



**TEXAS MATH
SOLUTION**

Grade 6

Student Textbook

Skills Program Edition

SY 2022-2023

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Student Edition

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Manifesto

Our Manifesto

WE BELIEVE that quality math education is important for all students, to help them develop into creative problem solvers, critical thinkers, life-long learners, and more capable adults.

WE BELIEVE that math education is about more than memorizing equations or performing on tests—it's about delivering the deep conceptual learning that supports ongoing growth and future development.

WE BELIEVE all students learn math best when teachers believe in them, expect them to participate, and encourage them to own their learning.

WE BELIEVE teachers are fundamental to student success and need powerful, flexible resources and support to build dynamic cultures of collaborative learning.

WE BELIEVE our learning solutions and services can help accomplish this, and that by working together with educators and communities we serve, we guide the way to better math learning.

LONG + LIVE + MATH

Acknowledgments

Middle School Math Solution Authors

- Sandy Bartle Finocchi, Chief Mathematics Officer
- Amy Jones Lewis, Senior Director of Instructional Design
- Kelly Edenfield, Instructional Designer
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“Mathematics is so much more than memorizing rules. It is learning to reason, to make connections, and to make sense of the world. We believe in Learning by Doing™—you need to actively engage with the content if you are to benefit from it. The lessons were designed to take you from your intuitive understanding of the world and build on your prior experiences to then learn new concepts. My hope is that these instructional materials help you build a deep understanding of math.”

Sandy Bartle Finocchi, Chief Mathematics Officer

“My hope is that as you work through this course, you feel capable—capable of exploring new ideas that build upon what you already know, capable of struggling through challenging problems, capable of thinking creatively about how to fix mistakes, and capable of thinking like a mathematician.”

Amy Jones Lewis, Senior Director of Instructional Design

“At Carnegie Learning, we have created an organization whose mission and culture is defined by your success. Our passion is creating products that make sense of the world of mathematics and ignite a passion in you. Our hope is that you will enjoy our resources as much as we enjoyed creating them.”

Barry Malkin, CEO

Table of Contents

Module 1: Composing and Decomposing

Topic 1: Factors and Multiples

- 1 Taking Apart Numbers and Shapes
Writing Equivalent Expressions Using the Distributive Property
- 2 Searching for Common Ground
Identifying Common Factors and Common Multiples
- 3 Composing and Decomposing Numbers
Least Common Multiple and Greatest Common Factor

Topic 2: Positive Rational Numbers

- 1 Rocket Strips
Dividing a Whole into Fractional Parts
- 2 Getting Closer
Benchmark Fractions
- 3 Did You Get the Part?
Multiplying Fractions
- 4 Yours IS to Reason Why!
Fraction by Fraction Division

Topic 3: Shapes and Solids

- 1 Consider Every Side
Constructing Triangles Given Sides
- 2 Turning a One-Eighty!
Triangle Sum Theorem
- 3 All About That Base ... and Height
Area of Triangles and Quadrilaterals
- 4 Length, Width, and Depth
Deepening Understanding of Volume

Topic 4: Decimals

- 1 You Have a Point
Plotting, Comparing, and Ordering Rational Numbers
 - 2 Get in Line
Adding and Subtracting Decimals
 - 3 Product Placement
Multiplying Decimals
 - 4 Dividend in the House
Dividing Whole Numbers and Decimals
-

Module 2: Relating Quantities

Topic 1: Ratios

- 1 It's All Relative
Introduction to Ratio and Ratio Reasoning
- 2 Going Strong
Comparing Ratios to Solve Problems
- 3 Oh, Yes, I Am the Muffin Man
Determining Equivalent Ratios
- 4 A Trip to the Moon
Using Tables to Represent Equivalent Ratios
- 5 They're Growing!
Graphs of Ratios
- 6 One Is Not Enough
Using and Comparing Ratio Representations

Topic 2: Percents

- 1 We Are Family!
Percent, Fraction, and Decimal Equivalence
- 2 Warming the Bench
Using Estimation and Benchmark Percents
- 3 The Forest for the Trees
Determining the Part and the Whole in Percent Problems

Topic 3: Unit Rates and Conversions

- 1 Several Ways to Measure
Using Ratio Reasoning to Convert Units
 - 2 What Is the Best Buy?
Introduction to Unit Rates
 - 3 Seeing Things Differently
Multiple Representations of Unit Rates
-

Module 3: Moving Beyond Positive Quantities

Topic 1: Signed Numbers and the Four Quadrants

- 1 Human Number Line
Introduction to Negative Numbers
- 2 Magnificent Magnitude
Absolute Value
- 3 What's in a Name?
Rational Number System
- 4 Four Is Better Than One
Extending the Coordinate Plane

