TEXAS MATH SOLUTION

Grade 7

Student Textbook

Skills Program Edition

SY 2022-2023

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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
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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(TM)—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

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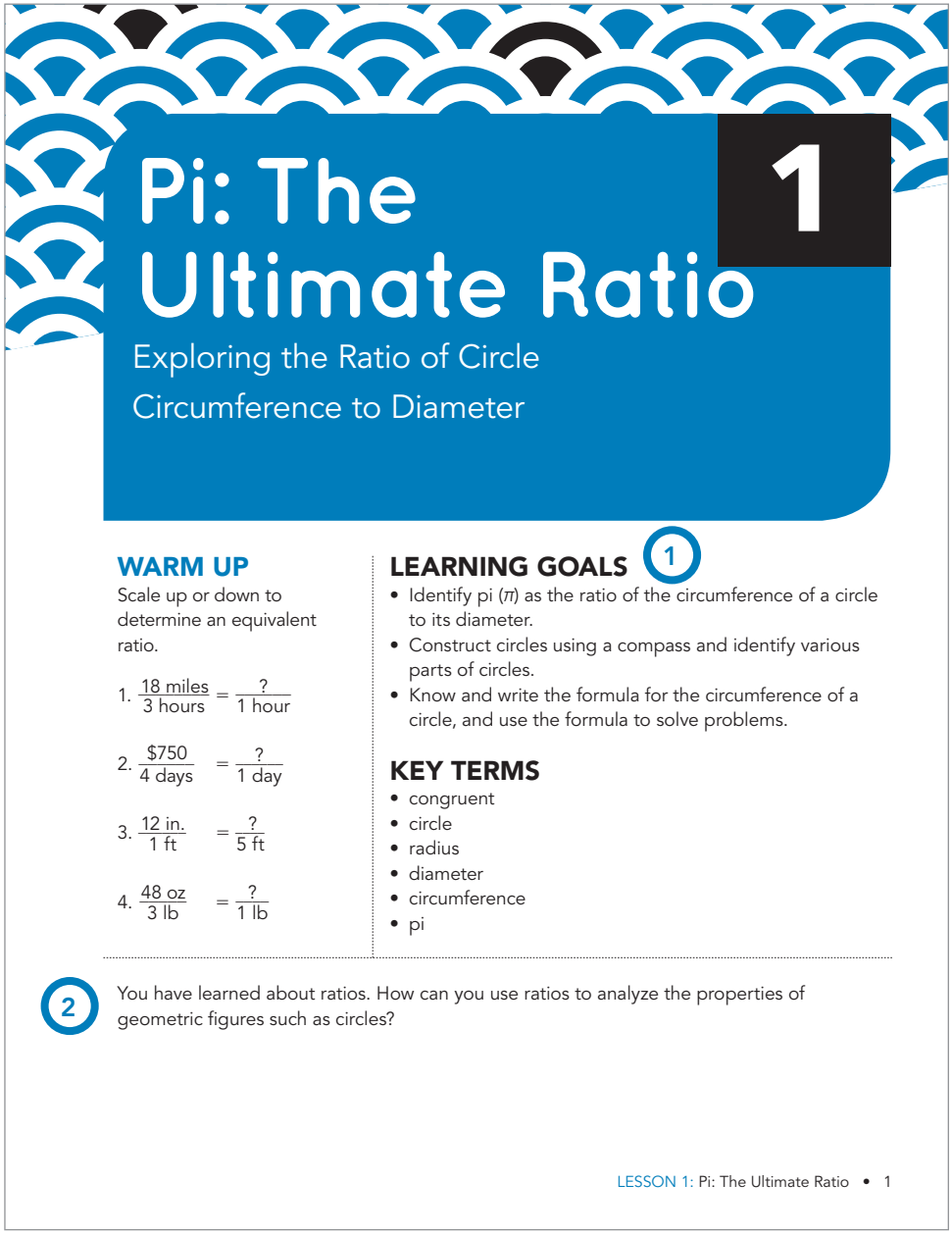
Glossary

Lesson Structure

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.



Pi: The Ultimate Ratio

1

Exploring the Ratio of Circle Circumference to Diameter

WARM UP

Scale up or down to determine an equivalent ratio.

1. $\frac{18 \text{ miles}}{3 \text{ hours}} = \frac{?}{1 \text{ hour}}$
2. $\frac{\$750}{4 \text{ days}} = \frac{?}{1 \text{ day}}$
3. $\frac{12 \text{ in.}}{1 \text{ ft}} = \frac{?}{5 \text{ ft}}$
4. $\frac{48 \text{ oz}}{3 \text{ lb}} = \frac{?}{1 \text{ lb}}$

LEARNING GOALS

1

- Identify pi (π) as the ratio of the circumference of a circle to its diameter.
- Construct circles using a compass and identify various parts of circles.
- Know and write the formula for the circumference of a circle, and use the formula to solve problems.

KEY TERMS

- congruent
- circle
- radius
- diameter
- circumference
- pi

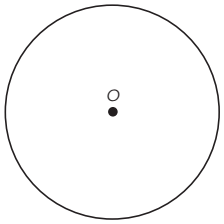
2 You have learned about ratios. How can you use ratios to analyze the properties of geometric figures such as circles?

LESSON 1: Pi: The Ultimate Ratio • 1

3 Getting Started

Across and Around

A circle is shown with a point drawn at the center of the circle. The name of the point is *O*, so let's call this Circle *O*.



