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Introduction

Mathematics 7 is built on the thesis that most children can learn, understand, and master mathematical concepts. It seeks to relate math to everyday life and to make it practical. We believe that mathematics should help students achieve the ultimate goal of loving, serving, and glorifying God.

Mathematics 7 introduces concepts in incremental steps, allowing the student to master each increment of a skill before advancing to the next step. Each increment easily becomes a part of the student's "big picture," not only because it is small, but also because it fits with what he has already learned.

Mathematics 7 uses a system of continuous review of each concept. Students retain what they have learned by consistent, systematic review. Instead of a grand review at the end of the year, a large part of every day's work is review. The goal is mastery, not just exposure.

UNIT 1

Contents

Lesson 1	2	Lesson 9	24
Number Properties; Identifying and Plotting Points on a Grid		Finding Prime Factors	
Lesson 2	5	Lesson 10	27
Simplifying Expressions; Adding and Subtracting Fractions		Quiz 2	
Lesson 3	8	Lesson 11	28
Identifying Parts of a Solid; Combining Integers		Solving and Checking Equations	
Lesson 4	11	Lesson 12	31
Dividing Whole Numbers		Simplifying Expressions by Substituting Variables With Numbers; Dividing Fractions	
Lesson 5	14	Lesson 13	34
Quiz 1		Converting Percents Greater Than 100%; Naming, Measuring, and Classifying Angles	
Lesson 6	15	Lesson 14	37
Understanding Exponents; Multiplying Fractions		Simplifying Expressions by Combining Like Terms; The Distributive and Associative Properties	
Lesson 7	18	Lesson 15	40
Converting From Ratios to Decimals, Percents, or Fractions		Identifying Quadrilaterals	
Lesson 8	21	Lesson 16	43
Solving Word Problems		Test 1	



Materials

Student

- **Mathematics 7 Textbook**
- **Student Packet**
 - Worksheets
 - Speed/Mastery Drills
 - Quizzes
 - Tests

Teacher

- **Mathematics 7 Teacher's Guide**
 - Resource CD
- **Full Solution Answer Key**

Student Materials

Textbook

Mathematics 7 is a non-consumable text, designed to be reused year after year. Students write their answers on separate paper. For teacher ease in grading, set up a form for students to follow. Show them in the first math class of the year how you expect them to arrange and number their papers. Tell them whether you want their work to be done in spiral notebooks or on notebook paper. *Appendix C* page 480 contains suggestions and samples for ways to have students set up their work pages.

Mathematics 7 is divided into 10 units with 16 lessons each. Lessons 1-4, 6-9, and 11-15 are daily lessons. Lessons 5 and 10 are quiz lessons, and Lesson 16 is the test lesson.

UNIT 2



Lesson 146
Dividing Decimals; Identifying
Parts of a Circle

Lesson 249
Dividing to Solve Equations;
Finding a Percent of a Number
and Computing Sales Tax

Lesson 352
Formulas for the Area of Polygons;
Converting Fractions to Decimals

Lesson 455
Making a Tally Chart

Lesson 558
Quiz 1

Lesson 659
Repeating Decimal Quotients;
Formula for Perimeter and Volume

Lesson 762
Using Prime Factors to Find
Greatest Common Factor;
Converting Mixed Number
Percents to Decimals

Lesson 865
Formula for the Circumference
of a Circle; Using Proportions
to Convert U.S. Measures

Lesson 968
Dividing to Solve Two-
Step Equations

Lesson 1071
Quiz 2

Lesson 1172
Finding the Area of Irregular Shapes

Lesson 1275
Subtracting Integers

Lesson 1378
Classifying Triangles by
Angles and Sides

Lesson 1481
Multiplying to Solve Equations

Lesson 1584
Using Proportions to Solve
Percent Problems

Lesson 1687
Test 2



Teaching Boxes

Daily lessons begin with at least one framed and colored teaching box that introduces and explains one or more mathematical concepts. A few lesson exercises follow each teaching box to reinforce the new material.

Applying Your Skills

The *Applying Your Skills* section systematically reviews concepts taught in earlier lessons. The first exercises review material taught the previous day. The final exercises review the concepts taught in this lesson. The other exercises review concepts taught earlier in the textbook.

20. Below each bold black p. 6 exercise number is at least one small gray *reference number*. The reference number indicates the textbook page where the concept reviewed in this exercise was taught.

Sharpening Your Skills

Math skills must be continually sharpened. The *Sharpening Your Skills* section in each lesson hones those skills day by day. These exercises include *Computation* and *Fact Focus* sections. These exercises do not have reference numbers.

Computation

Addition, subtraction, multiplication, and division problems appear in this section. Students copy and work the problems. Using calculators is not recommended but is left to the teacher's discretion. Instructions in gray give specific direction for dividing, rounding quotients, and writing remainders. These instructions refer only to computation exercises.

Unit Themes

The introduction to each unit features a different theme relating to math in the work world.

Unit 1—*Mathematics in the Work World*

Unit 2—*Mathematics in Building Contracting*

Unit 3—*Mathematics at Sunnyburn Children's Home*

Unit 4—*Mathematics in Metal Manufacturing*

Unit 5—*Mathematics in Family Life*

Unit 6—*Mathematics in Accounting*

Unit 7—*Mathematics in Nursing*

Unit 8—*Mathematics in Teaching*

Unit 9—*Mathematics in Forestry*

Unit 10—*Mathematics in Dairy Farming*

Fact Focus

Some lessons include reviews of simple facts that students should be able to recall instantly. Students write only the answers without copying the problem. *Fact Focus* includes geometric formulas, measurement equivalents, fractions, decimals, percent equivalents, squares, and square roots.