Topic 2: Operating with Integers

- 1 Math Football
Using Models to Understand Integer Addition
- 2 Walk the Line
Adding Integers, Part I
- 3 Two-Color Counters
Adding Integers, Part II
- 4 What's the Difference?
Subtracting Integers
- 5 Equal Groups
Multiplying and Dividing Integers

Module 4: Determining Unknown Quantities

Topic 1: Expressions

- 1 Relationships Matter
Evaluating Numeric Expressions
- 2 Into the Unknown
Introduction to Algebraic Expressions
- 3 Second Verse, Same as the First
Equivalent Expressions
- 4 Are They Saying the Same Thing?
Verifying Equivalent Expressions
- 5 DVDs and Songs
Using Algebraic Expressions to Analyze and Solve Problems

Topic 2: Equations and Inequalities

- 1 First Among Equals
Reasoning with Equal Expressions
- 2 Bar None
Solving One-Step Addition Equations
- 3 Play It In Reverse
Solving One-Step Multiplication Equations
- 4 The Real Deal
Solving Equations to Solve Problems
- 5 Greater Than Most
Solving Inequalities with Inverse Operations

Topic 3: Graphing Quantitative Relationships

- 1 Every Graph Tells a Story
Independent and Dependent Variables
- 2 The Power of the Horizontal Line
Using Graphs to Solve Problems
- 3 Planes, Trains, and Paychecks
Multiple Representations of Equations
- 4 Time for Triathlon Training
Relating Distance, Rate, and Time
- 5 There Are Many Paths ...
Problem Solving on the Coordinate Plane

Topic 4: Financial Literacy: Accounts, Credit, and Careers

- 1 Knowledge You Can Bank On
Checking Accounts
 - 2 You Are a Real Card!
Debit Cards vs. Credit Cards
 - 3 Financial Report Card
Understanding Credit Reports
 - 4 The Possibilities Are Endless
Career Exploration
 - 5 Student Aid 101
Paying for College
-

Module 5: Describing Variability of Quantities

Topic 1: The Statistical Process

- 1 What's Your Question?
Understanding the Statistical Process
- 2 Get in Shape
Analyzing Numerical Data Displays
- 3 Follow Me on Histogram
Using Histograms to Display Data

Topic 2: Numerical Summaries of Data

- 1 In the Middle
Analyzing Data Using Measures of Center
 - 2 Box It Up
Displaying the Five-Number Summary
 - 3 Dealing with Data
Collecting, Displaying, and Analyzing Data
-

End of Course Topic

Formative Assessment

- 1 Living Room Rug
Performance Task
- 2 Pizza Party
Performance Task
- 3 School Ski Trip
Performance Task

Glossary

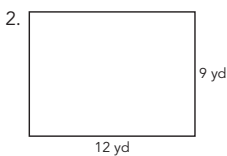
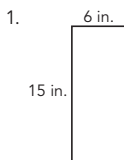
Taking Apart Numbers and Shapes

1

Writing Equivalent Expressions Using the Distributive Property

REVIEW

Calculate the area of each rectangle. Show your work.



LEARNING GOALS

1

- Write, read, and evaluate equivalent numeric expressions.
- Identify the adjacent side lengths of a rectangle as factors of the area value.
- Identify parts of an expression, such as the product and the factors.
- Write equivalent numeric expressions for the area of a rectangle by decomposing one side length into the sum of two or more numbers.
- Apply the Distributive Property to rewrite the product of two factors.

KEY TERMS

- numeric expression
- equation
- Distributive Property

2

You know how to operate with numbers using different strategies. Taking apart numbers before you operate can highlight important information or make calculations easier. How can you use these strategies to express number sentences in different ways?

1. Learning Goals
Learning goals are stated for each lesson to help you take ownership of the learning objectives.

2. Connection
Each lesson begins with a statement connecting what you have learned with a question to ponder.

Return to this question at the end of this lesson to gauge your understanding.

3. Getting Started

Each lesson begins with a Getting Started. When working on the Getting Started, use what you know about the world, what you have learned previously, or your intuition. The goal is just to get you thinking and ready for what's to come.

3

Getting Started

Break It Down to Build It Up

Callie is building a rectangular walkway up to her house. The width of the walkway is 5 feet and the length is 27 feet. She needs to calculate the area of the walkway to determine the amount of materials needed to build it.

1. Mark and label 2 different ways you could divide an area model to determine the area of the walkway.



2. Determine the areas of each of the subdivided parts of your models.

3. What is the total area of the walkway?



4

ACTIVITY 1.1 Connecting Area Models and the Distributive Property 

The numeric expression of 5×27 represents the area of the walkway from the Getting Started. A **numeric expression** is a mathematical phrase that contains numbers and operations.