1. Analyze the distance around the circle.

a. Use a string and a centimeter ruler to determine the distance around the circle.

b. How does your measurement compare to your classmates' measurements? Summarize the similarities and differences.

2. Draw a line from a point on the circle to the center of the circle, point *O*.

a. Measure your line using your centimeter ruler.

b. How does your measurement compare to your classmates' measurements? Summarize the similarities and differences.

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.

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.

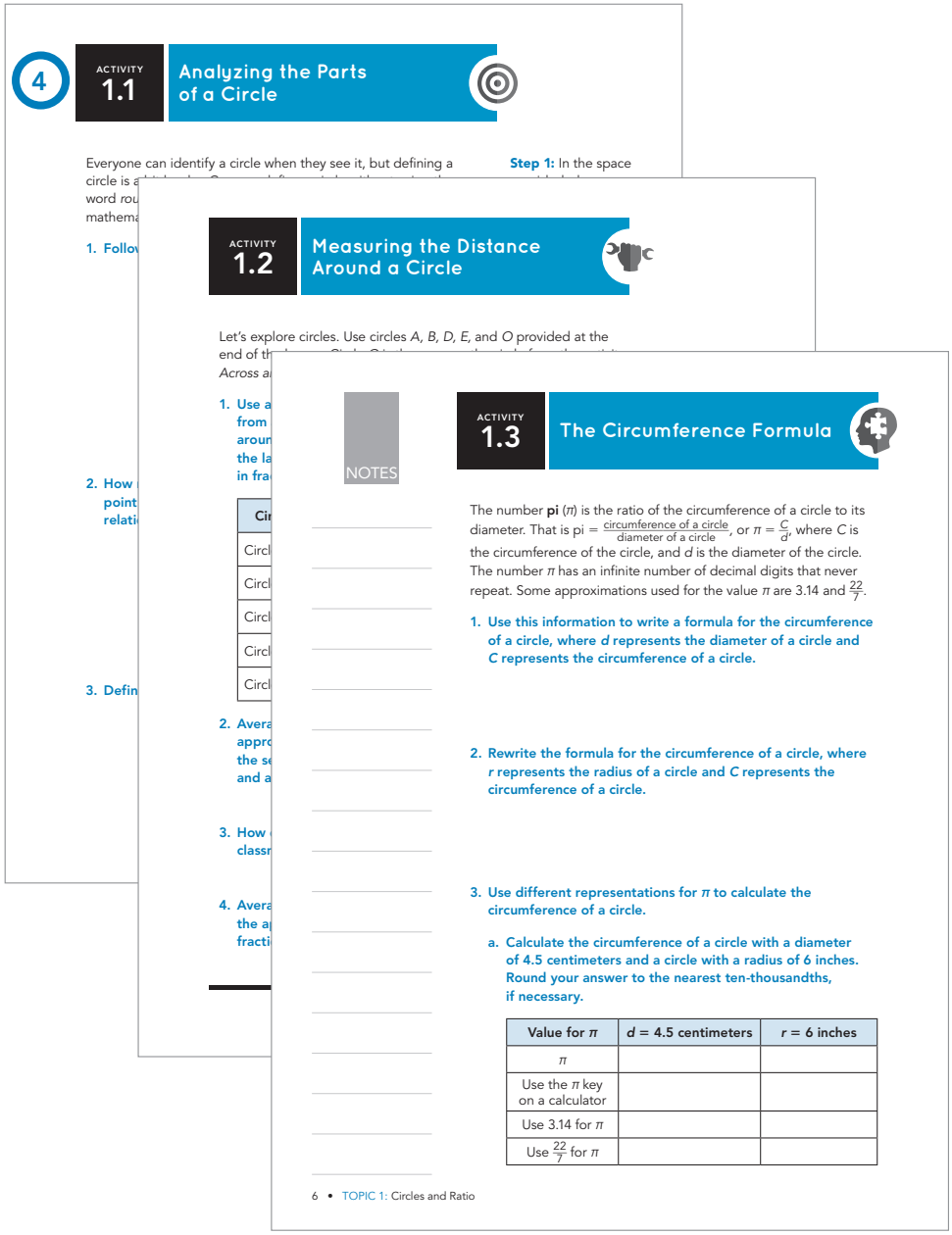
You will learn how to solve new problems, but you will also learn why those strategies work and how they are connected to other strategies you already know.

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.



4

ACTIVITY 1.1

Analyzing the Parts of a Circle

Everyone can identify a circle when they see it, but defining a circle is a

Step 1: In the space

word *rou*

mathema

1. Follo

ACTIVITY 1.2

Measuring the Distance Around a Circle

Let's explore circles. Use circles *A*, *B*, *D*, *E*, and *O* provided at the end of th

Across a

1. Use a from arou the la in fra

Cir
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2. How point relati

3. Defin

2. Avera appro the se and a

3. How classr

4. Avera the a fracti

NOTES

ACTIVITY 1.3

The Circumference Formula

The number **pi** (π) is the ratio of the circumference of a circle to its diameter. That is pi $= \frac{\text{circumference of a circle}}{\text{diameter of a circle}}$, or $\pi = \frac{C}{d}$, where C is the circumference of the circle, and d is the diameter of the circle. The number π has an infinite number of decimal digits that never repeat. Some approximations used for the value π are 3.14 and $\frac{22}{7}$.

