>- Prime---has exactly two factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Composite---has more than two factors</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Order Relations

<table>
<thead>
<tr>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Given a set of whole numbers, the student can write them in order from least to greatest and vice versa.</td>
<td>8,9,</td>
<td>74-76</td>
<td>60,61,113,</td>
</tr>
<tr>
<td>- 226-229,</td>
<td>235</td>
<td></td>
<td>133</td>
</tr>
<tr>
<td>9. The student can write the symbols $&lt;$, $&gt;$, $=$, $\neq$ to express the relationship between numbers.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### NUMBER - GRADE FIVE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>$S$</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RATIONAL NUMBERS</strong></td>
<td>10. The student can identify a rational number as one which can be expressed as the ratio of two whole numbers $a/b$ when $b \neq 0$.</td>
<td>220-229</td>
<td>72-76</td>
<td>109,111,113</td>
</tr>
<tr>
<td></td>
<td>11. The student can demonstrate that all whole numbers are also rational numbers. For example:</td>
<td>228,229,</td>
<td>78,79</td>
<td>117,125,126</td>
</tr>
<tr>
<td></td>
<td>$2 = 4/2 = 14/7 = 100/50$, etc.</td>
<td>240,241</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12. Given a situation involving a rational number, the student can identify $a/b$ as a ratio, as a fraction, or as an indicated division.</td>
<td>300</td>
<td>78,79</td>
<td>113</td>
</tr>
<tr>
<td><strong>INTEGERS</strong></td>
<td>13. The student can name the numbers associated with points opposite the points for whole numbers on the number line.</td>
<td>167</td>
<td>184-189</td>
<td></td>
</tr>
</tbody>
</table>
NUMERATION - GRADE FIVE

CONTENT

BEHAVIORAL OBJECTIVES

NAMES FOR NUMBERS
1. The student can identify, name, read, and write many different names for the same number. For example: $6 \, 7/10 = 6 + 7/10 = 6.7 = 67/10 = 2 + 4 + .7 = \text{etc.}$

WHOLE NUMBERS
0 - 999,999,999
2. The student can identify, name, read, and write numerals for whole numbers.

3. Given a numeral such as 467,304, the student can write the words: four hundred sixty-seven thousand, three hundred four.

4. Given a verbal phrase naming a number, the student can write the number words and/or the Arabic numeral.

Place value--nine-digit numerals
5. Given a base ten (decimal) numeral, the student can identify and name the place value for each digit.

6. Given a nine-digit numeral the student can identify and name the period value for each group of three digits. For example:

\[
\begin{array}{ccc}
473 & 201 & 715 \\
\text{millions} & \text{thousands} & \text{ones}
\end{array}
\]

Expanded notation--nine-digit numerals
7. Given a numeral such as 473,231,715, the student can write the expanded numeral in the following way: $473,231,715 = (4 \times 100,000,000) + (7 \times 10,000,000) + (3 \times 1,000,000) + (2 \times 100,000) + (3 \times 10,000) + (1 \times 1,000) + (7 \times 100) + (1 \times 10) + (5 \times 1)$.

8. Given a numeral such as 273,401,715, the student can write the expanded numeral illustrating period (rather than place) value in the following way:

\[
273,401,715 = (273 \times 1,000,000) + (401 \times 1,000) + (715 \times 1).
\]
## NUMERATION - GRADE FIVE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime factorization</td>
<td>9. Given a numeral for a composite number, the student can write a numeral which names the number as the product of prime numbers. For example: $60 = 2 \times 2 \times 3 \times 5$.</td>
<td>169, 170, 172, 173</td>
<td>41-43</td>
<td></td>
</tr>
<tr>
<td>Roman numerals through C</td>
<td>10. Given a numeral such as 104, the student can write the Roman numeral CIV.</td>
<td>14</td>
<td>169</td>
<td>35-37</td>
</tr>
<tr>
<td></td>
<td>11. Given a Roman numeral such as CII, the student can write the Arabic numeral 102.</td>
<td>14</td>
<td>169</td>
<td>35-37</td>
</tr>
<tr>
<td></td>
<td>12. Given the numerals XXX and 333, the student can describe the difference between them by saying: In the Roman numeral the &quot;X&quot; always has the value of ten, but in the decimal numeral the value of the &quot;3&quot; depends upon its place in the numeral. Therefore, $XXX = 10 + 10 + 10$, but $333 = 300 + 30 + 3$.</td>
<td>14</td>
<td>169</td>
<td>35-37</td>
</tr>
<tr>
<td>Non-decimal numeration--base two, four, five</td>
<td>13. Given a set with from 1 to 100 members, the student can group the members and write a base five numeral for the cardinal number of the set.</td>
<td>10-13</td>
<td>179-181</td>
<td>53-58</td>
</tr>
<tr>
<td>RATIONAL NUMBERS</td>
<td>14. The student can identify, name, read, and write fractions for rational numbers.</td>
<td>186-217</td>
<td>70-79</td>
<td>52, 53, 110</td>
</tr>
<tr>
<td>Common fractions a/b</td>
<td>15. Given a fraction such as $\frac{3}{5}$, the student can identify, name, and distinguish the numerator and the denominator.</td>
<td>190, 191</td>
<td>70, 71</td>
<td>111-172</td>
</tr>
<tr>
<td>Equivalent fractions</td>
<td>16. Given a fraction such as $\frac{7}{8}$, the student can write a set of fractions which are equivalent to $\frac{7}{8}$. For example: $\frac{7}{8} = \frac{14}{16} = \frac{21}{24} = \frac{28}{32} = \text{etc.}$</td>
<td>196-205, 210-212, 240-242, 254, 255</td>
<td>137-139, 148-150, 236, 254-256</td>
<td>109-127</td>
</tr>
</tbody>
</table>
### Numeration - Grade Five

#### Behavioral Objectives

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Given a mathematical sentence such as 4/9 = ?/18 = 32/?, the student can name the missing numerator or denominator.</td>
<td>240-242</td>
<td>74</td>
<td>121-124</td>
</tr>
<tr>
<td>19. The student can rename an improper fraction as a mixed numeral and vice versa. For example: 25/7 = 3 4/7 and 16 2/3 = 50/3.</td>
<td>240-242</td>
<td>74,78,79, 135</td>
<td>125,178</td>
</tr>
<tr>
<td>Improper fractions and mixed numerals</td>
<td>20. The student can identify, name, read, and write decimal numerals for rational numbers named with common fractions having denominators of 10, 100, 1000. For example: 7 14/100 = 7.14.</td>
<td>270-274</td>
<td>256</td>
</tr>
<tr>
<td>Decimal fractions—tenths, hundredths, thousandths</td>
<td>21. Given a numeral such as 23.74, the student can write the expanded numeral in the following way: 23.74 = (2 x 10) + (3 x 1) + (7 x 1/10) + (4 x 1/100).</td>
<td>272-273</td>
<td>256</td>
</tr>
<tr>
<td>22. Given a set of numerals such as 1/3, 2 1/2, .23, the student can classify them as common fractions, decimal fractions, or mixed numerals.</td>
<td>241,270,273</td>
<td>254,255</td>
<td>125,142-143</td>
</tr>
<tr>
<td>Other Notation</td>
<td>23. Given a numeral such as 14.36, the student can round it to 10 to the nearest ten, to 14 to the nearest one (whole number), and to 14.4 to the nearest tenth.</td>
<td>74-81, 106-108, 116-118, 126-128</td>
<td>77,98,102, 211,233,239, 288</td>
</tr>
</tbody>
</table>
## WHOLE NUMBERS

### Addition and Subtraction

**Inverse relationship**
1. The student can solve addition or subtraction problems with missing sums, differences, or addends. For example:

   \[ \_ + 4687 = 10,000 \quad \text{and} \quad \_ - 23,459 = 1461 \]

2. The student can check subtraction problems by addition.

**Basic facts**
3. Given any single-digit addition or subtraction combination, the student can immediately name the sum or difference.

**Properties**
4. Given an addition problem with three or more addends, the student can demonstrate how to find the sum in the easiest way by renaming and rearranging the addends.

**Algorithms**
5. The student can solve equations such as \(3905 + \_ = 3905; \quad 5477 - \_ = 5477 + \_; \quad 0 = \_ - 380,357; \) and \(8,777,300 = \_ - 0.\)

### Column addition and subtraction

6. The student can name the sums and differences for problems such as:

   \[
   \begin{align*}
   478,305,077 + 23,989,196 & = 5,000,000,000 \\
   600,703,200 - 5,876,999 & = 594,826,201
   \end{align*}
   \]

### Other notation

7. The student can identify and name sums, differences, missing addends, missing digits, and missing operational signs in problems written in both horizontal and vertical notation.

*immediately* is defined as 5 seconds or less.