Quiz or Unit Test

After a concept has been reviewed for five lessons, it may appear on any quiz or test.

Fascinating Patterns

Quiz and test lessons include optional enrichment activities to expose students to new concepts. *Fascinating Patterns* activities are neither reviewed nor tested.

Textbook Graphics


Applying Your Skills

Applying Your Skills—The daily review section continuously reviews skills and concepts.

Informative *nuggets* in the lessons often relate to the unit theme. These photographs with their accompanying tidbits of information may generate additional discussion and/or research. Measurements in nuggets are often rounded to whole units such as inches, feet, yards, miles, meters, and kilometers.

Sharpening Your Skills

Sharpening Your Skills—Computation and Fact Focus

 A calculator icon indicates that students may use a calculator for those exercises.

UNIT 3

VOLUNTEERS NEEDED

Lesson 190	Lesson 9 112
Formula for the Area of a Circle	Using a Proportion to Convert Between Miles and Kilometers
Lesson 293	Lesson 10 115
Multiplying Expressions That Include Variables	Quiz 2
Lesson 396	Lesson 11 116
Calculating Discount and Sale Prices	Formula for the Area of a Trapezoid
Lesson 499	Lesson 12 119
Building Bar Graphs	Rounding Mixed Numbers to the Nearest Whole Number
Lesson 5 102	Lesson 13 122
Quiz 1	Equations, Inequalities, and Variables
Lesson 6 103	Lesson 14 125
Finding the Missing Dimension for the Area and the Perimeter of a Rectangle	Dividing Mixed Measures
Lesson 7 106	Lesson 15 128
Solving Equations With Fractional Solutions; Adding, Subtracting, and Multiplying Mixed Units of Measure	Converting Fractional Percents to Decimals
Lesson 8 109	Lesson 16 131
Finding Commission	Test 3



Glossary, Reference Charts, Index

The *Glossary*, *Reference Charts*, and *Index* are tools that help students work more independently. The *Glossary* defines terms used throughout the course. The page number indicates where the term is defined or where the concept is shown in an example. When new terms are used in textbook lessons, they are in **bold** print. The *Reference Charts* provide definitions, diagrams, equivalent measures, geometry formulas, and abbreviations. The *Index* contains topics under various headings and the page numbers where they can be found.

UNIT 4



Lesson 1 134
Measuring Angles of a Triangle

Lesson 2 137
Multiplying to Solve
Two-Step Equations

Lesson 3 140
Solving Percent Word Problems
With Remainders; Decimal and
Percent Equivalents for Eighths

Lesson 4 143
Building Pictographs

Lesson 5 146
Quiz 1

Lesson 6 147
Identifying Congruent
and Similar Figures

Lesson 7 150
Solving Inequalities

Lesson 8 153
Simplifying Expressions
and Solving Equations

Lesson 9 156
Using Proportions to Convert
Between Gallons and Liters

Lesson 10 159
Quiz 2

Lesson 11 160
Graphing Information Accurately

Lesson 12 163
Graphing Solutions ($=$, $<$, $>$)

Lesson 13 166
Using Fractional Equivalents of
Percents in Word Problems

Lesson 14 169
Constructing Congruent
Line Segments

Lesson 15 172
Finding Missing Angle
Measurements in Triangles

Lesson 16 175
Test 4



Speed/Mastery Drills

Speed Drills drill addition, subtraction, multiplication, and division facts and squares and square roots. Unit 1 has 13 Speed Drills. Quiz and Test lessons have no drills.

Mastery Drills review measurement equivalents, geometry facts, formulas, fractions, decimals, percent equivalents, metric prefixes, the percent proportion, squares, and square roots. Units 2-10 each have 13 Mastery Drills. Quiz and Test lessons have no drills.

Distribute drills at the beginning of each math class. Speed Drills—students complete as many facts as possible in one minute. Mastery Drills—students complete without being timed. Until they master the information, they may look up answers on the *Math Reference Charts* in *Appendix A* pages 449-452.

Quizzes and Tests

Quizzes and tests are designed for the student to

write on. Each quiz is on one two-sided sheet. Each test is on a larger folded sheet with a cover and three working pages. Distribute quizzes in Lessons 5 and 10 and tests in Lesson 16 of each unit. Separate, collate, and file the quizzes by quiz and the tests by test number or store them in the booklet and separate as needed.

Student Packet

The *Student Packet* contains worksheets, Speed/Mastery Drills, quizzes, and tests used throughout the course. These pages are designed for the student to write on. Separate the pages from the packet and file them for easy retrieval when needed, or store them as packets and separate when needed.

Worksheets

Worksheets contain charts, grids for plotting and naming points, geometry exercises, and lines and figures for construction exercises.

Teacher Materials

Teacher's Guide

The goal of *Mathematics 7 Teacher's Guide* is to enable teachers of all levels of experience to successfully teach this course. This *Teacher's Guide* includes replicas of each student page with answers, complete lesson plans for each lesson, additional resources in the Appendixes, and a *Resource CD* with posters and practice sheets for teaching the lessons.