The equation $5 \times 27 = 135$ shows that the expression 5×27 is equal to the expression 135.

An **equation** is a mathematical sentence that uses an equals sign to show that two or more quantities are the same as one another.

1. Reflect on the different ways you can rewrite the product of 5 and 27. Select one of your area models to complete the example.

How did you split the side length of 27? $5 \times 27 = 5(\text{_____} + \text{_____})$

What are the factors of each smaller region? $= (5 \cdot \text{_____}) + (5 \cdot \text{_____})$

What is the area of each smaller region? $= \text{_____} + \text{_____}$

What is the total area? $= \text{_____}$

What are other ways you could split one of the factors and write a corresponding equation? What would the equation look like if you split one of the factors into more than two regions?



4. Activities

You are going to build a deep understanding of mathematics through a variety of activities in an environment where collaboration and conversations are important and expected.

You will learn how to solve new problems, but you will also learn why those strategies work and how they are connected to other strategies you already know.

Remember:

- It's not just about answer-getting. The process is important.
- Making mistakes is a critical part of learning, so take risks.
- There is often more than one way to solve a problem.

Activities may include real-world problems, sorting activities, Worked Examples, or analyzing sample student work.

Be prepared to share your solutions and methods with your classmates.

Assignment

Assignment

LESSON 1: Taking Apart Numbers and Shapes

6

Write

Explain the Distributive Property in terms of composing and decomposing numbers.

7

Remember

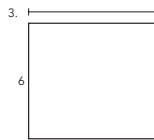
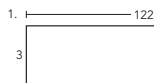
There are many ways to rewrite equivalent expressions using properties. The Distributive Property of Multiplication over Addition states that for any numbers a , b , and c , $a(b + c) = ab + ac$.

8

Practice

Decompose each rectangle into two or three smaller rectangles to demonstrate the Distributive Property. Then write each area in the form $a(b + c) = ab + ac$.

Visit www.ck12.org for more information on the Distributive Property.



Evaluate each expression using the Distributive Property. Show your work.

4. $6(12 + 4)$

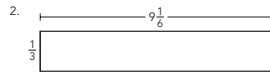
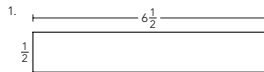
5. $10 + 4(2 + 20)$

6. $7(4 + 19)$

9

Stretch

Decompose each rectangle into smaller rectangles to demonstrate the Distributive Property. Write each area in the form $a(b + c) = ab + ac$ and then determine the total area.



10

Review

Calculate the area of each rectangle.

1. Width = 5 feet
Length = $\frac{2}{3}$ foot

2. Width = 10 feet
Length = $\frac{3}{4}$ foot

3. Width = 15 inches
Length = $\frac{2}{3}$ inch

4. Width = 20 inches
Length = $\frac{5}{6}$ inch

6. Write

Reflect on your work and clarify your thinking.

7. Remember

Take note of the key concepts from the lesson.

8. Practice

Use the concepts learned in the lesson to solve problems.

9. Stretch

Ready for a challenge?

10. Review

Remember what you've learned by practicing concepts from previous lessons and topics.

Problem Types You Will See

Worked Example

When you see a Worked Example:

- Take your time to read through it.
- Question your own understanding.
- Think about the connections between steps.

Ask Yourself:

- What is the main idea?
- How would this work if I changed the numbers?
- Have I used these strategies before?

WORKED EXAMPLE

Determine the quantity in pounds that is equivalent to 4.5 kilograms.

Scaling Up

$$\begin{array}{c} \times 4.5 \\ \curvearrowright \\ \frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{4.5 \text{ kg}}{? \text{ lb}} \\ \curvearrowleft \\ \times 4.5 \end{array}$$

Unit Analysis

$$4.5 \text{ kg} \left(\frac{2.2 \text{ lb}}{1 \text{ kg}} \right)$$

$$\frac{4.5 \text{ kg}}{1} \left(\frac{2.2 \text{ lb}}{1 \text{ kg}} \right) = 9.9 \text{ lb}$$

$$\frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{4.5 \text{ kg}}{9.9 \text{ lb}}$$

$$4.5 \text{ kg} = 9.9 \text{ lb}$$

Christopher and Max want to determine the number of miles in 31,680 feet using unit analysis.