### OPERATIONS - GRADE FIVE

<table>
<thead>
<tr>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> The student can solve addition or subtraction problems with missing sums, differences, or addends. For example:</td>
<td>28,30,31, 45,48</td>
<td>79,80</td>
<td></td>
</tr>
<tr>
<td><strong>2.</strong> The student can check subtraction problems by addition.</td>
<td>20-23, 30-31,54, 66-95</td>
<td>78,80, 210, 213</td>
<td></td>
</tr>
<tr>
<td><strong>3.</strong> Given any single-digit addition or subtraction combination, the student can immediately name the sum or difference.</td>
<td>20-23, 30,314</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td><strong>4.</strong> Given an addition problem with three or more addends, the student can demonstrate how to find the sum in the easiest way by renaming and rearranging the addends.</td>
<td>21,29,54, 45,54</td>
<td>14,19, 76,77</td>
<td></td>
</tr>
<tr>
<td><strong>5.</strong> The student can solve equations such as (3905 + _ = 3905; \quad 5477 - _ = 5477 + _; \quad 0 = _ - 380,357; ) and (8,777,300 = _ - 0.)</td>
<td>21,26,67, 86,91,256</td>
<td>28,30, 83</td>
<td></td>
</tr>
<tr>
<td><strong>6.</strong> The student can name the sums and differences for problems such as:</td>
<td>20-23, 30-31, 66-95</td>
<td>18,19, 172, 213</td>
<td></td>
</tr>
<tr>
<td><strong>7.</strong> The student can identify and name sums, differences, missing addends, missing digits, and missing operational signs in problems written in both horizontal and vertical notation. <em>immediately</em> is defined as 5 seconds or less.</td>
<td>20-23, 30-34, 66-91, 314-316, 314-321</td>
<td>14-19, 59-65</td>
<td></td>
</tr>
</tbody>
</table>
OPERATIONS - GRADE FIVE

CONTENT

BEHAVIORAL OBJECTIVES

Multiplication and Division

Inverse relationship

8. Given a multiplication equation such as $5 \times 34 = 170$, the student can write the two related division equations, $170 \div 34 = 5$ and $170 \div 5 = 34$.

9. Given a multiplication problem with a missing factor such as $\underline{\phantom{1}} \times 17 = 391$, the student can write the related division equation, $391 \div 17 = \underline{\phantom{1}}$.

10. The student can check division problems by multiplication.

Basic facts

Through products of 81

11. Given any single-digit multiplication or division combination, the student can immediately* name the product or quotient and use sets or a number line to prove his result.

Properties

Commutative property of multiplication

12. Given a multiplication problem such as $468 \times 1003 = \underline{\phantom{1}}$, the student can select the vertical algorithm which will make the multiplication easiest. For example:

$$\begin{align*}
468 & \quad \text{instead of} \quad 1003 \\
\times 1003 & \quad \times \quad 468
\end{align*}$$

13. The student can check multiplication problems by reversing the order of the factors and multiplying again.

*Immediately is defined as ≤ 5 seconds or less.
OPERATIONS - GRADE FIVE

BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ASC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associative property of multiplication</td>
<td>14. Given a problem such as $67 \times 25 \times 4 = \underline{\quad}$, the student can indicate the grouping of factors which will make the multiplication easiest by enclosing the 25 and 4 in parentheses. For example: $67 \times (25 \times 4) = 6700$.</td>
<td>26 - 27</td>
<td>20-30</td>
<td>87, 89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52 - 53</td>
<td>290</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15. Given a multiplication problem such as $4000 \times 500 = \underline{\quad}$, the student can name the product.</td>
<td>56-59</td>
<td>92-93</td>
</tr>
<tr>
<td>Identity element for multiplication</td>
<td>16. The student can solve equations such as $1 \times 8967 = \underline{\quad}$; $555 \times \underline{\quad} = 555$; $89,453 \div 89,453 = \underline{\quad}$; $349 \div \underline{\quad} = 349$; and $870 \div \underline{\quad} = 870 \times \underline{\quad}$.</td>
<td>26</td>
<td>29, 30</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiplicative property of 0</td>
<td>17. The student can solve equations such as $7320 \times 0 = \underline{\quad}$; $0 = \underline{\quad} \times 4900$; $0 \div 685 = \underline{\quad}$; $0 \times 1 = \underline{\quad}$; and $0 \div 1 = \underline{\quad}$.</td>
<td>96 - 100</td>
<td>20, 95</td>
<td>95, 231, 233, 244</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56-59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>137</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>18. Given a division problem such as $7 \div 0 = \underline{\quad}$, the student can demonstrate that the problem has no solution by using repeated subtraction and/or the inverse relationship.</td>
<td>36, 117,</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REPEATED SUBTRACTION

<table>
<thead>
<tr>
<th>INVERSE RELATIONSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 \div 7 = \underline{\quad}$</td>
</tr>
<tr>
<td>$7 \div 0 = \underline{\quad}$</td>
</tr>
<tr>
<td>- 0 1</td>
</tr>
<tr>
<td>0 7</td>
</tr>
<tr>
<td>- 0 3</td>
</tr>
<tr>
<td>0 7</td>
</tr>
<tr>
<td>- 0 25</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>etc.</td>
</tr>
<tr>
<td>etc.</td>
</tr>
<tr>
<td>etc.</td>
</tr>
</tbody>
</table>

because no number $\times 0 = 7$
### OPERATIONS - GRADE FIVE

#### CONTENT

**Distributive property of multiplication over addition**

19. The student can name the missing numbers in problems such as:

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>26, 27, 52</td>
<td>24-27, 30</td>
<td>88, 89, 96, 97, 232</td>
</tr>
<tr>
<td>53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Algorithms

**Multiplication--vertical notation**

- (four-digit factor by three-digit factor)

20. The student can name the products for problems such as:

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>56-61</td>
<td>173</td>
<td>97, 215, 216, 231-234</td>
</tr>
<tr>
<td>96-100</td>
<td></td>
<td>219, 223,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>231-234</td>
</tr>
</tbody>
</table>

| 9607 | 7956 |
| x 173 | x 798 |

**Long division**

- (five-digit dividend by two-digit divisor)

21. The student can name the quotients and remainders for problems such as:

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-115</td>
<td>100, 101</td>
<td>218, 221,</td>
</tr>
<tr>
<td>117-120</td>
<td>104-106</td>
<td>222, 225-230,</td>
</tr>
<tr>
<td>126-131</td>
<td></td>
<td>237-241</td>
</tr>
<tr>
<td>134-136</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note: See objective # 32 for Grade Three for examples of algorithms.)

**Short division**

- (five-digit dividend by one-digit divisor)

22. The student can use the short algorithm (short division form) to determine and name the quotients and remainders for problems such as:

<table>
<thead>
<tr>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>134-136</td>
<td>48-54</td>
<td>221, 222</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| 9 ) 4203 | 5 ) 37,416 | |</p>
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>A3C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other notation</td>
<td>23. The student can identify and name products, quotients, missing factors, and missing operational signs in problems written in both horizontal and vertical notation.</td>
<td>34,35,37, 32-39, 56,59-63, 46-55, 71,96-98, 100,112,113, 116-120,126-131,134-137</td>
<td>108</td>
<td>87-104, 108</td>
</tr>
<tr>
<td>Other Operations</td>
<td>24. Given a set of numbers such as 98, 75, 83, 100, and 79, the student can name the average (arithmetic mean) of the numbers.</td>
<td>110,111, 108-111, 143,325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Averaging</td>
<td>25. Given a set of numbers such as 8, 12, 20, and 32, the student can name the greatest common factor of the numbers.</td>
<td>176,177, 148-150, 123,124, 207,212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greatest common factor (greatest common divisor)</td>
<td>26. Given a set of numbers such as 8, 12, 20, and 32, the student can name the least common multiple of the numbers.</td>
<td>178,179, 140-146, 136-139, 254,255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least common multiple (least common denominator)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATIONAL NUMBERS</td>
<td>27. Given a model (region or number line) for the addition or subtraction of rational numbers, the student can determine and name the sum or difference.</td>
<td>254-258, 145-147, 127-135, 266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Addition and Subtraction</td>
<td>28. The student can solve equations such as:</td>
<td>258,260, 82,83, 134,135</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition (fractions with like and unlike denominators)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inverse relationship</td>
<td>3/4 + ____ = 7/8, 2 2/3 - ____ = 5/6, ____ + 3/5 = 1 2/7, ____ - 3/4 = 1 1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## OPERATIONS - GRADE FIVE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>A(^3)C</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. The student can check subtraction problems by addition.</td>
<td>82, 83, 134, 135</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Properties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commutative property of addition</td>
<td>258, 259, 133, 134</td>
<td>290</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2 + ____ = 1/3 + 1/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8 + ____ = ____ + 3/8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associative property of addition</td>
<td>258, 259, 128</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1/2 + 1/3) + 2/5 = 1/2 + (____ + 2/5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. The student can solve equations such as:</td>
<td>258, 259, 134, 135</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. The student can solve equations such as:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1/2 + 1/3) + 2/5 = 1/2 + (____ + 2/5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. Given an addition problem with three addends, the student can indicate the grouping of addends which will make the addition easiest by inserting parentheses. For example:</td>
<td>258, 259, 134, 135, 139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14/33 + (21/35 + 14/35) = 1 14/33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identity element for addition</td>
<td>258</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2 + 0/8 = ____</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/7 - ____ = 0; 0/7 + 0/10 = ____; and ____ - 0/2 = 7/15.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. The student can solve equations such as 1/2 + 0/8 = ____;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. The student can name the sums and differences (as fractions in lowest terms and/or as mixed numerals) for problems such as:</td>
<td>81, 82, 238, 77 - 86, 127-130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/11 + 3.11 = ____</td>
<td>251, 256, 137 - 139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/12 - 5/12 = ____</td>
<td>257, 259, 140 - 152</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algorithms</td>
<td>264</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction notation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like denominators</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Operations - Grade Five