Discussion Points

Each unit begins with a list of questions and/or suggestions teachers may use to generate discussion about the unit theme on the next page. Use and/or adapt as time and interest allows.

Reflect—Units 2-10

Before beginning each unit, you may take some time to reflect on the material in the previous unit. Use this list of questions or come up with your own.

Assess

At the beginning of a unit is a good time to assess students' math skills. Use this list of items to check student progress. Add your own as needed.

Research Challenge

Research Challenge contains a list of nugget titles in the unit and the page number where each is located. Students who finish early and need an extra challenge may use information from any of the nuggets to generate ideas for further research.

UNIT 5



Lesson 1 178
Combining Numbers and Words
to Express Large Numbers

Lesson 2 181
Formula for the Volume
of a Triangular Prism

Lesson 3 184
Order of Operations With
Exponents and Square Roots

Lesson 4 187
Building Line Graphs

Lesson 5 190
Quiz 1

Lesson 6 191
Identifying Reflex Angles

Lesson 7 194
Using Exponents to List
Prime Factors

Lesson 8 197
Calculating Depreciation

Lesson 9 200
Using Proportions to Convert
Between Pounds and Kilograms

Lesson 10 203
Quiz 2

Lesson 11 204
Calculating Unit Price
to the Nearest Cent

Lesson 12 207
Graphing Solutions (\geq , \leq)

Lesson 13 210
Calculating the Amount of
Increase or Decrease

Lesson 14 213
Formula for the Volume
of a Cylinder

Lesson 15 216
Simplifying Complex Fractions

Lesson 16 219
Test 5



Unit Material, Terms, and Symbols

The concepts taught in the unit are categorized by addition, subtraction, geometry, measures, word problems, etc.

In the sidebar are terms, symbols, or formulas used in the unit. Use these lists as reference, to preview the unit, or to review at the end of the unit.

Student Page

A replica of the textbook page appears on each corresponding *Teacher's Guide* page. Answers are red. Where answers do not fit on the page, a note tells the appendix page where the answer is given. Solutions are shown in detail in the *Full Solution Answer Key*.

UNIT 6



Lesson 1 222
Constructing Congruent Angles

Lesson 2 225
Multiplying Numbers When
the Signs Are Different

Lesson 3 228
The Cost of Installment Buying

Lesson 4 231
Reading Circle Graphs and
Calculating Sector Percents

Lesson 5 234
Quiz 1

Lesson 6 235
Finding Any Missing Dimension

Lesson 7 238
Multiplying Numbers When
the Signs Are the Same

Lesson 8 241
Rules for Exponents of 1 and 0

Lesson 9 244
Using a Proportion to Convert
Between Inches and Centimeters

Lesson 10 247
Quiz 2

Lesson 11 248
Using Proportions to Solve
Fraction Questions

Lesson 12 251
Identifying Complementary
and Supplementary Angles

Lesson 13 254
Dividing Negative Numbers

Lesson 14 257
Multiplying Variables
With Exponents

Lesson 15 260
Using the Formula to Find Distance

Lesson 16 263
Test 6



Decide if students will trade drills for grading, grade their own, or hand them in for teacher grading. Drill exercises and answers are in the *Teacher's Guide* in the sidebar of the final page of each lesson. If a student is not doing well on drills, use an alternate method to achieve mastery. See *Teacher's Guide Appendix B* page 473. Students who need extra practice may be assigned to work the drill at another time—possibly as homework.

► Review

Each lesson contains a short review of concepts taught in the previous lesson.

Answers are **rust**. Review briefly before teaching the lesson.


► Teach

This is a list of the new concept(s) taught in the lesson.

► Assign

This is a list of the sections of student exercises in daily lessons or the quiz or test to be administered in the quiz and test lessons.

Materials Needed

Check here for a list of any materials needed for the day's lesson. The Speed/Mastery Drill listed is the same as the lesson number. Worksheets are at the top of the Student Packet. Posters and practice sheets are on the *Resource CD* and are indicated in this list by a CD icon  and a poster or practice sheet number.

Lesson Overview

► Speed/Mastery Drill

Distribute the drills. For Speed Drills, give students one minute to complete as many facts as possible. Mastery Drills do not need to be timed. If students do not know a Mastery Drill answer, they may look it up on the *Math Reference Charts*.

Teaching the Lesson

► Daily Lessons

Refer to the colored teaching box and to this section for teaching each part of the lesson. Text in this section is intended to enhance and further explain the lesson without merely repeating material from the textbook. Familiarize yourself with both the teaching box and *Teaching the Lesson*. In the *Teacher's Guide* new terms are **bold italic**. Board exercises are provided, and the answers are **rust**. Write board exercises on the board before class or as the lesson is taught. Work the examples as directed and call on students to work the remaining examples.

► Quiz and Test Lessons

Use the exercises in the *Review* section to prepare students for problems they have not yet encountered on a quiz or test. Review any concepts students struggled with in the lesson just prior to the quiz or test.

Administer the quiz or test. Have students clear their desks except for pencils, erasers, and any other needed tools (protractor, calculator, etc.). Distribute the quiz or test and give students time to complete it. Solutions and answers are **red** on the student page in the *Teacher's Guide*.

