FLORIDA'S

B.E.S.T. Standards for **MATH**

Geometry

with **CalcChat®** and **CalcView®**

Ron Larson
Laurie Boswell

Big Ideas Learning

A Single Authorship Team

Written by renowned authors, Dr. Ron Larson and Dr. Laurie Boswell, *Florida's B.E.S.T. Standards for MATH* offers a seamless math pedagogy from Kindergarten through Algebra 2. Together, Ron and Laurie provide a consistent voice that encourages students to make connections through cohesive progressions and clear instruction. Since 1992, Ron and Laurie have authored over 50 mathematics programs.

> *Each time Laurie and I start working on a new program, we spend time putting ourselves in the position of the reader. How old is the reader? What is the reader's experience with mathematics? The answers to these questions become our writing guides. Our goal is to make the learning targets understandable and to develop these targets in a clear path that leads to student success.*

Ron Larson

Ron Larson, Ph.D., is well known as lead author of a comprehensive and widely used mathematics program that ranges from elementary school through college. He holds the distinction of Professor Emeritus from Penn State Erie, The Behrend College, where he taught for nearly 40 years. He received his Ph.D. in mathematics from the University of Colorado. Dr. Larson engages in the latest research and advancements in mathematics education and consistently incorporates key pedagogical elements to ensure focus, coherence, rigor, and student self-reflection.

> *My passion and goal in writing is to provide an essential resource for exploring and making sense of mathematics. Our program is guided by research around the learning and teaching of mathematics in the hopes of improving the achievement of all students. May this be a successful year for you!*

Laurie Boswell

Laurie Boswell, Ed.D., is the former Head of School at Riverside School in Lyndonville, Vermont. In addition to authoring textbooks, she provides mathematics consulting and embedded coaching sessions. Dr. Boswell received her Ed.D. from the University of Vermont in 2010. She is a recipient of the Presidential Award for Excellence in Mathematics Teaching and later served as president of CPAM. Laurie has taught math to students at all levels, elementary through college. In addition, Laurie has served on the NCTM Board of Directors and as a Regional Director for NCSM. Along with Ron, Laurie has co-authored numerous math programs and has become a popular national speaker.

A Program Built for Florida

Florida Landmarks
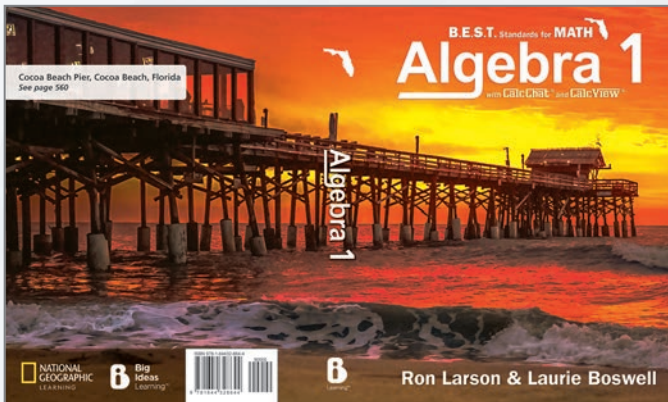
Cocoa Beach Pier, Cocoa Beach, Florida
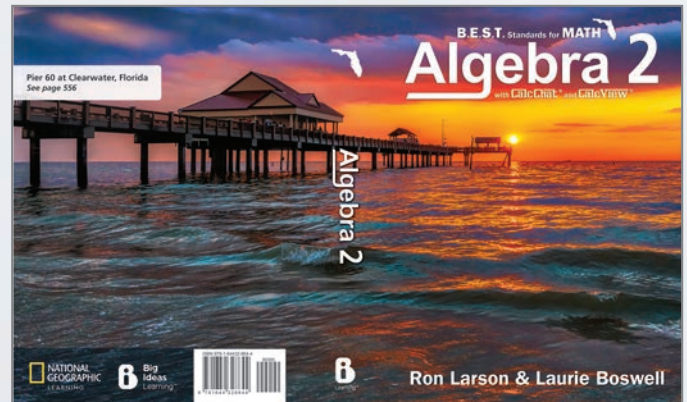
Pier 60, Clearwater, Florida

Old Pier, Naples, Florida

Opportunities for Deeper Thinking

Course Project

One of the course projects suggested at the end of this book is related to the Florida landmark on the cover. You can choose to study the numerous structures of the Old Pier, or perhaps an environmental issue related to the coastal region, or any other topic of interest to you. Several topics are suggested. Work on your project throughout the course as you investigate, explore, and analyze the world around you.