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlike denominators (renaming with common denominator)</td>
</tr>
<tr>
<td>Mixed numerals (renaming and regrouping)</td>
</tr>
<tr>
<td>Decimal notation (including money)</td>
</tr>
</tbody>
</table>

### Behavioral Objectives

35. The student can name the sums and differences (as fractions in lowest terms and/or as mixed numerals) for problems such as:

\[
\frac{3}{7} + \frac{9}{9} + \frac{13}{18} = \quad \frac{5}{9} - \frac{1}{4} =
\]

36. The student can name the sums and differences (as fractions in lowest terms and/or as mixed numerals) for problems such as:

\[
7 \frac{1}{4} = 7 \frac{3}{12} \quad 7 \frac{1}{4} = 7 \frac{3}{12} = 6 \frac{15}{12}
\]

\[
+ \frac{4}{2}/3 = 4 \frac{8}{12} \quad - \frac{4}{2}/3 = 4 \frac{8}{12} = 4 \frac{8}{12}
\]

\[
11 \frac{11}{12} \quad 2 \frac{7}{12}
\]

37. The student can name the sums and differences for problems such as:

\[
5.26 + 39.1 + 0.832 =
\]

\[
78.02 - 13.741 =
\]

38. Given a model (region or number line) for the multiplication of two rational numbers, the student can determine and name the product. For example:

\[
\frac{1}{2} \times \frac{1}{4} = \quad 3 \times \frac{1}{4} =
\]

### Table

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlike denominators (renaming with common denominator)</td>
<td></td>
<td>254-256</td>
<td>236 - 245</td>
<td>131-135, 142, 143</td>
</tr>
<tr>
<td>Mixed numerals (renaming and regrouping)</td>
<td></td>
<td>258-261</td>
<td>239-242</td>
<td>131-135, 139-141</td>
</tr>
<tr>
<td>Decimal notation (including money)</td>
<td></td>
<td>274-278, 282</td>
<td>110, 111, 142 - 147</td>
<td>257-261</td>
</tr>
<tr>
<td>Multiplication and Division</td>
<td></td>
<td>286-289</td>
<td>87</td>
<td>171 - 184</td>
</tr>
</tbody>
</table>
OPERATIONS - GRADE FIVE

CONTENT

BEHAVIORAL OBJECTIVES

Definition of division 39. Given a division equation such as $\frac{5}{12} \div \frac{1}{4} = \_\_\_$, the student can write and solve the related multiplication equation, $\_\_\_ \times \frac{1}{4} = \frac{5}{12}$. 294-295 89, 185-190, 249-251 192-193, 197

Algorithms 40. The student can name the products (as fractions in lowest terms) for problems such as $\frac{3}{4} \times \frac{2}{5} = \_\_\_$. 138-139 261 102, 215, 216, 229

Fraction notation 41. The student can name the products and quotients for problems such as:

$\frac{2.53}{x 27}$ 45 $\frac{41.85}{27}$
GEOMETRY - GRADE FIVE

CONTENT

GEOMETRIC FIGURES

Plane figures
(as sets of points)
Point
Path (curve)
Line \( \overline{AB} \)
Line segment \( \overline{AB} \)
Ray \( \overrightarrow{AB} \)
Angle (vertex) \( \angle ABC \)
Right angle
Polygon (vertices)
Triangle \( \triangle ABC \)
Right triangle
Quadrilateral \( \square ABCD \)
Parallelogram
Square
Rectangle
Rhombus
Pentagon
Hexagon
Octagon

Circle
Center
Radius
Diameter
Chord
Circumference

BEHAVIORAL OBJECTIVES

AW  S  ABC

1. The student can describe a plane geometric figure as a set of points. For example:

A circle is the set of all points in a plane a fixed distance from a given point.

An angle is the set of all points contained in the union of two rays with a common endpoint.

146–147  10–12, 1–7

56–57

2. Given models of the plane geometric figures named on the left (wire, paper or flannel cutouts, pencil or chalk outlines, etc.), the student can identify, name, and distinguish among them.

146–163  56–68, 3–8, 14, 15, 18–20, 22–25, 28

266–275

3. The student can read and write standard notation for the plane figures named on the left. For example:

\( \angle ZAP \)

\( \overline{HO} \)

(Note: See illustration of notation beside names on the left.)

146–153  56, 58  8
GEOMETRY - GRADE FIVE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space figures</td>
<td>4. Given models of the space figures named on the left (wood or plastic solids, paper models, sketches, etc.), the student can identify, name, and distinguish among them.</td>
</tr>
<tr>
<td>Plane</td>
<td>162-163 154-166 161-167</td>
</tr>
<tr>
<td>Prism</td>
<td></td>
</tr>
<tr>
<td>Sphere</td>
<td>5. The student can sketch, describe, and give examples of parallel lines. For example: Parallel lines are lines in the same plane that never intersect. The opposite edges of the table are parallel.</td>
</tr>
<tr>
<td>Hemisphere</td>
<td>73 270 14-15</td>
</tr>
<tr>
<td>Cylinder</td>
<td>6. The student can sketch, describe, and give examples of intersecting lines. For example: Intersecting lines are lines that have one point in common. Maryland Parkway intersects Desert Inn Road. The cross hairs on my rifle sight intersect.</td>
</tr>
<tr>
<td>Cone</td>
<td>152-155, 160-161</td>
</tr>
<tr>
<td>Pyramid</td>
<td>7. The student can sketch, describe, and give examples of perpendicular lines. For example: Perpendicular lines are intersecting lines that form right angles. The top edge and side edge of the window are perpendicular to each other.</td>
</tr>
<tr>
<td>Perimeter</td>
<td>268-272 18,158</td>
</tr>
<tr>
<td>PROPERTIES</td>
<td>8. Using a ruler, string, paper cutouts, etc., the student can demonstrate how to determine the perimeter of a given simple closed curve.</td>
</tr>
<tr>
<td>Parallel lines</td>
<td>Examples:</td>
</tr>
<tr>
<td>Intersecting lines</td>
<td></td>
</tr>
<tr>
<td>Perpendicular lines</td>
<td></td>
</tr>
<tr>
<td>Perimeter</td>
<td></td>
</tr>
</tbody>
</table>
**GEOMETRY - GRADE FIVE**

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
</tr>
</thead>
</table>
| 9. The student can state and apply a rule for determining the perimeter of any polygon. For example: The perimeter of a polygon is equal to the sum of the lengths of its sides. | 50-51  
129,273  
26 |
| Area | 10. Using a grid of square units (regions), the student can demonstrate how to determine the area of a given simple closed curve. | 101,  
72-73,  
84-85 |
| | 11. The student can state and apply a rule for determining the area of any parallelogram. For example: The area of a parallelogram is equal to the length of the base multiplied by (the length of) the altitude. | 72-73  
129  
29,  
162-165 |
| Volume | 12. Given a hollow right rectangular prism, the student can count (estimate if necessary) the number of unit cubes needed to fill the interior space. | 144-145  
163 |
| Congruence | 13. Given a pair of line segments, angles, triangles, or other polygons, the student can identify the pairs as congruent or not congruent by matching the figures in some manner (trace and overlay, cutouts, etc.). | 130 - 151  
154, 155  
158 |
| 9 - 14  
1  
23 - 23 |
| CONSTRUCTIONS | 14. Using a straightedge, the student can construct models for lines, line segments, rays, angles, and polygons and label them. | 50,51,  
150,160,  
161 |
| 57-59  
20,22,23,  
23 |
GEOMETRY - GRADE FIVE

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line segment</td>
<td>Using a straightedge and compass, the student can construct a plane figure congruent to a given line segment, angle, or triangle. For example:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triangle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line segment bisector</td>
<td>Using a straightedge and compass, the student can bisect (separate into two congruent figures) a given line segment and a given angle. For example:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle bisector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circle</td>
<td>Using a compass, the student can construct a circle with a given center and radius (or diameter).</td>
<td>151, 156-157, 160-161, 186</td>
<td>57, 62-68, 266-277, 65</td>
<td>12, 17, 158-160</td>
</tr>
</tbody>
</table>
## MEASUREMENT - GRADE FIVE

### CONCEPTS OF MEASUREMENT

#### Process of measuring
1. Given a measurable physical property such as length, area, weight, temperature, etc., the student can select a suitable unit and/or measuring device and measure the property. For example:

   Time can be measured by using a(n) ________.