Max



$$31,680 \text{ ft} \frac{1 \text{ mi}}{5280 \text{ ft}} = 6 \text{ mi}$$

Christopher



$$31,680 \text{ ft} \left(\frac{5280 \text{ ft}}{1 \text{ mi}} \right) = 167,270,400 \text{ mi}$$

Thumbs Up

When you see a Thumbs Up icon:

- Take your time to read through the correct solution.
- Think about the connections between steps.

Ask Yourself:

- Why is this method correct?
- Have I used this method before?

Thumbs Down

When you see a Thumbs Down icon:

- Take your time to read through the incorrect solution.
- Think about what error was made.

Ask Yourself:

- Where is the error?
- Why is it an error?
- How can I correct it?

Tim and Dan love cereal, but don't want to spend a lot of money. After scanning the aisle in the grocery store for the lowest prices, the boys make the following statements.

- **Tim says, "I found Sweetie Oat Puffs for \$0.14 per ounce. That's the cheapest cereal in the aisle!"**
- **Dan replies, "It's not cheaper than Sugar Hoops! The unit price for that is 6.25 oz per dollar."**

Who is correct? Explain your reasoning.



Who's Correct?

When you see a Who's Correct icon:

- Take your time to read through the situation.
- Question the strategy or reason given.
- Determine if correct or not correct.

Ask Yourself:

- Does the reasoning make sense?
- If the reasoning makes sense, what is the justification?
- If the reasoning does not make sense, what error was made?

The Crew

The Crew is here to help you on your journey. Sometimes they will remind you about things you already learned. Sometimes they will ask you questions to help you think about different strategies. Sometimes they will share fun facts. They are members of your group—someone you can rely on!



Teacher aides will guide you along your journey. They will help you make connections and remind you to think about the details.



Mathematical Process Standards

Texas Mathematical Process Standards

Effective communication and collaboration are essential skills of a successful learner. With practice, you can develop the habits of mind of a productive mathematical thinker. The “I can” expectations listed below align with the TEKS Mathematical Process Standards and encourage students to develop their mathematical learning and understanding.

► Apply mathematics to problems arising in everyday life, society, and the workplace.

I can:

- use the mathematics that I learn to solve real world problems.
- interpret mathematical results in the contexts of a variety of problem situations.

► Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying a solution, and evaluating the problem-solving process and reasonableness of the solution.

I can:

- explain what a problem “means” in my own words.
- create a plan and change it if necessary.
- ask useful questions in an attempt to understand the problem.
- explain my reasoning and defend my solution.
- reflect on whether my results make sense.

- ▶ **Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate; and techniques including mental math, estimation, and number sense as appropriate, to solve problems.**

I can:

- use a variety of different tools that I have to solve problems.
- recognize when a tool that I have to solve problems might be helpful and when it has limitations.
- look for efficient methods to solve problems.
- estimate before I begin calculations to inform my reasoning.

- ▶ **Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.**

I can:

- communicate and defend my own mathematical understanding using examples, models, or diagrams.
- use appropriate mathematical vocabulary in communicating mathematical ideas.
- make generalizations based on results.
- apply mathematical ideas to solve problems.
- interpret my results in terms of various problem situations.

► **Create and use representations to organize, record, and communicate mathematical ideas.**

I can:

- consider the units of measure involved in a problem.
- label diagrams and figures appropriately to clarify the meaning of different representations.
- create an understandable representation of a problem situation.

► **Analyze mathematical relationships to connect and communicate mathematical ideas.**

I can:

- identify important relationships in a problem situation.
- use what I know to solve new problems.
- analyze and organize information.
- look closely to identify patterns or structure
- look for general methods and more efficient ways to solve problems.

► **Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.**

I can:

- work carefully and check my work.
- distinguish correct reasoning from reasoning that is flawed.
- use appropriate mathematical vocabulary when I talk with my classmates, my teacher, and others.
- specify the appropriate units of measure when I explain my reasoning.
- calculate accurately and communicate precisely to others.

Academic Glossary

Visit the Students & Caregivers Portal on the Texas Support Center at www.CarnegieLearning.com/texas-help to access the Mathematics Glossary for this course anytime, anywhere.



There are important terms you will encounter throughout this book. It is important that you have an understanding of these words as you get started on your journey through the mathematical concepts. Knowing what is meant by these terms and using these terms will help you think, reason, and communicate your ideas.

Related Phrases

- Examine
- Evaluate
- Determine
- Observe
- Consider
- Investigate
- What do you notice?
- What do you think?
- Sort and match

Related Phrases

- Show your work
- Explain your calculation
- Justify
- Why or why not?

ANALYZE

Definition

To study or look closely for patterns. Analyzing can involve examining or breaking a concept down into smaller parts to gain a better understanding of it.

Ask Yourself

- Do I see any patterns?
- Have I seen something like this before?
- What happens if the shape, representation, or numbers change?