1. **Use this information to write a formula for the circumference of a circle, where *d* represents the diameter of a circle and *C* represents the circumference of a circle.**

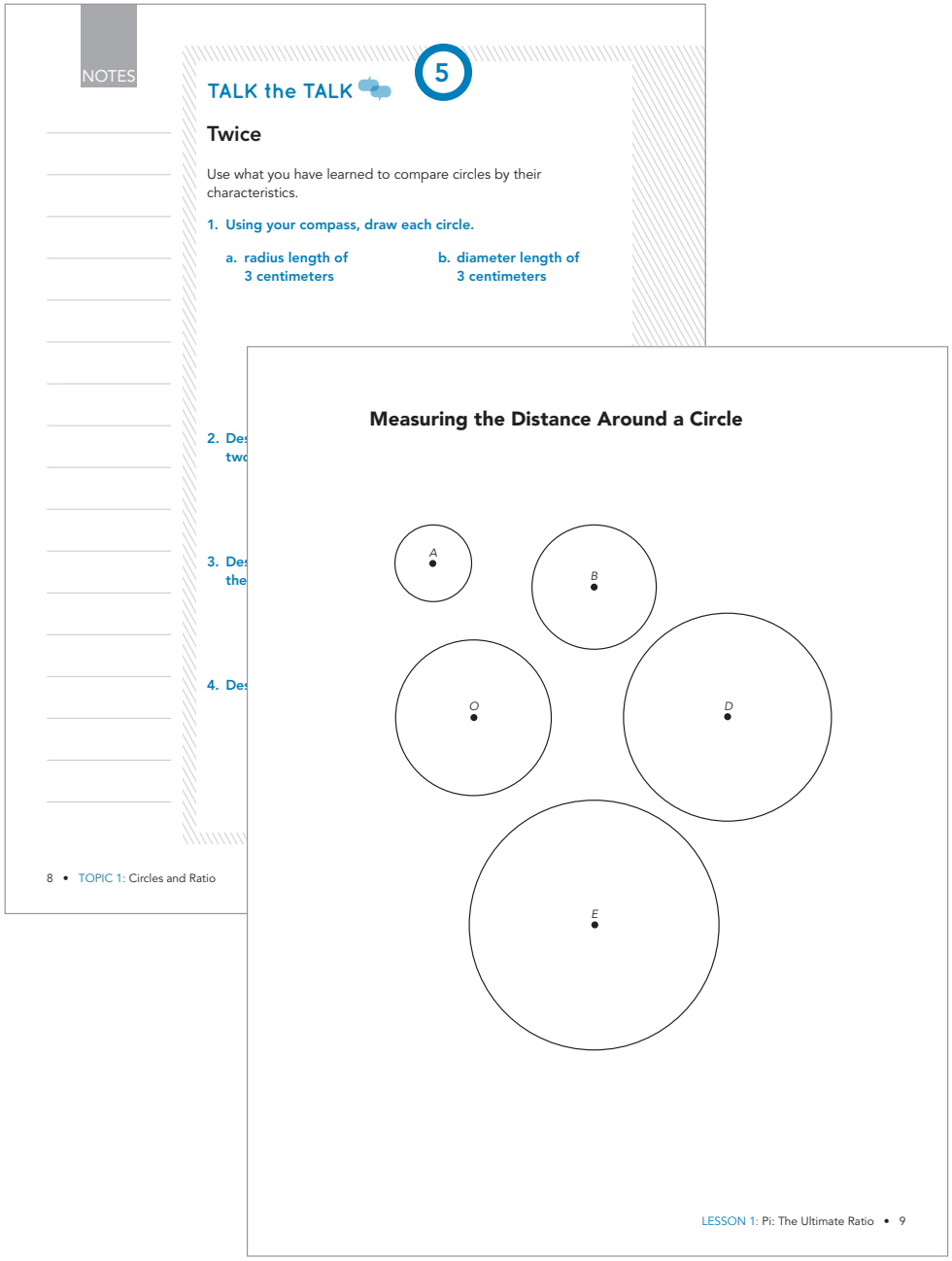
2. **Rewrite the formula for the circumference of a circle, where *r* represents the radius of a circle and *C* represents the circumference of a circle.**

3. **Use different representations for π to calculate the circumference of a circle.**

   a. **Calculate the circumference of a circle with a diameter of 4.5 centimeters and a circle with a radius of 6 inches. Round your answer to the nearest ten-thousandths, if necessary.**

Value for π	d = 4.5 centimeters	r = 6 inches
π		
Use the π key on a calculator		
Use 3.14 for π		
Use $\frac{22}{7}$ for π		

6 • TOPIC 1: Circles and Ratio



5. Talk the Talk

Talk the Talk gives you an opportunity to reflect on the main ideas of the lesson.

- Be honest with yourself.
- Ask questions to clarify anything you don't understand.
- Show what you know!

Don't forget to revisit the question posed on the lesson opening page to gauge your understanding.