#### Arbitrary selection of unit
2. The student can name at least two units suitable for naming the measure of a given physical property. For example:

   The room temperature can be expressed in degrees Fahrenheit or Centigrade.

#### Approximate nature of measurement
3. The student can demonstrate his understanding of the approximate nature of measurement by stating the precision of the measure. For example:

   The volume of a bottle is 1½ ounces correct to the nearest ounce.

### MEASUREMENT OF PHYSICAL PROPERTIES

#### Length
4. The student can use various measuring devices (ruler, yardstick, meter stick) to measure length in whole and fractional parts of units.
MEASUREMENT - GRADE FIVE

CONTENT

PERIMETER
5. Given the measures of the sides of a polygon, the student can compute the perimeter. (Note: See objective # 9 for GEOMETRY - GRADE FIVE.)

AREA - square units
6. Using paper figures and scissors, the student can demonstrate that the areas of a parallelogram and a rectangle having the same base and altitude measures are equal.

VOLUME - cubic units
8. Given a sketch of a right rectangular space figure, the student can determine and name the volume of the figure by counting the number of volume units (cubes) needed to fill the space. (Note: See objective # 12 for GEOMETRY - GRADE FIVE.)

LIQUID MEASURE
9. The student can name the standard English units of liquid measure and measure the capacity of a given container to the nearest whole unit.

TIME
10. Given that the time is 9:00 A.M. in Las Vegas, the student can name the time in Denver, Chicago, and New York.
### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Content</th>
<th>Objective</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. The student can name the century for a given date. For example: 1492 was in the 15th century.</td>
<td></td>
<td>117</td>
</tr>
<tr>
<td>Weight Ounce, pound, ton Grom</td>
<td>12. Using a scale, the student can measure the weight of a given object in whole and fractional parts of units.</td>
<td>120</td>
</tr>
<tr>
<td>Temperature Fahrenheit degrees Centigrade degrees</td>
<td>13. Using a thermometer calibrated in either Fahrenheit or Centigrade degrees, the student can read the temperature to the nearest degree and name the freezing and boiling points of water.</td>
<td>253 118</td>
</tr>
<tr>
<td>Angle Degree</td>
<td>14. Using a protractor, the student can measure an angle to the nearest degree.</td>
<td>218-219 118</td>
</tr>
</tbody>
</table>

### RENAMING MEASURES

<table>
<thead>
<tr>
<th>Comparison of units Conversion of units</th>
<th>15. The student can express the relationships between units of measure appropriate to the grade level and can rename a measure in other units. For example: 248 hours = 10 days, 8 hours = 1 week, 3 days, 8 hours. If 1 inch = 2.54 centimeters, then 7 inches = ____ centimeters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>236-237</td>
<td>114-117, 119-122, 123-126</td>
</tr>
</tbody>
</table>
### COMPUTATIONS WITH MEASURES

16. The student can compute with measures appropriate to the grade level, assign the proper unit to the result, and rename if necessary. For example:

\[
\begin{align*}
2 \text{ ft.} &\quad 5 \text{ in.} \\
\times &\quad 6 \\
\hline
12 \text{ ft.} &\quad 30 \text{ in.} = 14 \text{ ft.} 6 \text{ in.} = 14 \frac{1}{2} \text{ ft.} = 4 \text{ yd.} 2 \text{ ft.} 6 \text{ in.}
\end{align*}
\]
### NUMBER - GRADE SIX

#### CONTENT

#### BEHAVIORAL OBJECTIVES

**SETS**

1. Given a list of finite and infinite sets, the student can identify those which are finite (the set of students in the 6th grade) and those which are infinite (the set of counting numbers).

**WHOLE NUMBERS 0 - infinity**

2. The student can determine the cardinal number of a given set.

3. Given a number, the student can identify the numbers which precede and follow it.

4. The student can identify and name odd and even numbers.

5. Given a number greater than 1000, the student can verbalize his notion of the quantity involved. For example: "A million dollars is having a thousand dollars in each of a thousand banks!"

**Prime and composite numbers**

6. Given a set of whole numbers, the student can classify them as prime or composite.

**Order relations**

7. The student can express a composite number as the product of prime numbers. For example: \(28 = 2 \times 2 \times 7\).

8. Given a set of whole numbers, the student can write them in order from least to greatest and vice versa.

9. The student can write the symbols \(<, >, =, \neq\) to express the relationship between numbers.
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RATIONAL NUMBERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio</td>
<td>10. The student can write the ratio of three pennies to four nickels as 3:20 and/or 3/20, and given the symbol 4/9, the student can express it in words as &quot;the ratio of 4 to 9.&quot;</td>
<td>218-221, 223, 225</td>
<td>28, 122, 263</td>
<td>158-159, 267-275, 289</td>
</tr>
<tr>
<td>Indicated division</td>
<td>11. Given a numeral such as 25/4, the student demonstrates his understanding of the symbol as an indicated division by renaming it as 6 1/4 and as 6.25.</td>
<td>232, 254, 260</td>
<td>30, 117</td>
<td>213-214</td>
</tr>
<tr>
<td>Order relations</td>
<td>12. Given a set of rational numbers such as 1/8, .33 ..., 2/3, 1/4, .5, 7/4, 5/6, .75, and 4/3, the student can arrange them in order from least to greatest and vice versa.</td>
<td>50, 111, 113, 115, 179</td>
<td>28, 30, 33, 35, 38, 75, 114-115, 121, 123, 192</td>
<td>25-26, 29, 109, 160-161, 257-258, 260, 300-301</td>
</tr>
<tr>
<td><strong>INTEGERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directed numbers</td>
<td>13. Given the numbers +3, -3, +4, -2, 0, the student can graph them on the number line.</td>
<td>284-287, 295</td>
<td>88-89</td>
<td>308-310</td>
</tr>
<tr>
<td><strong>IRRATIONAL NUMBERS</strong></td>
<td>14. Asked to define (\pi), the student states that it is approximately equal to 22/7 or 3.14 rounded to the nearest hundredth.</td>
<td>283</td>
<td>253</td>
<td>94-95</td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AW</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------</td>
<td>----</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td>NAMES FOR NUMBERS</td>
<td>1. The student can identify, name, read, and write many different names for the same number. For example: $8 = 8/1 = 32/4 = 8.00 = 2^3 = \text{VIII} = 13$, etc.</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHOLE NUMBERS</td>
<td>2. The student can identify, name, read, and write numerals for whole numbers.</td>
<td>6-7,260</td>
<td>120</td>
<td>1-2,19,109</td>
</tr>
<tr>
<td></td>
<td>3. Given a fifteen-digit numeral, the student can read it and write it in words.</td>
<td>120</td>
<td>18-19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Given a verbal phrase naming a number, the student can write the number word's and/or the Arabic numeral.</td>
<td>6</td>
<td>120</td>
<td>3-4,19,109</td>
</tr>
<tr>
<td>Place value--fifteen-digit numerals</td>
<td>5. Given a base ten (decimal) numeral, the student can identify and name the period value for each group of three digits and the place value for each digit.</td>
<td>1-7,19</td>
<td>120-121</td>
<td>3-6</td>
</tr>
<tr>
<td>Expanded notation</td>
<td>6. Given a numeral such as 473,245, the student can write the expanded numeral in the following way: $473,245 = (4 \times 100,000) + (7 \times 10,000) + (3 \times 1000) + (2 \times 100) + (4 \times 10) + (5 \times 1)$.</td>
<td>12</td>
<td>153,225</td>
<td>5-7,15-17,54,285</td>
</tr>
<tr>
<td></td>
<td>7. Given a numeral such as 81,437, the student can write the expanded numeral using exponential notation. For example: $81,437 = (8 \times 10^4) + (1 \times 10^3) + (4 \times 10^2) + (3 \times 10^1) + (7 \times 10^0)$.</td>
<td>10-12,56</td>
<td>225</td>
<td>15-17,105,109</td>
</tr>
<tr>
<td>Prime factorization</td>
<td>8. Given a numeral for a composite number, the student can write a numeral which names the number as the product of prime numbers. For example: $60 = 2 \times 2 \times 3 \times 5$.</td>
<td>80</td>
<td>329</td>
<td>179-180,225</td>
</tr>
</tbody>
</table>
### NUMERATION - GRADE SIX