The Old Pier

The Old Pier is one of the best-known landmarks of Naples, Florida. Originally constructed in 1888, the pier has had an eventful life. Four hurricanes, a fire, and worms (yes—worms) have all damaged or destroyed the pier over the years, requiring a series of reconstructions and repairs.

Piers are surprisingly complex structures and contain numerous geometric and mathematical features. The length, width, and layout of the pier; the height and shape of the pilings; the dimensions of the building materials used, their number, and how they are assembled; and the depth of the water and contours of the ocean floor can all be described using geometry and other types of mathematics.

Research the Old Pier and its history. Pay particular attention to the specifications of the various reconstructions, repairs, and remodels the pier has undergone. Use what you learn to choose a topic and generate a driving question that you will seek to answer. Use factual information or invent fictitious stories and situations based on real-life information to create a presentation that answers your question and explains how the history of the Old Pier relates to what you are learning in Geometry.

Embedded Florida Honors Content

Throughout this program, look for **H** to denote honors content. This icon may appear at the beginning of a section or within a section.

Dig Deeper

Go deeper in your thinking on every topic by accessing *Dig Deeper* problems online. These problems allow you to work with more complex and interconnected ideas to achieve deeper understanding of conceptual themes throughout your course. These additional higher order thinking problems are available for every section.

Research

Ron Larson and Laurie Boswell used the latest in educational research, along with the body of knowledge collected from expert mathematics educators, to develop the *Florida's B.E.S.T. Standards for MATH* series. The pedagogical approach used in this program follows the best practices outlined in the most prominent and widely accepted educational research, including:

- *B.E.S.T. Standards for Mathematics*, Florida Department of Education ©2020
- *Visible Learning*, John Hattie ©2009
- *Visible Learning for Mathematics* John Hattie ©2017
- *Visible Learning Feedback* John Hattie ©2018
- *Teaching Mathematics in the Visible Learning Classroom, High School* John Almarode, Douglas Fisher, Joseph Assof, John Hattie, and Nancy Frey ©2018
- *The Teacher Clarity Playbook, Grades K–12* Douglas Fisher, Nancy Frey, Olivia Amador, and John Hattie ©2018
- *The Distance Learning Playbook, Grades K–12* Douglas Fisher, Nancy Frey, and John Hattie ©2020
- *Principles to Actions: Ensuring Mathematical Success for All* NCTM ©2014
- *Adding It Up: Helping Children Learn Mathematics* National Research Council ©2001
- *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching* Jo Boaler ©2015
- *What Works in Schools: Translating Research into Action* Robert Marzano ©2003
- *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement* Marzano, Pickering, and Pollock ©2001

- *Principles and Standards for School Mathematics* NCTM ©2000
- *Rigorous PBL by Design: Three Shifts for Developing Confident and Competent Learners* Michael McDowell ©2017
- *Universal Design for Learning Guidelines* CAST ©2011
- Rigor/Relevance Framework® International Center for Leadership in Education
- *Understanding by Design* Grant Wiggins and Jay McTighe ©2005
- Achieve, ACT, and The College Board
- *Elementary and Middle School Mathematics: Teaching Developmentally* John A. Van de Walle and Karen S. Karp ©2015
- *Evaluating the Quality of Learning: The SOLO Taxonomy* John B. Biggs & Kevin F. Collis ©1982
- *Unlocking Formative Assessment: Practical Strategies for Enhancing Students' Learning in the Primary and Intermediate Classroom* Shirley Clarke, Helen Timperley, and John Hattie ©2004
- *Formative Assessment in the Secondary Classroom* Shirley Clarke ©2005
- *Improving Student Achievement: A Practical Guide to Assessment for Learning* Toni Glasson ©2009

Contributing Specialists and Reviewers

Big Ideas Learning would like to express our gratitude to the mathematics education and instruction experts from Florida who served as our advisory panel, in addition to all the contributing specialists and reviewers who played a key role during the writing of *Florida's B.E.S.T. Standards for MATH*. Their input was an invaluable asset during the development of this program.