Assignment

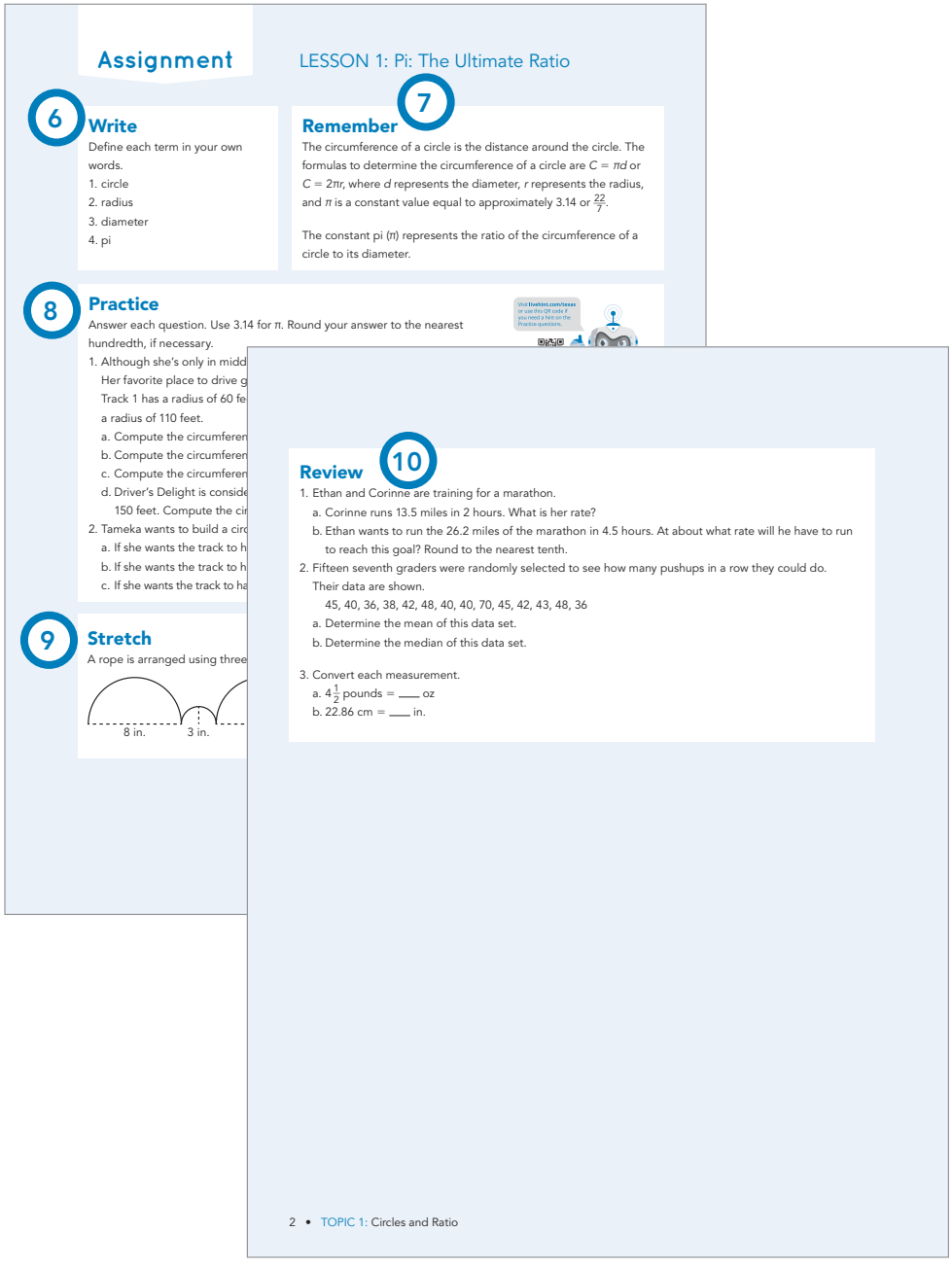
6. Write
Reflect on your work and clarify your thinking.

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.



Assignment

LESSON 1: Pi: The Ultimate Ratio

6 **Write**

Define each term in your own words.

1. circle
2. radius
3. diameter
4. pi

7 **Remember**

The circumference of a circle is the distance around the circle. The formulas to determine the circumference of a circle are $C = \pi d$ or $C = 2\pi r$, where d represents the diameter, r represents the radius, and π is a constant value equal to approximately 3.14 or $\frac{22}{7}$.

The constant pi (π) represents the ratio of the circumference of a circle to its diameter.

8 **Practice**

Answer each question. Use 3.14 for π. Round your answer to the nearest hundredth, if necessary.

1. Although she's only in midd
   Her favorite place to drive g
   Track 1 has a radius of 60 fe
   a radius of 110 feet.
   a. Compute the circumferen
   b. Compute the circumferen
   c. Compute the circumferen
   d. Driver's Delight is conside
   150 feet. Compute the cir
2. Tameka wants to build a circ
   a. If she wants the track to h
   b. If she wants the track to h
   c. If she wants the track to ha

9 **Stretch**

A rope is arranged using three

8 in. 3 in.

10 **Review**

1. Ethan and Corinne are training for a marathon.
   a. Corinne runs 13.5 miles in 2 hours. What is her rate?
   b. Ethan wants to run the 26.2 miles of the marathon in 4.5 hours. At about what rate will he have to run to reach this goal? Round to the nearest tenth.
2. Fifteen seventh graders were randomly selected to see how many pushups in a row they could do. Their data are shown.
   45, 40, 36, 38, 42, 48, 40, 40, 70, 45, 42, 43, 48, 36
   a. Determine the mean of this data set.
   b. Determine the median of this data set.
3. Convert each measurement.
   a. $4\frac{1}{2}$ pounds = ___ oz
   b. 22.86 cm = ___ in.