Fascinating Patterns on the student page is an optional activity and may be worked individually or as a class. This is intended to be enjoyed by students after they finish the quiz or test before class time is over.

Assign Class Work

► Lesson Alert

Exercises that may need special attention are noted here. Extra lines provide a place for additional alerts.

► Assign the lesson exercises

Assign the exercises following the teaching box(es) after teaching the lesson and before *Applying Your Skills*. These exercises may also be worked together in class.

► Assign *Applying Your Skills* and *Sharpening Your Skills*

After teaching the lesson and completing the accompanying lesson exercises, assign *Applying Your Skills* and *Sharpening Your Skills*. Students should be able to complete these exercises independently. Any exercises not completed in class time should be completed before the next day's class.

Decide whether your students must do every exercise. If

UNIT 7



Lesson 1	266	Lesson 9	288
Bisecting an Angle		Using a Proportion to Convert Between Yards and Meters	
Lesson 2	269	Lesson 10	291
Translating Words to Numbers and Symbols		Quiz 2	
Lesson 3	272	Lesson 11	292
Combining Like Terms to Simplify and Solve Equations		Finding the Surface Area of a Prism	
Lesson 4	275	Lesson 12	295
Calculating Degrees for Circle Graph Sectors		Interest on Savings and Loans	
Lesson 5	278	Lesson 13	298
Quiz 1		Using the Distributive Property to Simplify and Solve Equations	
Lesson 6	279	Lesson 14	301
Identifying Polyhedra and Their Nets		Calculating the Percent of Increase and Decrease	
Lesson 7	282	Lesson 15	304
Choosing Equations for Word Problems		Writing Negative Exponents as Decimals	
Lesson 8	285	Lesson 16	307
Finding Mean, Median, and Mode		Test 7	



multiple problems review the same operation, you may allow students to work one problem. If a student works that problem correctly, he may skip the others.

Extra Practice

The *Extra Practice* list provides additional examples to review the concept(s) taught in the lesson. Answers are **rust**.

Fascinating Patterns

A *Fascinating Patterns* activity appears in each quiz and test lesson. Any additional explanation or discussion relating to the *Fascinating Patterns* activity in this lesson is included here.

UNIT 8



Lesson 1	310
Bisecting a Line Segment	
Lesson 2	313
Symbols for Sets	
Lesson 3	316
Calculating Interest for Months	
Lesson 4	319
Histograms	
Lesson 5	322
Quiz 1	
Lesson 6	323
Using the Distance Formula to Find Rate and Time; Finding the Range of a Set of Data	
Lesson 7	326
Venn Diagrams for Universal Sets, Sets, and Subsets	
Lesson 8	329
Dividing Variables With Exponents	

Lesson 9	332
Converting Between Teaspoons and Milliliters	
Lesson 10	335
Quiz 2	
Lesson 11	336
Finding Complements, Supplements, and Opposites	
Lesson 12	339
Points on a Coordinate Plane	
Lesson 13	342
Using Powers of Ten to Expand Numbers	
Lesson 14	345
Converting Bible Measures of Length	
Lesson 15	348
Using Prime Factorization to Find the LCM	
Lesson 16	351
Test 8	



Speed/Mastery Drill

The sidebar on the third page of each lesson contains a list of all the exercises and answers from that lesson's Speed/Mastery Drill.

Teaching Tips

Teaching Tip
Additional teaching tips are scattered throughout the *Teacher's Guide* on yellow sticky notes. Use these tips as you see fit.

Additional teaching tips are scattered throughout

the *Teacher's Guide* on yellow sticky notes. Use these tips as you see fit—if they help and if time allows.

Appendixes A-D

Appendix A consists of the textbook glossary, reference charts, and index.

Appendix B has games, activities, strategies, and skills to supplement the *Teacher's Guide*.

Appendix C contains student answers that do not fit on the student pages in the *Teacher's Guide* and samples of student work page setups. *Appendix D* supplies a list of the material on the *Resource CD*, and a list of teaching resources (books, manipulatives, and websites).

Student Helps

Student Helps in the sidebars include tips, explanations, shortcuts, practice, games, etc. that may help students better understand the material taught in the lesson.

► Thinking It Through, or Digging Deeper

This section provides additional information related to the lesson. It may be another way to think about the concept or solve the exercises.

► Practical Problems

This section gives examples of ways the concept may be put into practice outside the classroom.

Resource CD

The *Resource CD* is inside the back cover of the *Teacher's Guide*. It contains posters and practice sheets for use in teaching and reviewing daily lessons. Print and file the posters and practice sheets ahead of time or print them as needed for each student. Laminate the posters to make them sturdier and reusable for write on/wipe off activities.

The first page on the CD lists the contents with interactive links. Click on the poster name or number to be taken directly to that poster. The *Teacher's Guide Appendix D* pages 503-504 contains a list of the materials on the CD.

Full Solution Answer Key —

The *Full Solution Answer Key* provides answers to all Mathematics 7 exercises and, where applicable, detailed solutions. Final answers are black. Where answers have solutions, the exercise copied from the textbook is teal, and the solution is gray.

Grading

Daily Lessons

Answers are **red** on the *Teacher's Guide* student page. Answers that do not fit can be found in *Appendix C* pages 481-502. For best results, grade student papers as soon as possible. To check students' worked solutions, see the *Full Solution Answer Key*. Record the scores and return papers to students so they can learn from any wrong answers. If students consistently miss specific types of problems, they may need individualized instruction.