#### CONTENT

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Objective</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roman numerals through M</td>
<td>9. Given a numeral such as 1,151, the student can write the Roman numeral MCLI.</td>
<td>232</td>
<td>28,148</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Given a Roman numeral such as MCCXLV, the student can write the Arabic numeral: 1,245.</td>
<td>232</td>
<td>28,148</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Given the numerals XXX and 333, the student can describe the difference between them by saying: In the Roman numeral the &quot;X&quot; always has the value of ten, but in the decimal numeral the value of the &quot;3&quot; depends upon its place in the numeral. Therefore, XXX = 10 + 10 + 10, but 333 = 300 + 30 + 3.</td>
<td>36</td>
<td>28,36,109, 148,193,343</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12. Given the numeral CDLX, the student can write the numeral (500 - 100) + 50 + 10.</td>
<td>36</td>
<td>28,36,109, 148,193,343</td>
<td></td>
</tr>
<tr>
<td>Non-decimal numeration--base two, four, five</td>
<td>13. Given a set with from 1 to 100 members, the student can group the members and write a base five numeral for the cardinal number of the set.</td>
<td>14-19</td>
<td>228-229</td>
<td>7-11</td>
</tr>
<tr>
<td>RATIONAL NUMBERS</td>
<td>14. Given a numeral such as 10110two, the student can write the expanded numeral in the following way: 10110two = (1 x 2^4) + (0 x 2^3) + (1 x 2^2) + (0 x 2^1) + (1 x 2^0).</td>
<td>14-19</td>
<td>228-230</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common fractions a/b</td>
<td>15. Given a model of five-sevenths, the student can identify, name, read, and write a numeral (fraction) for the rational number associated with the model.</td>
<td>102-103</td>
<td>28-30</td>
<td>158-161</td>
</tr>
<tr>
<td></td>
<td>16. Given a fraction such as 7/3, the student can identify, name, and distinguish the numerator and the denominator.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equivalent fractions</td>
<td>17. Given a fraction such as 7/8, the student can write a set of fractions which are equivalent to 7/8.</td>
<td>104-110</td>
<td>29,34-38, 160-161,163, 165-166, 170-172,225</td>
<td></td>
</tr>
</tbody>
</table>
**NUMERATION - GRADE SIX**

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. The student can rename a given fraction in simplest form. For example: 12/32 = 3/8.</td>
<td>104-110</td>
<td>29,34-38,40</td>
<td>75,77</td>
<td>160-161,163</td>
</tr>
<tr>
<td>19. Given a mathematical sentence such as 4/9 = 2/18 = 32/?, the student can name the missing numerator or denominator.</td>
<td>104-106, 115,258</td>
<td>29,34-38, 40-41,75, 77,122</td>
<td>160-163, 165-170,172,225</td>
<td></td>
</tr>
<tr>
<td>20. Given a set of fractions such as 3/4, 3/5, 6/8, 18/24, 18/30, 6/10, 75/100, 15/25, 60/100, the student can identify and name the fractions which are equivalent.</td>
<td>104-106, 115,258</td>
<td>29,34-38, 40-41,75, 77,122</td>
<td>160-163, 165-170,172,225</td>
<td></td>
</tr>
<tr>
<td>Improper fractions and mixed numerals 21. Given a model such as , the student can identify, name, read, and write the fraction 7/4 and/or the mixed numeral 1 3/4 for the rational number associated with the model.</td>
<td>112,115,128, 138-139,143, 165</td>
<td>29-30, 71-72,139</td>
<td>159-163, 165</td>
<td></td>
</tr>
<tr>
<td>22. The student can rename an improper fraction as a mixed numeral and vice versa. For example: 25/7 = 3 4/7 and 16 2/3 = 50/3.</td>
<td>228-233</td>
<td>114-116</td>
<td>20-21,34,172-173,165</td>
<td></td>
</tr>
<tr>
<td>Decimal fractions—tenths, hundredths, thousandths, ten thousandths, hundred thousandths 23. The student can identify, name, read, and write decimal numerals for rational numbers named with common fractions having denominators of 10,100,1000. For example: 7 14/100 = 7.14.</td>
<td>228-233</td>
<td>114-116</td>
<td>20-21,34,172-173,165</td>
<td></td>
</tr>
<tr>
<td>24. Given a numeral such as 23.74, the student can write the expanded numeral in the following way: 23.74 = ( 2 x 10 ) + ( 3 x 1 ) + ( 7 x 1/10 ) + ( 4 x 1/100 ).</td>
<td>229,240,260</td>
<td>120,192</td>
<td>21-23,34,164, 204-205</td>
<td></td>
</tr>
<tr>
<td>25. Given a numeral such as 2,474.6305, the student can read it and write it in words.</td>
<td>229,240,260</td>
<td>120,192</td>
<td>21-23,34,164, 204-205</td>
<td></td>
</tr>
</tbody>
</table>
## Numeration - Grade Six

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>26. Given a numeral such as .17856, the student can write the expanded numeral in the following way: .17856 = 1/10 + 7/100 + 8/1000 + 5/10,000 + 6/100,000.</td>
<td>230–231, 240</td>
<td>116–117, 120, 122</td>
<td>20–22, 34, 188, 202–203, 206</td>
<td></td>
</tr>
<tr>
<td>27. Given numerals such as .33... and .5, the student can distinguish between repeating and terminating decimal fractions.</td>
<td>255</td>
<td>243, 252</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. The student can demonstrate that the common fraction 2/3 is a repeating decimal fraction.</td>
<td>255</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent notation</td>
<td>29. The student can rename numerals such as 47% as .47 and/or 47/100.</td>
<td>264–269, 280</td>
<td>123–124, 208–209</td>
<td>23–24, 109, 165, 173, 191, 246, 250–251, 266, 281, 343</td>
</tr>
<tr>
<td></td>
<td>30. Given a set of numerals such as 3/4, .64, 3 2/3, 26%, the student can classify them as common fractions, decimal fractions, mixed numerals, or percents.</td>
<td>268–269, 280</td>
<td>122–124, 208–209</td>
<td>23–24, 36, 109, 188, 243–246, 266, 289, 341</td>
</tr>
<tr>
<td>Integers</td>
<td>31. Given a numeral such as -8, the student can name it as negative eight or the opposite of eight.</td>
<td>284–287, 295</td>
<td>88–89</td>
<td>308–310</td>
</tr>
<tr>
<td>Irrational Numbers</td>
<td>32. The student can read and write the symbol ( \sqrt{2} ).</td>
<td>282–283</td>
<td>253</td>
<td>94–95</td>
</tr>
<tr>
<td>Other Notation</td>
<td>33. Given a numeral such as 3, 628, 765, the student can round it to the nearest hundredth, tenth, one, ten, hundred, and thousand.</td>
<td>8–9, 241, 248</td>
<td>204, 226</td>
<td>210–211, 225</td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AW</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Exponential notation</td>
<td>34. The student can write expanded numerals using exponential notation (see objectives # 7 and 14).</td>
<td>10-12</td>
<td>222-223</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>35. Given a numeral such as $3^5$, the student can rename it as $(3 \times 3 \times 3 \times 3 \times 3)$ or 243.</td>
<td>19,56,96</td>
<td>65,222-223</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>36. Given the numerals $2^3$ and $(2 \times 3)$, the student can distinguish between them and state that they do not name the same number!</td>
<td>65,223</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific notation</td>
<td>37. The student can rename a given numeral using scientific notation. For example, $93,000,000 = 9.3 \times 10^7$ and $34,589 = 3.4589 \times 10^4$.</td>
<td>13,257</td>
<td>225,227</td>
<td></td>
</tr>
</tbody>
</table>
WHOLE NUMBERS

 Addition and Subtraction (Review and maintain concepts and skills.)

Inverse relationship
1. The student can solve addition or subtraction problems with missing sums, differences, or addends. For example:

   \[ \_ + 45,987 = 6,000,001 \] and \[ \_ - 500,800 = 1,333,708 \]

2. The student can check subtraction problems by addition.

Basic facts
Through sums of 18
3. Given any single-digit addition or subtraction combination, the student can \textit{immediately} name the sum or difference.

Properties
Commutative and associative properties of addition
4. Given an addition problem with three or more addends, the student can demonstrate how to find the sum in the easiest way by renaming and rearranging the addends.

Identity element for addition
5. The student can solve equations such as 3905 + \_ = 3905; 5477 - 5477 + \_; 0 = \_ - 380,357; and 8,777,300 = \_ - 0.

Algorithms
Column addition and subtraction
6. Given any "reasonable" addition or subtraction problem, the student can name the sum or difference.

Other notation
7. The student can identify and name sums, differences, missing addends, missing digits, and missing operational signs in problems written in both horizontal and vertical notation.