2 • TOPIC 1: Circles and Ratio

Problem Types You Will See

WORKED EXAMPLE

	$\frac{11}{3}x + 5 = \frac{17}{3}$	$\frac{1}{2}x + \frac{3}{4} = 2$
Step 1:	$3\left(\frac{11}{3}x + 5\right) = 3\left(\frac{17}{3}\right)$	$4\left(\frac{1}{2}x + \frac{3}{4}\right) = 4(2)$
Step 2:	$11x + 15 = 17$	$2x + 3 = 8$
Step 3:	$x = \frac{17 - 15}{11}$	$x = \frac{8 - 3}{2}$
	$= \frac{2}{11}$	$= \frac{5}{2}$

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?

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?

Analyze the solution strategy and solution for each inequality.

Ella

$$-\frac{1}{2}x + \frac{3}{4} < 2$$

$$-4\left(-\frac{1}{2}x + \frac{3}{4} < 2\right)$$

$$2x - 3 > -8$$

$$2x > -5$$

$$x > \frac{-5}{2}$$

$$x > -2.5$$

Describe the strategy that Ella used correctly.

Jeff

$$-12x + 20 < 32$$

$$\frac{-12x + 20}{-4} < \frac{32}{-4}$$

$$3x - 5 < -8$$

$$3x < -3$$

$$x < -1$$

Identify the error in Jeff's strategy and determine the correct solution.

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?

Vanessa was given a math problem to determine how many different rectangles can be constructed with an area of 12 square inches.

Vanessa thinks that there are only two: one with a width of 2 inches and a length of 6 inches, and another with a width of 3 inches and a length of 4 inches.
Is she correct? Explain your reasoning.

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

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.

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.

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?

Related Phrases

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

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?

Related Phrases

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

REPRESENT

Related Phrases

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

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?

ESTIMATE

Related Phrases

- Predict
- Approximate
- Expect
- About how much?

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?

DESCRIBE

Related Phrases

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

Definition

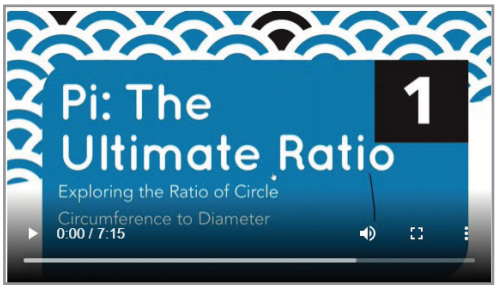
To represent or give an account of in words. Describing communicates mathematical ideas to others.

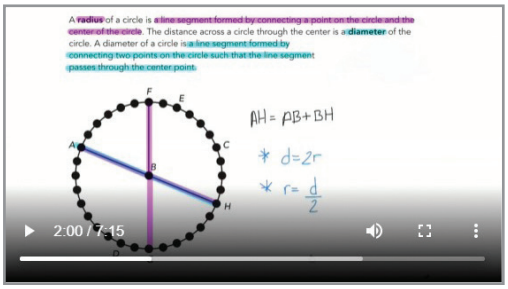
Ask Yourself

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

Student Lesson Overview Videos

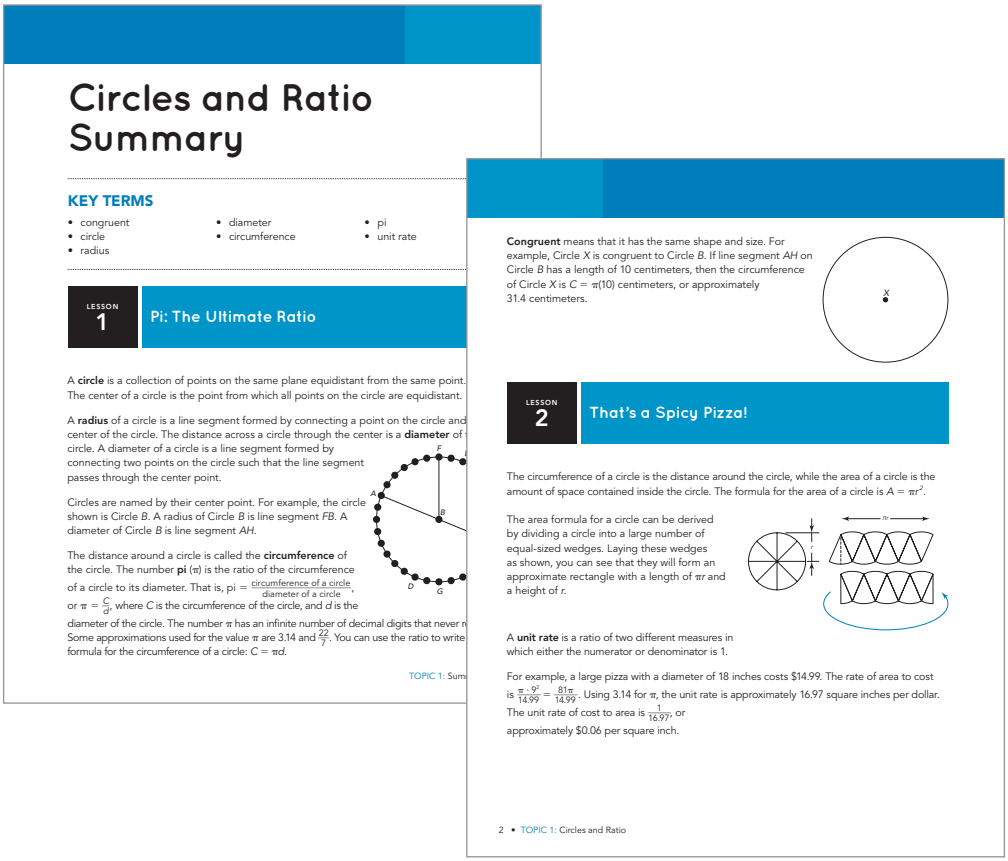
Each lesson has a corresponding lesson overview video(s) for you to use and reference as you are learning. The videos provide an overview of key concepts, strategies, and/or worked examples from the lessons.