EXPLAIN YOUR REASONING

Definition

To give details or describe how to determine an answer or solution. Explaining your reasoning helps justify conclusions.

Ask Yourself

- How should I organize my thoughts?
- Is my explanation logical?
- Does my reasoning make sense?
- How can I justify my answer to others?

REPRESENT

Definition

To display information in various ways. Representing mathematics can be done using words, tables, graphs, or symbols.

Ask Yourself

- How should I organize my thoughts?
- How do I use this model to show a concept or idea?
- What does this representation tell me?
- Is my representation accurate?

Related Phrases

- Show
- Sketch
- Draw
- Create
- Plot
- Graph
- Write an equation
- Complete the table

ESTIMATE

Definition

To make an educated guess based on the analysis of given data. Estimating first helps inform reasoning.

Ask Yourself

- Does my reasoning make sense?
- Is my solution close to my estimation?

Related Phrases

- Predict
- Approximate
- Expect
- About how much?

DESCRIBE

Definition

To represent or give an account of in words. Describing communicates mathematical ideas to others.

Ask Yourself

- How should I organize my thoughts?
- Is my explanation logical?
- Did I consider the context of the situation?
- Does my reasoning make sense?

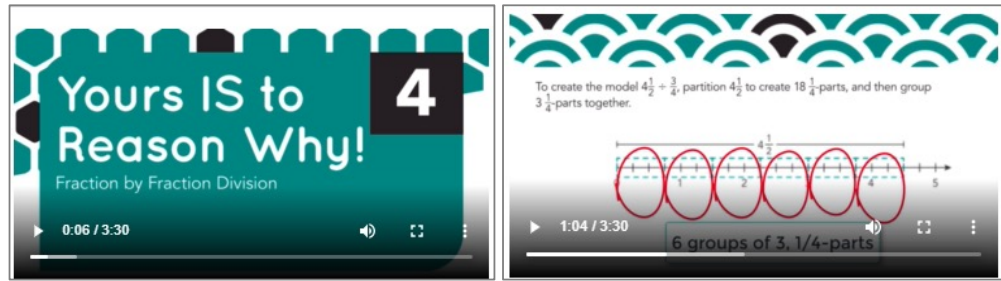
Related Phrases

- Demonstrate
- Label
- Display
- Compare
- Determine
- Define
- What are the advantages?
- What are the disadvantages?
- What is similar?
- What is different?

Resources for Students and Caregivers

Student Lesson Overview Videos

Each lesson has a corresponding lesson overview video(s) for you to use and reference as you are learning. The videos provide an overview of key concepts, strategies, and/or worked examples from the lessons.



Topic Summary

A Topic Summary is provided at the end of each topic. The Topic Summary lists all key terms of the topic and provides a summary of each lesson. Each lesson summary defines key terms and reviews key concepts, strategies, and/or worked examples.

Factors and Multiples Summary

KEY TERMS

- numeric expression
- equation
- Distributive Property
- base
- power
- exponent
- common factor
- relatively prime
- greatest common factor (GCF)
- multiple
- Commutative Prop.
- least common multiple (LCM)

LESSON 1 Taking Apart Numbers and Shapes

A **numeric expression** is a mathematical phrase that contains numbers and operations. A **mathematical sentence** that uses an equals sign to show that two quantities are the same as one another.

The equation $5 \times 27 = 135$ shows that the expression 5×27 is equal to the expression 135.

There are many ways to rewrite equivalent expressions using properties of operations. The **Distributive Property**, when applied for multiplication, states that for any numbers a , b , and c , $a(b + c) = ab + ac$.

For example, you can use the Distributive Property to rewrite the expression $4(2 + 15)$ in different ways.

You can read and describe the expression $4(2 + 15)$ in different ways.

For example, you can say:

- four times the quantity of two plus fifteen,
- four times the sum of two and fifteen, or
- the product of four and the sum of two and fifteen.

You can describe the expression $4(2 + 15)$ as a product of two factors. The quantity is both a single factor and a sum of two terms.

You can also use grouping symbols to show that you need to multiply each set of factors before you add them, $(4 \cdot 2) + (4 \cdot 15)$.

TOPIC 1: Sum

LESSON 2 Searching for Common Ground

Understanding the area of rectangles is helpful when learning about factors. A rectangular area model is one way to represent multiplication. You can determine the factors of a number by creating rectangles with a given area. You can combine rectangles with a shared side length, or common factor, to create larger rectangles. **Common factors** are the factors shared between the numbers.

In this example, the common factor, or shared side length, of the two smaller rectangles is three.