\* Immediately is defined as 1 second or less.
OPERATIONS - GRADE SIX

BEHAVIORAL OBJECTIVES

Multiplication and Division (Review and maintain concepts and skills.)

Inverse relationship

8. The student can solve multiplication or division problems with missing products, quotients, or factors. For example:

   ___ x 317 = 1,595,144   and   ___ ÷ 23 = 11,776

9. The student can check division problems by multiplication (without remainder) or by multiplication and addition (with remainder). (Note: See objective # 18.)

Basic facts

Through products of 81

10. Given any single-digit multiplication or division combination, the student can immediately* name the product or quotient.

Properties

Commutative and associative properties of multiplication

11. Given a multiplication problem with two or more factors, the student can demonstrate how to find the product in the easiest way by rearranging the factors. For example:

   4 x 359 x 25 = (4 x 25) x 359
   = 100 x 359
   = 35,900

12. The student can check multiplication problems by reversing the order of the factors and multiplying again.

Identity element for multiplication

13. The student can solve equations such as 1 x 8967 = ___;

   555 x ___ = 555;  89,453 ÷ 89,453 = ____;  349 ÷ ____ = 349;

   and 870 ÷ ____ = 870 x ____.

* Immediately: it is defined as 5 seconds or less.
OPERATIONS - GRADE SIX

CONTENT

BEHAVIORAL OBJECTIVES

Multiplicative property 14. The student can solve equations such as 7320 x 0 = ___; of 0
0 = ___ x 4900; 0 ÷ 685 = ___; 0 x 1 = ___; and
0 ÷ 1 = ___.

15. Given a division problem such as 15 ÷ 0 = ____, the student can
demonstrate that the problem has no solution by using repeated
subtraction and/or the inverse relationship.

REPEATED SUBTRACTION

<table>
<thead>
<tr>
<th>0</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0</td>
<td>1</td>
</tr>
<tr>
<td>-15</td>
<td>3</td>
</tr>
<tr>
<td>-0</td>
<td>25</td>
</tr>
</tbody>
</table>
| -15 | etc.
| etc. | etc.
| etc. | etc.

INVERSE RELATIONSHIP

15 ÷ 0 = no number

because no number x 0 = 15

Distributive property 16. Given a problem such as 53 x 624 = ____, the student
can demonstrate his understanding of the distributive
principle by multiplying in expanded horizontal form.

For example:

53 x 624 = (50 + 3) x 624
= (50 x 624) + (3 x 624)
= 31,200 + 1872
= 33,072
OPERATIONS - GRADE SIX

BEHAVIORAL OBJECTIVES

17. Given any "reasonable" multiplication problem, the student can name the product.

18. Given any "reasonable" division problem, the student can name the quotient in both of the following ways:

\[
\begin{array}{c}
29 \div 11 \\
23 \div 678 \\
46 \\
218 \\
207 \\
11
\end{array}
\]

\[
\begin{array}{c}
29 \\
23 \div 678 \\
46 \\
218 \\
207 \\
11
\end{array}
\]

Check: \((23 \times 29) + 11 = 678\)

19. Given any "reasonable" division problem with a single-digit divisor, the student can use the short algorithm (short division form) to name the quotient and remainder.

20. The student can identify and name products, quotients, missing factors, missing digits, and missing operational signs in problems written in both horizontal and vertical notation.

Other Operations

Averaging

21. Given a set of numbers such as 98, 75, 83, 100, and 79, the student can name the average (arithmetic mean) of the numbers.

AW: 33, 51-53, 62, 96, 184, 238, 311
S: 18, 55, 87, 29, 65
ABC: 113, 151, 242
60-65, 70-73, 82, 96, 224, 238, 313
154-157, 152, 159, 265, 326
124, 130-133, 165, 191, 141, 145

66-67, 96, 314
OPERATIONS - GRADE SIX

CONTENT

BEHAVIORAL OBJECTIVES

Greatest common factor
(greatest common divisor) 22. Given a set of numbers such as 28, 56, 70, and 126, the student can name the greatest common factor of the numbers.

Least common multiple
(least common denominator) 23. Given a set of numbers such as 12, 15, 35, and 36, the student can name the least common multiple of the numbers.

Exponentiation 24. Given a problem such as $5^3 = \_\_\_\_$, the student can identify and name the base, exponent, and power. For example:

$$5^3 = 125$$

5 is the base,
3 is the exponent,
125 is the third power of 5.

RATIONAL NUMBERS

Addition and Subtraction

Definition
(fractions with like and unlike denominators) 25. Given an addition or subtraction problem such as $2/3 + 3/4 = \_\_\_\_$ or $2 \frac{5}{6} - 1 \frac{1}{2} = \_\_\_\_$, the student can demonstrate how to find the sum or difference by using a region or number line model.

Inverse relationship 26. The student can solve equations such as:

$$3/4 + \_\_\_\_ = 7/8$$

$$2\frac{2}{3} - \_\_\_\_ = 5/6$$

$$\_\_\_\_ + 3/5 = 1 \frac{2}{7}$$

$$\_\_\_\_ - 3/4 = 1 \frac{1}{2}$$
OPERATIONS - GRADE SIX

BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Properties</th>
<th>Behavioral Objectives</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commutative and associative properties of addition</td>
<td>27. Given an addition problem with three or more addends, the student can demonstrate how to find the sum in the easiest way by renaming and rearranging the addends. For example: 7/8 + 2/3 + 5/8 + 1 5/6 = (7/8 + 5/8) + (4/6 + 1 5/6) = 1 1/2 - 1 - 1 1/2 = 4</td>
<td>126, 130</td>
<td>134, 142, 150-151</td>
<td></td>
</tr>
<tr>
<td>Identity element for addition (0 = 0/1 = 0/2 = 0/3...)</td>
<td>28. The student can solve subtraction problems by addition.</td>
<td>318</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. The student can solve equations such as 1/2 + 0/8 = ...; 4/7 - ____ = 0; 0/7 + 0/10 = ...; and ____ - 0/2 = 7/15.</td>
<td>118-121, 124-125, 128-132, 142-143, 152, 165</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. The student can name the sums and differences (as fractions in lowest terms and/or as mixed numerals) for problems such as: 3/7 + 8/9 + 13/18 = ____</td>
<td>131, 165, 181, 186, 190, 192, 167, 190, 229, 260, 285, 281, 314, 329</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/9 - 1/4 = ____</td>
<td>49, 82, 234, 294, 314, 321</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed numerals</td>
<td>31. The student can name the sums and differences (as fractions in lowest terms and/or as mixed numerals) for problems such as:</td>
<td>131, 165, 181, 186, 190, 192, 167, 190, 229, 260, 285, 281, 314, 329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decimal notation (including money)</td>
<td>32. Given any &quot;reasonable&quot; addition or subtraction problem, the student can name the sum or difference.</td>
<td>49, 82, 234, 294, 314, 321</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algorithms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraction notation</td>
<td>118, 133, 134, 142, 150-151</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like and unlike denominators</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONTENT

MULTIPLICATION AND DIVISION

BEHAVIORAL OBJECTIVES

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

33. Given multiplication problems such as \( \frac{2}{3} \times \frac{3}{4} = \) ____, and \( 4 \times \frac{3}{8} = \) ____, the student can demonstrate how to find the products by using regions or a number line.

For example:

\[
\begin{array}{|c|c|}
\hline
\text{3/4} & \text{2/3 of 3/4 = 6/12 = 1.2} \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{0} & \text{1} & \text{2} \\
\hline
\end{array}
\]

\[4 \times \frac{3}{8} = 12 \text{ or } 1 \frac{1}{2}\]

34. Given a division equation such as \( 12 \div \frac{4}{7} = \) ____, the student can write and solve the related multiplication equation, ____, \( \times \frac{4}{7} = 12 \frac{1}{2} \).
35. Given a model (region or number line) for the division of two rational numbers, the student can determine and name the quotient. For example:

\[ \frac{2}{3} \div \frac{1}{2} = \_ \_ \_ \_ \]

Think! \_ \_ \_ \_ \times \frac{1}{2} = \frac{2}{3}

Look at the model!

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

Inverse relationship

36. The student can solve equations such as:

\[ \frac{1}{3} \times \_ \_ \_ = \frac{2}{15} \]

\[ \frac{2}{7} \div \_ \_ \_ = \frac{3}{4} \]

\[ \_ \_ \_ \times \frac{3}{8} = \frac{5}{9} \]

\[ \_ \_ \_ \div \frac{1}{5} = \frac{4}{11} \]
### OPERATIONS - GRADE SIX

#### CONTENT

**Properties**
- Commutative and associative properties of multiplication

1/2 x 3/4 = 3/4 x __

(1/2 x 3/4) x 4/7 = 1/2 x (3/4 x ___)

**Identity element for multiplication**

1 = 1/1 = 2/2 = 3/3...