Speed/Mastery Drills

Speed/Mastery Drill problems with answers are in the *Teacher's Guide* in the sidebar of the final page of each lesson. Drill answers are also in the *Full Solution Answer Key*.

Quizzes and Tests

Quiz and test answers and solutions are **red** on the replicated quiz and test pages in the *Teacher's Guide*. Quiz and test answers and solutions are also in the *Full Solution Answer Key*. Each quiz and test has a total of 100 points. Points per problem is stated after each set of directions. Count the number of points missed and subtract from 100 to find the score.

UNIT 9



Lesson 1	354	Lesson 10	379
Constructing Parallel Lines		Quiz 2	
Lesson 2	357	Lesson 11	380
Making a Table of Values		Complement of a Set	
Lesson 3	360	Lesson 12	383
Calculating Operating Expenses		Map Scales Using a Proportion	
Lesson 4	363	Lesson 13	386
Choosing Appropriate Graphs to Display Data		Changing Standard Form to Scientific Notation	
Lesson 5	366	Lesson 14	389
Quiz 1		Converting Between Celsius and Fahrenheit Temperatures	
Lesson 6	367	Lesson 15	392
Venn Diagram for Intersection of Sets		U.S. and Metric Land Area Measures	
Lesson 7	370	Lesson 16	395
Graphing Linear Relations		Test 9	
Lesson 8	373		
Disjoint Sets and the Empty Set			
Lesson 9	376		
Converting Bible Measures of Capacity to Standard Measures			



Analyze student quizzes and tests. Several students missing the same problems may indicate a teaching weakness in that area. Revisit the areas and make sure students understand the concept. Plan extra class review to strengthen the concept. A student who repeatedly misses the same type of problem may need remedial help.

Recording Scores

Follow the formula to arrive at a final score for daily work, quizzes, and tests.

$$\begin{aligned} &\text{Daily work} + \text{Quiz 1} + \text{Quiz 2} + \text{Test} \\ &87\% + 90\% + 88\% + 94\% = 359\% \\ &359 \div 4 = 89.75\% \approx 90\% \end{aligned}$$

UNIT 10



Lesson 1 398
Constructing a Perpendicular
Line From a Point to a Line

Lesson 2 401
Graphing Linear Equations

Lesson 3 404
Changing Scientific Notation
to Standard Form

Lesson 4 407
Reading Double Line Graphs

Lesson 5 410
Quiz 1

Lesson 6 411
Converting Bible Measures
to Standard Measures

Lesson 7 414
Identifying Diagonals of Polygons

Lesson 8 417
Special Sets of Numbers

Lesson 9 420
Using Prime Factorization
to Reduce Fractions

Lesson 10 423
Quiz 2

Lesson 11 424
Converting Old Testament
Shekels and Talents

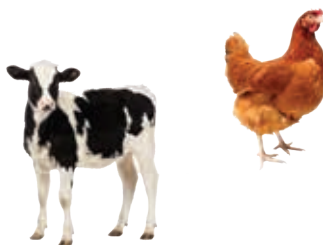
Lesson 12 427
Twenty-Four-Hour Digital Time

Lesson 13 430
Using a Proportion to Find
the Actual Size of a Scale Drawing

Lesson 14 433
The Relationship of Volume to
Capacity in the Metric System

Lesson 15 436
Using Reflection to Construct
a Congruent Figure

Lesson 16 439
Test 10



Glossary 440
Reference Charts 449

Index 453
Credits 471

Unit 1

Welcome students to *Mathematics 7*, Unit 1. Read and discuss “Mathematics in the Work World” on page 1.

- Ask students to name businesses they are familiar with and describe the kind of work they do or services they perform.
- Discuss how math may be used in businesses.
- Have students describe the kind of work they would like to do.

UNIT 1



Lesson 1	2
Number Properties; Identifying and Plotting Points on a Grid	
Lesson 2	5
Simplifying Expressions; Adding and Subtracting Fractions	
Lesson 3	8
Identifying Parts of a Solid; Combining Integers	
Lesson 4	11
Dividing Whole Numbers	
Lesson 5	14
Quiz 1	
Lesson 6	15
Understanding Exponents; Multiplying Fractions	
Lesson 7	18
Converting From Ratios to Decimals, Percents, or Fractions	
Lesson 8	21
Solving Word Problems	
Lesson 9	24
Finding Prime Factors	
Lesson 10	27
Quiz 2	
Lesson 11	28
Solving and Checking Equations	
Lesson 12	31
Simplifying Expressions by Substituting Variables With Numbers; Dividing Fractions	
Lesson 13	34
Converting Percents Greater Than 100%; Naming, Measuring, and Classifying Angles	
Lesson 14	37
Simplifying Expressions by Combining Like Terms; The Distributive and Associative Properties	
Lesson 15	40
Identifying Quadrilaterals	
Lesson 16	43
Test 1	

Getting Started

Ever since Adam and Eve were driven from the Garden of Eden, man has had to work to make a living. God gave Adam the responsibility to manage the gifts of life, health, and natural resources.

Today people choose occupations to provide for their daily needs. Business owners use many of the concepts taught in *Mathematics 7* to operate their businesses.