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.



Circles and Ratio Summary

KEY TERMS

- congruent
- circle
- radius
- diameter
- circumference
- pi
- unit rate

LESSON 1 Pi: The Ultimate Ratio

A **circle** is a collection of points on the same plane equidistant from the same point. The center of a circle is the point from which all points on the circle are equidistant.

A **radius** of a circle is a line segment formed by connecting a point on the circle and center of the circle. The distance across a circle through the center is a **diameter** of circle. A diameter of a circle is a line segment formed by connecting two points on the circle such that the line segment passes through the center point.

Circles are named by their center point. For example, the circle shown is Circle *B*. A radius of Circle *B* is line segment *FB*. A diameter of Circle *B* is line segment *AH*.

The distance around a circle is called the **circumference** of the circle. The number **pi** (π) is the ratio of the circumference of a circle to its diameter. That is, $\pi = \frac{\text{circumference of a circle}}{\text{diameter of a circle}}$, or $\pi = \frac{C}{d}$, where C is the circumference of the circle, and d is the diameter of the circle. The number π has an infinite number of decimal digits that never r Some approximations used for the value π are 3.14 and $\frac{22}{7}$. You can use the ratio to write formula for the circumference of a circle: $C = \pi d$.

TOPIC 1: Sum

Congruent means that it has the same shape and size. For example, Circle *X* is congruent to Circle *B*. If line segment *AH* on Circle *B* has a length of 10 centimeters, then the circumference of Circle *X* is $C = \pi(10)$ centimeters, or approximately 31.4 centimeters.

LESSON 2 That's a Spicy Pizza!

The circumference of a circle is the distance around the circle, while the area of a circle is the amount of space contained inside the circle. The formula for the area of a circle is $A = \pi r^2$.

The area formula for a circle can be derived by dividing a circle into a large number of equal-sized wedges. Laying these wedges as shown, you can see that they will form an approximate rectangle with a length of πr and a height of r.

A **unit rate** is a ratio of two different measures in which either the numerator or denominator is 1.

For example, a large pizza with a diameter of 18 inches costs $14.99. The rate of area to cost is $\frac{\pi \cdot 9^2}{14.99} = \frac{81\pi}{14.99}$. Using 3.14 for π, the unit rate is approximately 16.97 square inches per dollar. The unit rate of cost to area is $\frac{1}{16.97}$, or approximately $0.06 per square inch.

2 • TOPIC 1: Circles and Ratio

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

401(k) plan

A 401(k) plan is a retirement investment account set up by an employer. A portion of an employee's pay is invested into the account with the employer often matching a certain amount of it.

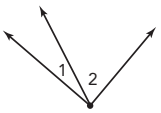
403(b) plan

A 403(b) plan is a retirement plan generally for public school employees or other tax exempt groups.

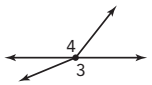
adjacent angles

Adjacent angles are two angles that share a common vertex and share a common side.

Examples



Angles 1 and 2 are adjacent angles.



Angles 3 and 4 are NOT adjacent angles.

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

appreciation

Appreciation is an increase in price or value.

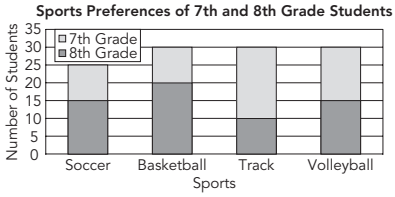
asset

Assets include the value of all accounts, investments, and things that you are own. They are positive and add to your net worth.

B

bar graph

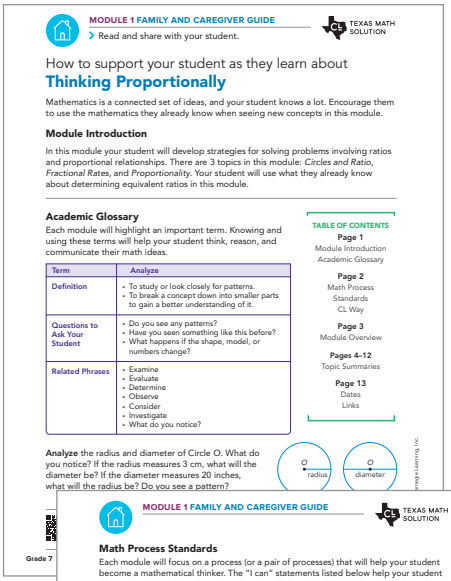
Bar graphs display data using horizontal or vertical bars so that the height or length of the bars indicates its value for a specific category



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.

TEXAS MATH SOLUTION

How to support your student as they learn about

Thinking Proportionally

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 develop strategies for solving problems involving ratios and proportional relationships. There are 3 topics in this module: *Circles and Ratio*, *Fractional Rates*, and *Proportionality*. Your student will use what they already know about determining equivalent ratios in this module.