Dimensions of Rectangle with an Area of 18	Dimensions of Rectangle with an Area of 6	Dimensions of the Combined Rectangle	Area of the Combined Rectangle as a Sum of the Smaller Rectangles	Total Area of Combined Rectangle
3×6	3×2	$3(6 + 2)$	$18 + 6$	24

One way to determine the prime factors of a number is by creating a factor tree. You can use a factor tree to organize the prime factors of a given number.

The example shows the prime factorization for 30.

- Pick any whole number factor pair of 30, other than 1 and 30.
- Draw a branch from 30 to each factor, 2 and 15.
- Since both of the factors are not prime, you are not finished.
- Use branches to write a factor pair for 15.
- Because 2, 3, and 5 are all prime, this factor tree is complete.

The prime factors of 30 are 2, 3, and 5.

In some cases, the prime factorization has repeat factors. You can represent repeated multiplication as a power. A **power** has two elements: the base and the exponent. The **base** of a power is the factor multiplied by itself repeatedly, and the **exponent** of the power is the number of times you use the base as a factor.

$2 \times 2 \times 2 \times 2 = 2^4$

base \rightarrow 2 \leftarrow exponent
power

Previously, we used area models to determine common factors between numbers. Another way to determine common factors is to use prime factorization.

2 • TOPIC 1: Factors and Multiples

Mathematics Glossary

A course-specific mathematics glossary is available to utilize and reference while you are learning. Use the glossary to locate definitions and examples of math key terms.

Glossary

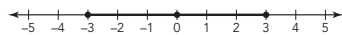
A

absolute value

The absolute value, or magnitude, of a number is its distance from zero on a number line.

Example

The absolute value of -3 is the same as the absolute value of 3 because they are both a distance of 3 from zero on a number line.



$$|-3| = |3|$$

account balance

Amount of money in an account at a given time.

Addition Property of Equality

The Addition Property of Equality states that if two values a and b are equal, when you add the same value c to each, the sums are equal.

Examples

$$12 = 12 \text{ and } 12 + 7 = 12 + 7$$

$$\text{If } a = b, \text{ then } a + c = b + c.$$

additive inverses

Two numbers with the sum of zero are called additive inverses.

Examples

$$-19 + 19 = 0 \quad a + (-a) = 0$$

additive reasoning

Additive reasoning focuses on the use of addition and subtraction for comparisons.

Examples

Vicki is 40 years old and Ben is 10 years old. In 5 years, Vicki will be 45 and Ben will be 15. Vicki will always be 30 years older than Ben. This is additive reasoning.

algebraic expression

An algebraic expression is a mathematical phrase that has at least one variable, and it can contain numbers and operation symbols.

Examples

$$a \quad 2a + b \quad xy \quad \frac{4}{p} \quad z^2$$

algorithm

An algorithm is a process or description of steps you can follow to complete a mathematical calculation.

Annual Percentage Yield (APY)

Annual Percentage Yield (APY) is a percentage that is paid to customers based on the account balance in an account for a year.

Example

For example, Yvonne opens a checking account with an average monthly balance of \$600. The account has a 2.5% APY.

$$(600)(0.025) = 15$$

Yvonne will earn \$15 on this checking account over the course of the year.

Module Family and Caregiver Guides

Each module guide will provide a different highlight of the academic glossary, description and examples of TEKS Mathematical Process Standards, and an overview of a different component of our instructional approach known as The Carnegie Learning Way. Also included is a module overview of content, specific key terms, visual representations, and strategies you are learning in each topic of the module.

The purpose of the Family and Caregiver Guides is to bridge student learning in the classroom to student learning at home. Our goal is to empower you and your family to understand the concepts and skills learned in the classroom so that you can review, discuss, and solidify the understanding of these key concepts together. Videos will be available on the Students & Caregivers Portal on the Texas Support Center to provide added support.

MODULE 1 FAMILY AND CAREGIVER GUIDE
Read and share with your student.

How to support your student as they learn about Composing and Decomposing

Mathematics is a connected set of ideas, and your student knows a lot. Encourage them to use the mathematics they already know when seeing new concepts in this module.

Module Introduction

In this module your student will learn more about numbers and shapes and their relationships. There are four topics in this module: Factors and Multiples, Positive Rational Numbers, Shapes and Solids, and Decimals. Your student will use what they already know about area, number properties, and volume in this module.

Academic Glossary

Each module will highlight an important term. Knowing and using these terms will help your student think, reason, and communicate their math ideas.

Term	Analyze
Definition	<ul style="list-style-type: none"> To study or look closely for patterns. To break down a concept into smaller parts to gain a better understanding of it.
Questions to Ask Your Student	<ul style="list-style-type: none"> Do you see any patterns? Have you seen something like this before? What happens if the shape, model, or number change?
Related Phrases	<ul style="list-style-type: none"> Examine Evaluate Determine Observe Consider Investigate What do you notice?