5/5 x 3/7 = ___

5/6 ÷ 13/13 = ___

3/4 x ___ = 3/4

2/3 ÷ ___ = 1

**BEHAVIORAL OBJECTIVES**

<table>
<thead>
<tr>
<th>#</th>
<th>Objective</th>
<th>A</th>
<th>V</th>
<th>S</th>
<th>A: C</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>The student can solve equations such as:</td>
<td>150-151, 155-154</td>
<td>187</td>
<td>305</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Given a multiplication problem with two or more factors, the student can demonstrate how to find the product in the easiest way by rearranging the factors. For example:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>The student can solve equations such as:</td>
<td>150</td>
<td>211-213</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>The student can demonstrate how to rename a given fraction such as 2/3 by multiplying by some name for the identity element. For example:</td>
<td>165, 287</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2/3 x 2/2 = 4/6

2/3 x 3/3 = 6/9

2/3 x 4/4 = 8/12
Multiplicative inverses 41. Given a set of rational numbers such as \( \frac{2}{3}, 4, \frac{7}{4}, 1, \) and 0, the student can name their multiplicative inverses (reciprocals) and demonstrate that the product of any rational number and its reciprocal is 1. For example:

\[
\begin{align*}
\frac{2}{3} \times \frac{3}{2} &= 1 \\
4 \times \frac{1}{4} &= 1 \\
\frac{7}{4} \times \frac{4}{7} &= 1 \\
1 \times \_ \_ &= 1 \\
0 \times \_ \_ &= 0 \text{ has no reciprocal.}
\end{align*}
\]

42. The student can solve equations such as:

\[
\begin{align*}
\frac{2}{3} x &= 0/5 \\
0 \div 2/3 &= \_
\end{align*}
\]

\[
\begin{align*}
\frac{4}{5} \times 0/13 \times 9/17 &= \\
\frac{4}{5} \times 0 &= 0
\end{align*}
\]

43. The student can demonstrate that \( 0/0 \) does not name a unique rational number. For example:

\[
\begin{align*}
0 \div 0 &= 0 \text{ since } 0 \times 0 &= 0 \\
0 \div 0 &= 3 \text{ since } 3 \times 0 &= 0 \\
0 \div 0 &= 17/35 \text{ since } 17/35 \times 0 &= 0
\end{align*}
\]

Distributive property 44. Given a problem such as \( 5 \frac{1}{2} \times 3 = \_ \_ \), the student can demonstrate his understanding of the distributive principle by multiplying in horizontal form. For example:

\[
\begin{align*}
5 \frac{1}{2} \times 3 &= (5 + \frac{1}{2}) \times 3 = (5 \times 3) + (\frac{1}{2} \times 3) \\
&= 15 + \frac{3}{2} \\
&= 16 \frac{1}{2}
\end{align*}
\]
OPERATIONS - GRADE SIX

BEHAVIORAL OBJECTIVES

AW S ABC

Algorithms
Fraction notation

Multiplication

45. The student can name the products (as fractions in lowest terms) for problems such as $\frac{14}{15} \times \frac{12}{35} = \frac{8}{25}$ and $\frac{7}{5} \times \frac{15}{18} \times \frac{10}{21} = \frac{82}{178} \times \frac{84}{180}$ and use the reducing shortcut where appropriate (see objective # 38 for justification). For example:

\[
\frac{4}{5} \times \frac{4}{5} = \frac{8}{25}
\]

46. The student can name the products (as fractions in lowest terms and/or as mixed numerals) for problems such as $\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}$ and $\frac{7}{2} \times \frac{3}{5} = \frac{15}{21}$ by renaming as improper fractions and/or by applying the distributive principle.

\[
\frac{3}{5} \times \frac{4}{7} = \frac{12}{35}
\]

Division

47. The student can name the quotients (as fractions in lowest terms and/or as mixed numerals) for problems such as $3 \div 7 = \frac{3}{7} \div \frac{7}{8} = \frac{24}{35}$.

For example:

\[
\frac{3}{5} \div \frac{7}{8} = \frac{3}{5} \times \frac{8}{7} = \frac{24}{35}
\]
OPERATIONS - GRADE SIX

CONTENT

BEHAVIORAL OBJECTIVES

48. The student can name the quotients (as fractions in lowest terms and/or as mixed numerals) for problems such as 3 1/2 ÷ 4/7 = _____ and 7 2/3 ÷ 5 1/8 = _____ by renaming as improper fractions and dividing.

ABC

49. The student can name the products and quotients for problems such as:

\[
\begin{align*}
21.07 & \quad 25 \div 43.75 \\
\times 8.4 &
\end{align*}
\]

(Note: In division problems, use only whole number divisors.)

50. The student can name the products, quotients, and missing factors for problems such as:

\[
\begin{align*}
\text{25 % of 160} & = _____ \\
\text{56} \times ____ \% & = 7
\end{align*}
\]

INTEGERS

Addition and Subtraction

Definition of addition 51. Given a number line model for the addition of two integers, the student can determine and name the sum. For example:

\[
\begin{align*}
\text{6} + \text{8} & = _____
\end{align*}
\]
### OPERATIONS - GRADE SIX

#### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>52.</strong> Given an addition problem such as $-5 + 13 = _____$, the student can name the sum and demonstrate how to find the sum by using a number line.</td>
</tr>
</tbody>
</table>

#### Definition of subtraction

<table>
<thead>
<tr>
<th><strong>53.</strong> Given a subtraction equation such as $2 - 3 = _____$, the student can write and solve the related addition equation, $_____ + ____ = _____$. For example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2 - 3 = _____$</td>
</tr>
<tr>
<td>$1 + 3 = _____$</td>
</tr>
</tbody>
</table>

![Number Line Diagram]

-3 -2 -1 0 1 2 3
GEOMETRY - GRADE SIX

CONTENT

GEOMETRIC FIGURES

Plane figures (as sets of points)
- Point
- Path (curve)
  - A pentagon is the set of points in a simple closed curve composed of the union of five line segments.
- Line segment $\overline{AB}$
- Ray $\overrightarrow{AB}$

Angle (vertex) $\angle ABC$
- Right angle

Polygon (vertices)
- Triangle $\triangle ABC$
  - Right triangle
- Quadrilateral $\square ABCD$
  - Parallelogram
  - Square
  - Rectangle
  - Rhombus
- Pentagon
- Hexagon
- Octagon

Circle
- Center $O$
- Radii $\overline{OB}$ and $\overline{OP}$
- Diameter $\overline{PQ}$
- Chord $\overline{OZ}$
- Arc $\overarc{PQ}$
- Circumference

BEHAVIORAL OBJECTIVES

| 1. The student can describe a given plane figure as a set of points. For example: |
| Plane figures (as sets of points) |
| A pentagon is the set of points in a simple closed curve composed of the union of five line segments. |

188-189, 10, 73-75, 111

| 2. Given models of the plane figures named on the left |
| Triangle $\triangle ABC$ |
| Quadrilateral $\square ABCD$ |
| Parallelogram |
| Square |
| Rectangle |
| Rhombus |
| Pentagon |
| Hexagon |
| Octagon |

192-193, 45, 50, 75, 80, 306-307, 112, 151

| 3. The student can read and write standard notation for the plane figures named on the left. |
| Note: See illustration of notation beside names on the left. |

192, 206-207, 213, 42, 78
GEOMETRY - GRADE SIX

CONTENT

Space figures (as sets of points)
Point
Plane
Polyhedron
Prism
Pyramid
Sphere
Hemisphere
Cylinder
Cone

BEHAVIORAL OBJECTIVES

4. The student can draw and name a set of points satisfying given conditions. For example:
   The set of all points in space one inch from a given line is a(n) (cylinder).

5. The student can describe a given space figure as a set of points. For example:
   A sphere is the set of points one inch from a given point in space.

6. Given models of the space figures named on the left (wood or plastic solids, paper models, sketches, etc.), the student can identify, name, and distinguish among them.

7. Given a set of space figures, the student can identify and name the various parts of each as plane figures. For example:
   The lateral surfaces (faces) of a right rectangular prism are rectangles.
   The bases of a cylinder are circles.

8. The student can sketch, describe, and give examples of parallel, intersecting, and perpendicular lines. (Note: See objectives # 5, # 6, # 7, for Grade Five for examples.)