Academic Glossary

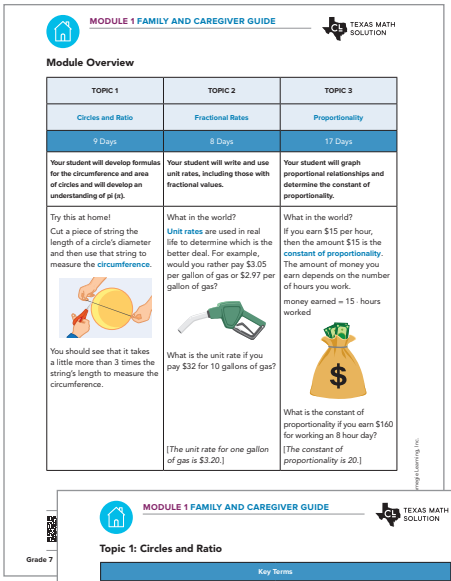
Each module will highlight an important term. Knowing and using these terms will help your student think, reason, and communicate their math ideas.

Term	Analyze
Definition	• To study or look closely for patterns. • To break a concept down into smaller parts to gain a better understanding of it.
Questions to Ask Your Student	• Do you see any patterns? • Have you seen something like this before? • What happens if the shape, model, or numbers change?
Related Phrases	• Examine • Evaluate • Determine • Observe • Consider • Investigate • What do you notice?

TABLE OF CONTENTS

Analyze the radius and diameter of Circle O. What do you notice? If the radius measures 3 cm, what will the diameter be? If the diameter measures 20 inches, what will the radius be? Do you see a pattern?

Grade 7



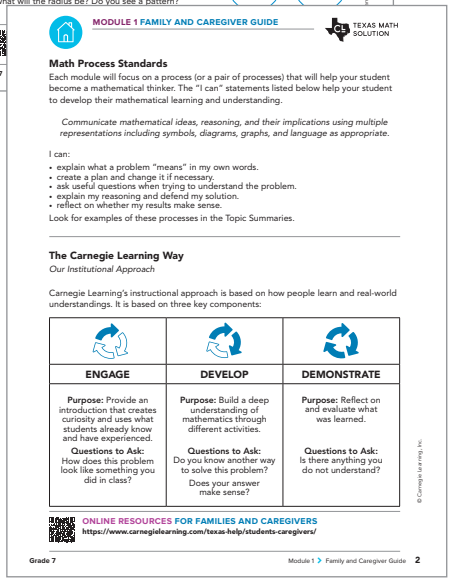
MODULE 1 FAMILY AND CAREGIVER GUIDE

TEXAS MATH SOLUTION

Module Overview

TOPIC 1	TOPIC 2	TOPIC 3
Circles and Ratio	Fractional Rates	Proportionality
9 Days	8 Days	17 Days
Your student will develop formulas for the circumference and area of circles and will develop an understanding of pi (π).	**Your student will write and use unit rates, including those with fractional values.**	**Your student will graph proportional relationships and determine the constant of proportionality.**
Try this at home! Cut a piece of string the length of a circle's diameter and then use that string to measure the **circumference**. You should see that it takes a little more than 3 times the string's length to measure the circumference.	What in the world? **Unit rates** are used in real life to determine which is the better deal. For example, would you rather pay $3.05 per gallon of gas or $2.97 per gallon of gas? What is the unit rate if you pay $32 for 10 gallons of gas? [*The unit rate for one gallon of gas is $3.20.*]	What in the world? If you earn $15 per hour, then the amount $15 is the **constant of proportionality**. The amount of money you earn depends on the number of hours you work. money earned = 15 · hours worked What is the constant of proportionality if you earn $160 for working an 8 hour day? [*The constant of proportionality is 20.*]

Grade 7



MODULE 1 FAMILY AND CAREGIVER GUIDE

TEXAS MATH SOLUTION

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

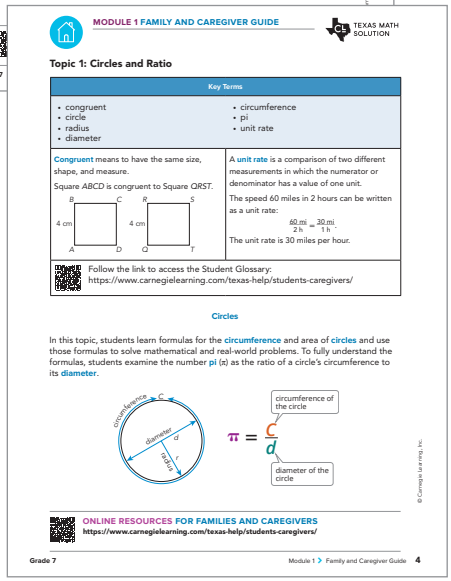
Our Institutional Approach

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 7 Module 1 › Family and Caregiver Guide 2



MODULE 1 FAMILY AND CAREGIVER GUIDE

TEXAS MATH SOLUTION

Topic 1: Circles and Ratio

Key Terms

- congruent
- circle
- radius
- diameter
- circumference
- pi
- unit rate

Congruent means to have the same size, shape, and measure.

Square *ABCD* is congruent to Square *QRST*.

A unit rate is a comparison of two different measurements in which the numerator or denominator has a value of one unit.

The speed 60 miles in 2 hours can be written as a unit rate:

$$\frac{60 \text{ mi}}{2 \text{ h}} = \frac{30 \text{ mi}}{1 \text{ h}}$$

The unit rate is 30 miles per hour.

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

Circles

In this topic, students learn formulas for the **circumference** and area of **circles** and use those formulas to solve mathematical and real-world problems. To fully understand the formulas, students examine the number **pi** (π) as the ratio of a circle's circumference to its **diameter**.