TABLE OF CONTENTS

- Page 1 Module Introduction Academic Glossary
- Page 2 Math Process Standards CL Way
- Page 3 Module Overview
- Pages 4-15 Topic Summaries
- Page 16 Dates Links

Example: Topic 1 Lesson 2

Determine the least common multiple of 6 and 9.

- List the first 9 multiples of 6.
- List the first 6 multiples of 9.

MODULE 1 FAMILY AND CAREGIVER GUIDE

Math Process Standards

Each module will focus on a process (or a pair of processes) that will help your student become a mathematical thinker. The "I can" statements listed below help your student to develop their mathematical learning and understanding.

Communicate mathematical ideas, reasoning, and their implications using multiple representations including symbols, diagrams, graphs, and language as appropriate.

I can:

- explain what a problem "means" in my own words.
- create a plan and change it if necessary.
- ask useful questions when trying to understand the problem.
- explain my reasoning and defend my solution.
- reflect on whether my results make sense.

Look for examples of these processes in the Topic Summaries.

The Carnegie Learning Way
Our Instructional Approach

Carnegie Learning's instructional approach is based on how people learn and real-world understandings. It is based on three key components:

ENGAGE	DEVELOP	DEMONSTRATE
 Purpose: Provide an introduction that creates curiosity and uses what students already know and have experienced. Questions to Ask: How does this problem look like something you did in class?	 Purpose: Build a deep understanding of mathematics through different activities. Questions to Ask: Do you know another way to solve this problem? Does your answer make sense?	 Purpose: Reflect on and evaluate what was learned. Questions to Ask: Is there anything you do not understand?

ONLINE RESOURCES FOR FAMILIES AND CAREGIVERS
<https://www.carnegielearning.com/texas-help/students-caregivers/>

Grade 6
Module 1 Family and Caregiver Guide
2

MODULE 1 FAMILY AND CAREGIVER GUIDE

Module Overview

TOPIC 1	TOPIC 2	TOPIC 3	TOPIC 4
Factors and Multiples	Positive Rational Numbers	Shapes and Solids	Decimals
6 Days	10 Days	11 Days	9 Days
Your student will study the relationship between numbers and area.	Your student will review fraction multiplication and use the inverse relationship between multiplication and division to understand fraction by fraction division.	Your student will study the relationships of angles and side lengths of triangles, as well as the area of triangles, parallelograms, and trapezoids, by decomposing and composing parts of shapes.	Your student will plot, compare, and order decimals on a number line and understand decimal multiplication and division.

Did you know that?

You can use an area model to represent the product of the two numbers 15 and 42.

Can you name the expression?

$400 + 20 + 200 + 10$

What in the world?

Dividing fractions is commonly used when cooking and baking. How many cups of chopped pecans would you need for half the serving size?

$\frac{1}{2}$ cup of chopped pecans

Did you know that?

A composite figure is a figure made up of more than one simple geometric figure. The house shown above is a composite figure. Can you name the 4 different shapes in the image?

Which runner ran the fastest?

{Yonetta}

Did you know that?

You can compare decimals to solve real-world problems.

Runner	Time (minutes)
Yonetta	23.9
Leah	24.3
Justin	24.7
Keenan	25.1
Terrell	25.6

Topic 1: Factors and Multiples

Key Terms

- numeric expression
- equation
- distributive Property
- base
- power
- exponent
- common factor
- relatively prime
- greatest common factor (GCF)
- multiple
- Commutative Property
- least common multiple (LCM)

The Distributive Property, when applied for multiplication, states that for any numbers a , b , and c , $a(b + c) = ab + ac$.

The exponent of the power is the number of times the base is used as a factor.

$8^3 = 8 \times 8 \times 8$

↑
exponent

A multiple is the product of a given whole number and another whole number.

multiples of 10:

Follow the link to access the Student Glossary:
<https://www.carnegielearning.com/texas-help/students-caregivers/>

In this topic, students will learn more about factors and multiples. They use area models to show the factors of a given number and the common factors of two or more numbers. Students use factor trees to organize the prime factors of a number. Then, they use tables to determine common factors, the greatest common factor (GCF), and the least common multiple (LCM) of two or more numbers.

Area Models

The equation $5 \times 27 = 135$ shows that the expression 5×27 is equal to the expression 135. An equation is a mathematical sentence that uses an equals sign to show that two or more quantities are the same as one another.

The area model shows the side length of 27 split into two parts.