PROPERTIES

Parallel lines
Intersecting lines
Perpendicular lines

AW S ABC

188-189, 104-108, 98
209-210, 296-300, 212
212 330-331

190-191, 44 1
208

210,213 98

296 100

199,202- 126 79,81,85
205,207, 111
213
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter</td>
<td>9. The student can state and apply a rule for determining the perimeter of any polygon. For example: The perimeter of a polygon is equal to the sum of the lengths of its sides.</td>
<td>20-21,96</td>
<td>39</td>
<td>88-89,97, 112,190, 317,346</td>
</tr>
<tr>
<td></td>
<td>10. Given a circle (with a whole number diameter) and using a ruler, string, cutouts, etc., the student can determine the ratio of the circumference (perimeter) to the diameter.</td>
<td>20</td>
<td>254</td>
<td>94-96, 227-228</td>
</tr>
<tr>
<td></td>
<td></td>
<td>282-283</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>11. The student can state and apply a rule for determining the area of any parallelogram. For example: The area of a parallelogram is equal to the length of the base multiplied by (the length of) the altitude.</td>
<td>42-43,96, 126</td>
<td>100</td>
<td>90-92,97, 112,229, 317,346</td>
</tr>
<tr>
<td></td>
<td>12. The student can demonstrate that the area of a given triangle is equal to one-half of the length of the base multiplied by (the length of) the altitude. For example:</td>
<td>216-217</td>
<td>255-258</td>
<td>93-94, 112</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>13. Using unit cubes, the student can demonstrate how to determine the volume of a given right rectangular prism.</td>
<td>64-85, 96,126</td>
<td>104-107</td>
<td>102-103</td>
</tr>
<tr>
<td></td>
<td>14. The student can state and apply a rule for determining the volume of any right rectangular prism. For example: The volume of a right rectangular prism is equal to the area of the base multiplied by the altitude.</td>
<td>84</td>
<td>104-105</td>
<td>101, 103-104, 112,234</td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AW</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------</td>
<td>-----</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Congruence</td>
<td>15. Given a pair of line segments, angles, triangles, or other polygons, the student can identify the pairs as congruent or not congruent by matching the figures in some manner (trace and overlay, cutouts, etc.).</td>
<td>194-196, 197,213</td>
<td>43,47</td>
<td>77-78,79, 151,194</td>
</tr>
<tr>
<td></td>
<td>16. The student can use the symbol ( \equiv ) to express the relationship between congruent figures.</td>
<td>194-197</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17. The student can distinguish between equal and congruent figures.</td>
<td>195, 204-205, 213</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For example: ( \angle ABC = \angle YBX )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( \angle ABC \equiv \angle ZIP )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18. Given two congruent triangles, the student can name the pairs of congruent line segments and the pairs of congruent angles.</td>
<td>197</td>
<td>81-83</td>
<td></td>
</tr>
<tr>
<td>Symmetry</td>
<td>19. The student can draw lines of symmetry for given plane figures— if they exist. For example:</td>
<td>301-312, 322-323</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 lines</td>
<td>4 lines</td>
<td>No lines</td>
<td></td>
</tr>
</tbody>
</table>
GEOMETRY - GRADE SIX

CONSTRUCTIONS

Copy:
Line segment
Angle
Triangle

20. Using a straightedge and compass, the student can construct a plane figure congruent to a given line segment, angle, or triangle.
(Note: See objective # 15 for Grade Five for example.)

21. Using a straightedge and compass, the student can construct the bisector of a given angle.

22. Using a straightedge and compass, the student can construct the perpendicular bisector of a given line segment.
(Note: See objective # 16 for Grade Five for example.)

23. Given a line and a point of the line, the student can construct a line perpendicular to the given line at the given point.

24. Given a line and a point not on the line, the student can construct a line perpendicular to the given line through the given point.

25. Given a line and a point not on the line, the student can construct a line parallel to the given line through the given point.

26. Using a compass, the student can construct a circle with a given center and radius (or diameter).
## MEASUREMENT - GRADE SIX

### CONTENT

### BEHAVIORAL OBJECTIVES

<table>
<thead>
<tr>
<th>Process of measuring</th>
<th>Behavioral Objective</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Given a measurable physical property such as length, area, weight, temperature, etc., the student can select a suitable unit and/or measuring device and measure the property. For example:</td>
<td>An angle can be measured by using a(n) _________.</td>
<td>187,329</td>
<td>109,251</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What is an appropriate unit when discussing the weight of diamonds? ________ of coal? ________ of a human being? ________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arbitrary selection of unit</td>
<td>2. The student can name at least two units suitable for naming the measure of a given physical property. For example:</td>
<td>Speed can be expressed in miles per hour or in feet per second.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximate nature of measurement</td>
<td>3. The student can demonstrate his understanding of the approximate nature of measurement by stating the precision of the measure. For example:</td>
<td>The circumference of the earth at the equator is 25,000 miles correct to the nearest thousand miles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The thickness of a piece of paper is .003 inches correct to the nearest thousandth of an inch.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Given that the measure of a line segment is 3 1/2 inches correct to the nearest half inch, the student can state that the actual length is between 3 1/4 and 3 3/4 inches.

3 1/4 in. < actual length < 3 3/4 in.

MEASUREMENT OF PHYSICAL PROPERTIES

Length

5. The student can use various measuring devices (ruler, yardstick, meter stick, tape) to measure length in whole and fractional parts of units.

6. Given the measures of the sides of a polygon, the student can compute the perimeter.

(Note: See objective #9 for GEOMETRY - GRADE SIX.)

Perimeter

7. Given the measure of the diameter or radius of a circle, the student can compute the circumference (perimeter).

(Note: See objective #10 for GEOMETRY - GRADE SIX.)

Circumference

8. Using paper figures and scissors, the student can demonstrate that the area of a triangle is equal to one-half of the area of a parallelogram having the same base and altitude measures.

(Note: See objective #12 for GEOMETRY - GRADE SIX.)

Area—square units related to units of length (acre)

Rectangle
Parallelogram
Triangle
Circle
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>BEHAVIORAL OBJECTIVES</th>
<th>AW</th>
<th>S</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume—cubic units related to units of length</td>
<td>9. Given the measures of the base and altitude of a rectangle, parallelogram, or triangle, the student can compute the area. (Note: See objective #11 for GEOMETRY - GRADE SIX.)</td>
<td>42-43,96,126, 216-217,226-227,238-239,</td>
<td>100-104,247-248, 256-259,264,280, 229,315,317,</td>
<td>90-94,97,112, 278, 346</td>
</tr>
<tr>
<td></td>
<td>10. Given the measure of the diameter or radius of a circle, the student can compute the area.</td>
<td>297</td>
<td>260</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>11. The student can compute the surface area of space figures whose faces are rectangles, parallelograms, or triangles.</td>
<td>96,126,307</td>
<td></td>
<td>98,101,112,229, 317</td>
</tr>
<tr>
<td></td>
<td>12. Given the measures of the edges of a right rectangular prism, the student can compute the volume. (Note: See objective #14 for GEOMETRY - GRADE SIX.)</td>
<td>84-85,96,126</td>
<td>104-108,280,322</td>
<td>101-104,112,264</td>
</tr>
<tr>
<td></td>
<td>13. The student can name the common standard units of liquid measure and measure the capacity of a given container to the nearest whole unit.</td>
<td>262-263</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14. Given that a man was born in 19 B.C. and died in 42 A.D., the student can compute the age of the man.</td>
<td></td>
<td></td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>15. Given that a football game begins at 1:00 P.M. Eastern Standard Time, the student can name the time at which to watch it live on television in Las Vegas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONTENT</td>
<td>BEHAVIORAL OBJECTIVES</td>
<td>AW</td>
<td>S</td>
<td>ABC</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------</td>
<td>----</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>16. Using a thermometer calibrated in either Fahrenheit or Centigrade degrees, the student can read the temperature to the nearest degree.</td>
<td>59</td>
<td>252</td>
<td></td>
</tr>
<tr>
<td><strong>Angle</strong></td>
<td>17. Using a protractor, the student can measure an angle to the nearest degree.</td>
<td>100-101, 116-117, 224</td>
<td>48-49</td>
<td></td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>18. The student can read a speedometer.</td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot/second</td>
<td>19. Given a distance and the time necessary for a car to travel the distance, the student can compute the average speed of the car.</td>
<td>78, 215, 218</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RENAMEING MEASURES**

<table>
<thead>
<tr>
<th>Comparison of units</th>
<th>20. The student can express the relationships between units of measure appropriate to the grade level and can rename a measure in other units. For example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cubic foot = ____ cubic inches.</td>
<td></td>
</tr>
<tr>
<td>If 1 gram = .035 ounce, then 1000 grams = ____ ounces = approximately ____ pounds.</td>
<td></td>
</tr>
<tr>
<td>45° F = ____ ° C Note: C° = 5/9 (F° - 32)</td>
<td></td>
</tr>
</tbody>
</table>
MEASUREMENT - GRADE SIX

CONTENT

BEHAVIORAL OBJECTIVES

AW  S  ASC

COMPUTATIONS WITH MEASURES

21. The student can compute with measures appropriate to the grade level, assign the proper unit to the result, and rename if necessary. For example:

\[
\frac{\text{miles per hour}}{8 \text{ hours}} = \frac{2880 \text{ miles}}{107-110,163}
\]