- **Sophie Murphy**, Ph.D. Candidate, Melbourne School of Education, Melbourne, Australia
  Learning Targets and Success Criteria Specialist and Visible Learning Reviewer

- **Judy Hickman**, Florida Education Consultant Northern Pan Handle, FL
  Content Reviewer and Assessment Specialist

- **India White**, Ph.D., National Education Consultant Team, Tampa, FL
  Content Reviewer

- **Dakeyan Chá Dré Graham**, Ph.D., Executive Director, Independent Education and Parental Choice, Florida Department of Education, Tallahassee, FL
  Equity Specialist

- **Noelle Camel**, Special Education Teacher, Osceola, FL
  Advisory Panel

- **Elisa Greco**, Math Teacher, Osceola, FL
  Advisory Panel

- **Benjamin Hicks**, Math Teacher, Alachua, FL
  Advisory Panel

- **Jake Kahn**, Math Teacher, Duval, FL
  Advisory Panel

- **Kéto Nord**, Math Department Head, Hillsborough, FL
  Advisory Panel

- **Denise Williams**, Secondary Math Coordinator, Leon, FL
  Advisory Panel

- **Jason Berkholz**, Mathematics Department Chair, Metropolitan School District of Washington Township, Indianapolis, IN
  Content Reviewer

- **Matthew L. Beyranevand**, Ed.D, K–12 Mathematics Coordinator, Chelmsford, MA
  Content Reviewer

- **Elizabeth Caccavella**, Ed.D, Supervisor of Mathematics, Paterson, NJ
  Content Reviewer

- **Larry Dorf**, Secondary Mathematics Teacher, Harrisburg, PA
  Content Reviewer

- **Linda Hall**, Mathematics Educational Consultant, Edmond, OK
  Teaching Edition Contributor and Advisory Panel

- **Jill Kalb**, Secondary Math Content Specialist, Arvada, CO
  Content Reviewer

- **Michael McDowell**, Ed.D., Superintendent, Ross, CA
  Project-Based Learning Specialist

- **Dr. Connie S. Schrock**, Professor of Mathematics, Emporia, KS
  Teaching Edition Contributor

- **Nancy Siddens**, Independent Language Teaching Consultant, Las Cruces, NM
  English Language Learner Specialist

- **Beverly Stitzel**, Secondary Mathematics Teacher, Oxford, MI
  Content Reviewer

Instructional Design

A single authorship team from Kindergarten through Algebra 2 results in a logical progression of focused topics with thoughtful coherence and rigor throughout the curriculum.

FOCUS

Focused on Florida's *B.E.S.T. Standards for Mathematics*, each section displays the precise language of Florida benchmarks, making the expectations clear. Learning Targets and Success Criteria are aligned to those expectations.

Florida benchmarks are shown at the beginning of each section, with related **Learning Targets** and **Success Criteria** to guide your learning.

4.2 Writing Equations in Point-Slope Form

Learning Target: Write and graph equations of lines in point-slope form.

Success Criteria:
• I can graph linear equations written in point-slope form.
• I can use a point on a line and the slope to write an equation of the line.
• I can use any two points to write an equation of a line.
• I can write a linear function using any two function values.

EXPLORE IT! Writing Equations

Work with a partner.

a. For each graph, find the y-intercept of the line that has the given slope and passes through the given point. Then write an equation of the line.

$m = \frac{1}{2}$ $m = -2$

b. The point (x_1, y_1) is a given point on a nonvertical line. The point (x, y) is any other point on the line. Write an equation that represents the slope m. Then solve your equation for $(y - y_1)$. What does the resulting equation represent? Explain your reasoning.

2 MTR MAKE A CONNECTION What information do you need in order to write an equation of a line using your equation in part (b)?

c. Justify your equations in part (a) using the results of part (b). Which method do you prefer? Explain your reasoning.