$5 \times 27 = 5(20 + 7)$

The factors for each region are $(5 \cdot 20) + (5 \cdot 7)$.

The area of each smaller region is $100 + 35$.

The total area is 135.

ONLINE RESOURCES FOR FAMILIES AND CAREGIVERS
<https://www.carnegielearning.com/texas-help/students-caregivers/>

Grade 6
Module 1 Family and Caregiver Guide
4

Topic Family Guides

Each topic contains a Family Guide that provides an overview of the math of the topic and answers the questions, “Where have we been?” and “Where are we going?” Additional components of the Family Guide are, as follows: an example of a math model or strategy taught in the topic, definitions of a few key terms, busting of a math myth, and questions families and caregivers can ask you to support your learning.

We recognize that learning outside of the classroom is crucial to student success at school. While we don’t expect families and caregivers to be math teachers, the Family Guides are designed to assist families and caregivers as they talk to you about what you are learning. Our hope is that both you and your family will read and benefit from these guides.

Carnegie Learning Family Guide
Grade 6

Module 1: Composing and Decomposing

TOPIC 1: FACTORS AND MULTIPLES

In this topic, students explore factors and multiples. They use area models to determine the factors of a given number and the common factors of two or more numbers. Students use factor trees to determine the prime factors of a number. Then, they use tables to determine common factors, the greatest common factor (GCF), and the least common multiple (LCM) of two or more numbers. Students solve real-world problems using factors and multiples. Throughout this topic, students use the Distributive Property and the Commutative Property to compose and decompose numbers and expressions.

Where have we been?

Students have used tiling to relate area to multiplication and addition, and they have used informal statements of the properties of operations. Students have also used area models to represent multiplication.

Where are we going?

This topic focuses on composing and decomposing numbers and expressing them in algebraic terms. Students will apply the same proper terminology to algebraic expressions in a later topic. They will use proper operations to write equivalent algebraic expressions. Students will continue to apply this knowledge throughout middle and high school as they generate equivalent algebraic expressions and multi-step equations and inequalities.

Using a Table to Determine the GCF and LCM

You can organize the prime factors of two or more numbers into a table. Only list shared factors in the same column.

Number	Prime Factors		
56	2	2	2
42	2		3

In the table shown, the common factors of 56 and 42 are 2, 7, and 14. The greatest common factor (GCF) is the product of the shared factors. $2 \times 7 = 14$, so the GCF is 14. The least common multiple (LCM) is the product of the shared and non-shared prime factors. $2 \times 2 \times 3 \times 7 = 168$, so the LCM is 168.

TOPIC 1: Family Guide

Myth: "I don't have the math gene."

Let's be clear about something. There isn't a gene that controls the development of mathematical thinking. Instead, there are probably **hundreds** of genes that contribute to it.

A recent study suggests that mathematical thinking arises from the ability to learn a language. Given the right input from the environment, children learn to speak without formal instruction. They can learn number sense and pattern recognition the same way.

To further nurture your child's mathematical growth, attend to the learning environment. You can think of it as providing a nutritious mathematical diet that includes: discussing math in the real world, offering encouragement, being available to answer questions, allowing your student to struggle with difficult concepts, and providing space for plenty of practice.

#mathmythbusted

Talking Points

Discuss With Your Student

Your student is learning to compose and decompose numbers using different techniques. You can further support your student's learning by asking questions about the work they do in class or at home.

Questions to Ask

- How does this problem look like something you did in class?
- Can you show me the strategy you used to solve this problem? Do you know another way to solve it?
- Does your answer make sense? How do you know?
- Is there anything you don't understand? How can you use today's lesson to help?

Key Terms

Distributive Property
The Distributive Property states that for any numbers a , b , and c , $a(b + c) = ab + ac$.

Commutative Property
The Commutative Property states that for any numbers a and b , the product $a \times b$ is equal to the product $b \times a$.

greatest common factor (GCF)
The GCF is the largest factor two or more numbers have in common.

least common multiple (LCM)
The LCM is the smallest multiple (other than zero) that two or more numbers have in common.

6 • TOPIC 1: Factors and Multiples



Students and Caregivers Portal

Research has proven time and again that family engagement greatly improves a student's likelihood of success in school.

The Students & Caregivers Portal on the Texas Support Center provides:

- Getting to Know Carnegie Learning video content to provide an introduction to the instructional materials and research.
- Articles and quick tip videos offering strategies for how families and caregivers can support student learning.
- Access to instructional resources to support students and caregivers.

To access new content and resources, visit the Students and Caregivers Portal on the Texas Support Center at <https://www.CarnegieLearning.com/texas-help/students-caregivers/>