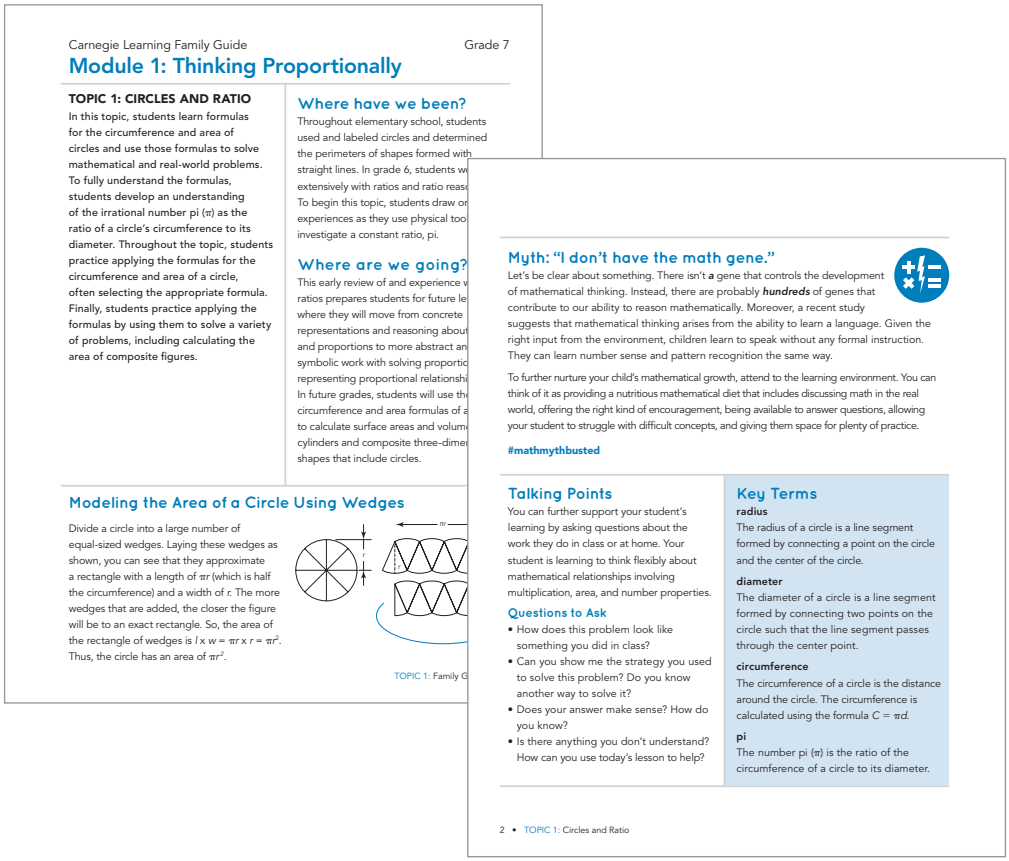
ONLINE RESOURCES FOR FAMILIES AND CAREGIVERS
https://www.carnegielearning.com/texas-help/students-caregivers/

Grade 7 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 7

Module 1: Thinking Proportionally

TOPIC 1: CIRCLES AND RATIO

In this topic, students learn formulas for the circumference and area of circles and use those formulas to solve mathematical and real-world problems. To fully understand the formulas, students develop an understanding of the irrational number pi (π) as the ratio of a circle's circumference to its diameter. Throughout the topic, students practice applying the formulas for the circumference and area of a circle, often selecting the appropriate formula. Finally, students practice applying the formulas by using them to solve a variety of problems, including calculating the area of composite figures.

Where have we been?

Throughout elementary school, students used and labeled circles and determined the perimeters of shapes formed with straight lines. In grade 6, students w extensively with ratios and ratio reas To begin this topic, students draw or experiences as they use physical too investigate a constant ratio, pi.

Where are we going?

This early review of and experience w ratios prepares students for future le where they will move from concrete representations and reasoning about and proportions to more abstract an symbolic work with solving proportic representing proportional relationshi In future grades, students will use th circumference and area formulas of a to calculate surface areas and volum cylinders and composite three-dime shapes that include circles.

Modeling the Area of a Circle Using Wedges

Divide a circle into a large number of equal-sized wedges. Laying these wedges as shown, you can see that they approximate a rectangle with a length of πr (which is half the circumference) and a width of r. The more wedges that are added, the closer the figure will be to an exact rectangle. So, the area of the rectangle of wedges is $l \times w = \pi r \times r = \pi r^2$. Thus, the circle has an area of πr^2.

TOPIC 1: Family G

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 our ability to reason mathematically. Moreover, 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 any 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 the right kind of encouragement, being available to answer questions, allowing your student to struggle with difficult concepts, and giving them space for plenty of practice.

#mathmythbusted

Talking Points

You can further support your student's learning by asking questions about the work they do in class or at home. Your student is learning to think flexibly about mathematical relationships involving multiplication, area, and number properties.

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

radius
The radius of a circle is a line segment formed by connecting a point on the circle and the center of the circle.

diameter
The diameter of a circle is a line segment formed by connecting two points on the circle such that the line segment passes through the center point.

circumference
The circumference of a circle is the distance around the circle. The circumference is calculated using the formula $C = \pi d$.

pi
The number pi (π) is the ratio of the circumference of a circle to its diameter.

2 • TOPIC 1: Circles and Ratio

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/