The early units of *Mathematics 7* review concepts and procedures taught in *Mathematics 6*. The following units teach more complicated work with numbers, computation, fractions, decimals, percents, geometry, and algebra.

Show students how to set up their work pages. See Appendix C, page 480 for examples to use or adapt.

Research Challenge

Informational nuggets are scattered throughout the lessons. For an extra challenge, students may use these tidbits as a starting point for additional research.

Unit 1 Nuggets

Title	Page
Successful Businessmen	12
Honoring God in Business	16
Servicemen	21
Refrigerants	25
Thermostat Wire	29

Mathematics in the Work World

"Have a seat, Ben," Mr. Hensley said. "You say you want help deciding what to aim for when you hit your high school years?" Ben lowered himself into a chair. "Yes, sir."

The principal spread a pack of leaflets across his desk. "What are your interests?" The colorful pamphlets displayed pictures of machinists, loggers, carpenters, nurses, farmers, teachers, and accountants. "There's one thing that provides a good foundation for all of these," Mr. Hensley said. He paused. "Math. If you fail math, you will fail in any service you enter." He slammed his fist on the table.

Ben jumped, then grinned. "Well, to tell you the truth, math is one of my weak points."

Mr. Hensley's brows furrowed. He leaned across the desk. "Then I'm glad you came to see me. I'm going to push you toward math the whole time you're in seventh grade." He smiled at Ben's expression. "Math is not hard or boring—unless you don't understand it. And we'll make sure you understand."

Ben looked down. "Actually, I love the woods. That's my interest area."

Mr. Hensley chuckled. He took a sip of coffee. "What about forestry? Managing forests, looking for disease, planting seedlings, cruising timber, keeping state parks and trails in good condition?"

Ben brightened. "Yes, sir! Being in the woods all day."

Mr. Hensley chuckled again. "There's one problem. You're going to need all the math you can get." He leaned back. "We can't escape math in any occupation we choose. Math begins with God and we want to give our best to serve Him in whatever occupation we choose." He clamped his hand on Ben's shoulder. "Work hard at math this year, young man, and you'll be in good standing to begin high school. And then—" he laughed, "and then the work world and the forests await you."



Unit 1 Terms

properties—commutative, identity, zero, distributive, associative
grid
 x -axis, y -axis
plotting points
ordered pair
order of operations
expression
dividend
divisor
common denominator
LCD
solid
face
edge
vertex
integer – negative, positive
estimated quotient
exponent
base
power
cancel
prime number
composite number
equation
variable
substitute
reciprocal
angles—right, acute, obtuse, straight
protractor
term, like terms
quadrilateral

Unit 1 Symbols

- () multiplication symbols
- division bar
- negative sign
- ∠ angle

Unit 1 Material

Addition

Fractions

Algebra

Read grid coordinates

Locate points on a grid

Plot points on a grid

Simplify expressions

Combine integers

Solve equations

Check equations

Substitute variables with numbers

Decimals

Convert to fractions and percents

Division

Fractions

Long division

Fractions

Add

Subtract

Multiply

Divide

Convert to decimals and percents

Geometry

Identify parts of a solid

Identify quadrilaterals

Multiplication

Fractions

Numbers

Commutative properties

Identity properties

Zero property

Distributive properties

Associative properties

Percents

Convert to fractions and decimals

Converting percents greater than 100%

Subtraction

Fractions

Word Problems

Steps to solve

Lesson 1

Pages 2-4

Materials Needed

Speed Drill 1

Worksheet 1

- 1 Number Properties
- 2 Points on a Grid
- 3 Grid Practice Sheet

Lesson Overview

Speed Drill

Teach

- › Number Properties
- › Identifying and Plotting Points on a Grid

Assign

- › Lesson Exercises
- › Applying Your Skills
- › Sharpening Your Skills

Unit 1

1

Number Properties; Identifying and Plotting Points on a Grid

SPEED DRILL 1

Number Properties

A **number property** in math is a rule about numbers that is always true. Number properties are written with letters that represent numbers we do not know the value of. These letters are replaced with numbers so the equation can be proven to be true.

A. Commutative Properties

The **commutative properties of addition and multiplication** state that the order of addends or factors may change without changing the answer.

$$a + b = b + a$$

$$5 + 6 = 6 + 5$$

$$c \times d = d \times c$$

$$7 \times 8 = 8 \times 7$$

B. Identity Properties

The identity property of **addition** states that when **zero is added to a number**, the sum is equal to the number. The identity property of multiplication states that when **a number is multiplied by one**, the product is equal to the number.

$$a + 0 = a$$

$$4 + 0 = 4$$

$$c \times 1 = c$$

$$9 \times 1 = 9$$

C. Zero Property

The zero property of **multiplication** states that when a number is **multiplied by zero**, the product is zero.

$$a \times 0 = 0$$

$$0 \times 75 = 0$$

Copy and complete each equation. After each equation write the letter of the property it illustrates.

1. $8 \times \underline{0} = 0$ **e**

2. $4 + 3 = 3 + \underline{4}$ **a**

3. $\underline{2} + 0 = 2$ **c**

4. $7 \times 4 = \underline{4} \times 7$ **b**

5. $11 \times 1 = \underline{11}$ **d**

6. $e + f = f + \underline{e}$ **a**

- a. commutative property of addition
- b. commutative property of multiplication
- c. identity property of addition
- d. identity property of multiplication
- e. zero property of multiplication

Focusing On Facts

Memorizing basic geometry facts, measurement equivalents, squares and square roots, and metric prefixes increases speed and accuracy in mathematics. Basic mathematical facts are reviewed in Fact Focus. Master each fact. Do not guess at the answers. If necessary, refer to the reference chart on pages 448-451.

2 Unit 1

Teaching the Lesson—Number Properties

Display the Number Properties poster. Explain and discuss the term **number property**.

A. Explain and discuss the terms **commutative property of addition** and **commutative property of multiplication**.

Subtraction and division are not commutative. Write these equations on the board. Have students complete them to demonstrate the commutative properties.

$$2 + 14 = \underline{14} + 2 \quad s + m = m + \underline{s} \quad \underline{7} \times 11 = \underline{11} \times 7$$

B. Explain and discuss the terms **identity property of addition** and **identity property of multiplication**.

Write these equations on the board. Have students complete them to demonstrate the identity properties.

$$14 + \underline{0} = 14 \quad 6 \times 1 = \underline{6} \quad n + 0 = \underline{n} \quad r \times 1 = \underline{r}$$

C. Explain and discuss the term **zero property of multiplication**.

Write these equations on the board. Have students complete them to demonstrate the zero property.

$$6 \times 0 = \underline{0} \quad n \times \underline{0} = 0$$

Focusing on Facts

Some lessons will include a *Fact Focus* section to review geometry facts, measurement equivalents, squares and square roots, metric prefixes, and other similar facts that should be memorized. After these facts have been reviewed several times in *Fact Focus*, they will begin to appear on Mastery Drills. Make flash cards with these facts to help students who have difficulty memorizing them otherwise.

2 Unit 1

Digging Deeper

Identity elements are numbers that combine with or multiply by other numbers without changing them.

The identity element of addition is 0.

$$7 + 0 = 7 \text{ and } 0 + 7 = 7$$

The identity element of multiplication is 1.

$$7 \times 1 = 7 \text{ and } 1 \times 7 = 7$$

Any number divided by 1 equals the number, but because division is not commutative, 1 is not the identity element of division.

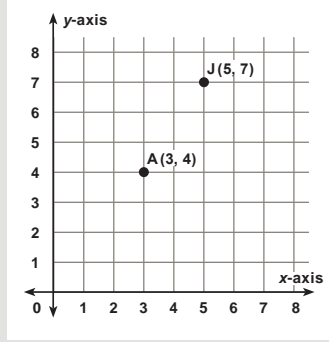
$$7 \div 1 = 7, \text{ but } 1 \div 7 \neq 7$$

Identifying and Plotting Points on a Grid

A **grid** is a pattern of horizontal and vertical lines. It has two scales or axes. An **axis** is a reference point from which the lines on the grid are measured. The **x-axis** runs horizontally and the **y-axis** runs vertically. Grids are used to identify and locate points.

Points are identified by two numbers called an **ordered pair**. To identify an ordered pair, follow the line from the x-axis and y-axis to the point where the two lines meet. These two numbers identify the ordered pair. Ordered pairs are always written in the same order—first the x-value and then the y-value.

Drawing a point for the ordered pair is called **plotting a point**. To plot an ordered pair, start at the zero line. Count horizontally on the x-axis and then vertically on the y-axis. Place the point on the grid where the two lines meet.



Ordered Pair of Point A (3, 4)
Ordered Pair of Point J (5, 7)

Plot Points A and B on the grid.

Write the ordered pair for Points C and D. Use Worksheet 1.

7. A(2, 0)

See Appendix C Page 481.

8. B(4, 3)

9. C

(5, 7)

10. D

(8, 5)



Applying Your Skills

Write the name of the property for each statement.

11. The product of a number multiplied by one is equal to the number.
p. 2
identity property of multiplication
12. The order of factors may change without changing the product.
p. 2
commutative property of multiplication
13. The product of a number multiplied by zero is equal to zero.
p. 2
zero property of multiplication
14. The order of addends may change without changing the sum.
p. 2
commutative property of addition
15. A number plus zero is equal to the number.
p. 2
identity property of addition

Lesson 1 – Number Properties; Identifying and Plotting Points on a Grid **3**

Teaching the Lesson—Identifying and Plotting Points on a Grid

Display the Points on a Grid poster.

Explain and discuss the terms **grid**, **x-axis**, **y-axis**, **ordered pair**, and **plotting a point**. Explain and discuss how to write ordered pairs and to find a point on a grid. The two numbers in parentheses are also called *coordinates*.

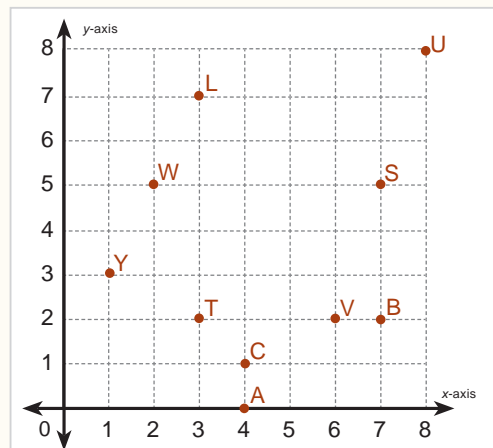
Write these points on the board. Demonstrate writing the ordered pair from the Points on a Grid poster for the first point. Have students write the ordered pairs for the remaining points.

B (5, 8) E (8, 2) G (6, 1) H (9, 0)

Write these points and ordered pairs on the board.

Demonstrate plotting the first point on the Grid Practice Sheet. Have students plot the other points.

L (3, 7) Y (1, 3) A (4, 0) V (6, 2)



Speed Drill 1

1. $6 + 1 = \underline{7}$
2. $8 + 5 = \underline{13}$
3. $5 + 7 = \underline{12}$
4. $9 + 9 = \underline{18}$
5. $2 + 7 = \underline{9}$
6. $9 + 7 = \underline{16}$
7. $7 + 4 = \underline{11}$
8. $8 + 7 = \underline{15}$
9. $7 + 3 = \underline{10}$
10. $5 + 6 = \underline{11}$
11. $8 + 8 = \underline{16}$
12. $9 + 8 = \underline{17}$
13. $6 + 9 = \underline{15}$
14. $8 + 3 = \underline{11}$
15. $7 + 6 = \underline{13}$
16. $5 + 9 = \underline{14}$
17. $3 + 9 = \underline{12}$
18. $4 + 9 = \underline{13}$
19. $9 + 2 = \underline{11}$
20. $6 + 8 = \underline{14}$
21. $7 + 7 = \underline{14}$
22. $8 + 4 = \underline{12}$
23. $1 + 9 = \underline{10}$
24. $8 + 2 = \underline{10}$
25. $7 + 0 = \underline{7}$
26. $6 + 6 = \underline{12}$
27. $5 + 4 = \underline{9}$
28. $4 + 6 = \underline{10}$

Plot Points E and F on the grid.

Write the ordered pair for Points G and H. Use Worksheet 1.

16. E(0, 4)
p. 3

See Appendix C Page 481.

17. F(2, 1)
p. 3

18. G
p. 3
(1, 6)

19. H
p. 3
(6, 1)



Sharpening Your Skills

COMPUTATION

Copy and solve.

$$\begin{array}{r} 49,220 \\ -45,917 \\ \hline 3,303 \end{array}$$

$$\begin{array}{r} 26,249 \\ \times 52 \\ \hline 1,364,948 \end{array}$$

$$\begin{array}{r} \$940.02 \\ -71.54 \\ \hline \$868.48 \end{array}$$

$$\begin{array}{r} 37.138 \\ \times 0.63 \\ \hline 23.39694 \end{array}$$

$$\begin{array}{r} 726 \\ 662 \\ 254 \\ 78 \\ +169 \\ \hline 1,889 \end{array}$$

$$\begin{array}{r} 270 \\ 49 \\ 300 \\ 876 \\ +179 \\ \hline 1,674 \end{array}$$

$$26. 8 \overline{)3,144} \quad 393$$

$$27. 9 \overline{)4,266} \quad 474$$

$$28. 4.7 + 2.73 + 9.421 \quad 16.851$$

FACT FOCUS

Write the answers. Refer to the Reference Chart if necessary.

$$29. 3^2 \quad 9$$

$$30. 12^2 \quad 144$$

$$31. 1^2 \quad 1$$

$$32. 14^2 \quad 196$$

$$33. 15^2 \quad 225$$

$$34. 5^2 \quad 25$$

$$35. 4^2 \quad 16$$

$$36. 13^2 \quad 169$$

$$37. 7^2 \quad 49$$

$$38. 2^2 \quad 4$$

$$39. 10^2 \quad 100$$

$$40. 11^2 \quad 121$$

$$41. 8^2 \quad 64$$

$$42. 6^2 \quad 36$$

$$43. 9^2 \quad 81$$

$$44. \sqrt{121} \quad 11$$

$$45. \sqrt{36} \quad 6$$

$$46. \sqrt{9} \quad 3$$

$$47. \sqrt{100} \quad 10$$

$$48. \sqrt{169} \quad 13$$

$$49. \sqrt{25} \quad 5$$

$$50. \sqrt{16} \quad 4$$

$$51. \sqrt{4} \quad 2$$

$$52. \sqrt{196} \quad 14$$

$$53. \sqrt{64} \quad 8$$

$$54. \sqrt{225} \quad 15$$

$$55. \sqrt{81} \quad 9$$

$$56. \sqrt{1} \quad 1$$

$$57. \sqrt{49} \quad 7$$

$$58. \sqrt{144} \quad 12$$

Assign Class Work

Lesson Alert

Assign the lesson exercises for number properties on page 2 and identifying and plotting points on a grid on page 3.

Assign *Applying Your Skills* and *Sharpening Your Skills*.

Extra Practice

- Name each property.

The order of addends may change without changing the sum.

commutative property of addition

Zero plus a number equals the number. identity property of addition

Zero times a number equals zero.

zero property of multiplication

The order of factors may change without changing the product.

commutative property of multiplication

One times a number equals the number.

identity property of multiplication

- Write the ordered pair for each point on the Points on a Grid poster.

N (1, 10) M (4, 6)

O (0, 4) R (10, 6)

- Plot the points on the Grid Practice Sheet.

S (7, 5) T (3, 2)

U (8, 8) W (2, 5)

See answers on grid on page 3.