Algebraic Reasoning
MA.912.AR.2.2 Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.
MA.912.AR.2.4 Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features.
Also MA.912.AR.2.5

4.2   Writing Equations in Point-Slope Form   185

Progressions

COHERENCE Through the Grades

Prior Learning	Current Learning	Future Learning
Middle School	**Chapter 3**	**Algebra 1**
• MA.8.GR.2.3 Describe and apply translations, reflections, rotations, and dilations using coordinates and the coordinate plane.	• MA.912.AR.2.5 Understand the concept of a function. Find the domain and range of a function.	• MA.912.AR.2.2 Write equations of lines in slope-intercept, point-slope, and standard form.
• MA.8.AR.3.4 Graph linear equations.	• MA.912.AR.2.4, MA.912.AR.2.5, MA.912.AR.3.7, MA.912.AR.3.8 Describe characteristics of functions.	• MA.912.AR.9.1 Write and solve linear equations by graphing
• MA.8.AR.3.2, MA.8.AR.3.5 Find and interpret the slope and y-intercept of a line.	• MA.912.AR.2.4 Sketch a graph of a function from a verbal description.	• MA.912.AR.2.1 Solve linear equations by graphing
• MA.8.F.1.1 Determine whether a relation is a function. Find the domain and range of a relation.	• MA.912.F.1.6 Compare key features of linear and nonlinear functions.	• MA.912.AR.2.8 Graph the solution of linear inequality in two variables
• MA.8.F.1.2 Recognize linear functions represented as tables, equations, and graphs.	• MA.912.AR.2.4, MA.912.AR.2.5 Graph linear functions and interpret key features of the graphs.	• MA.912.AR.9.4 Graph the solution of a system of linear inequalities
• MA.8.F.1.3 Describe relationships between quantities in graphs. Sketch graphs given	• MA.912.F.1.1 Identify linear functions using graphs, tables, and equations.	• MA.912.F.1.1 Distinguish between linear and exponential functions.
		• MA.912.AR.5.6 Graph exponential functions and show key features of the

Every chapter is written to follow the progressions built into the Florida benchmarks. The **Progressions** detailed in the Teaching Edition show how content progresses from grade to grade. These Algebra 1 standards, on functions, build on the foundational work with equations and graphs from middle school.

COHERENCE

The sequence of topics, from Kindergarten to Algebra 2, follows the benchmarks and clarifications for each grade and progresses meaningfully within each grade and between grade levels.

from a Single Authorship Team

Meet a **National Geographic Explorer** at the start of every chapter and follow the context through the chapter to connect the research to your learning.

1 Performance Task
Every Drop Counts

About Video Did You Know? STEM

NATIONAL GEOGRAPHIC E
Dalal Hanna
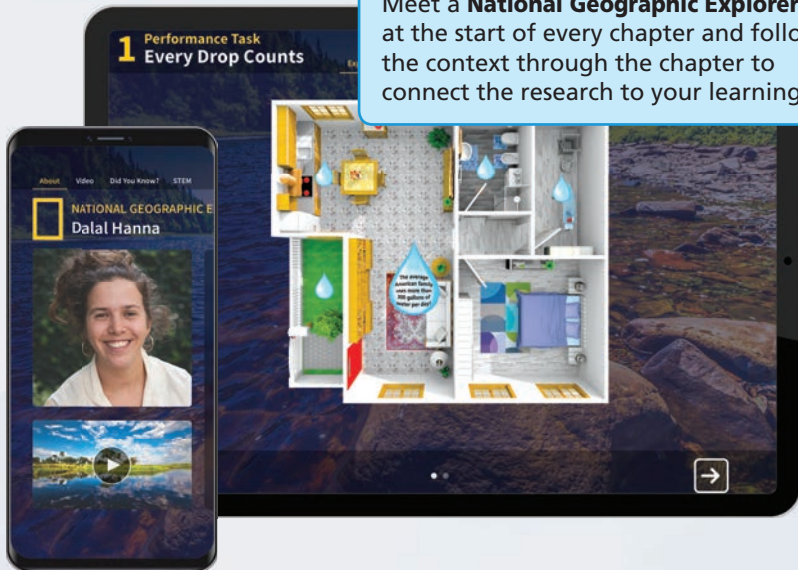
RIGOR

In every chapter, you have opportunities to explore, discover, and solidify conceptual understanding, then apply and transfer that learning. This program weaves together the three important building blocks of rigor:

- **Conceptual Understanding**
  Discovering why
- **Procedural Fluency**
  Learning how
- **Application**
  Knowing when to apply

EXPLORE IT!   Modeling a Real-Life Problem

Work with a partner. The Okavango Delta is the largest freshwater wetland in southern Africa and is the main source of water for one million people.

1 **ANALYZE A PROBLEM**
MTR
How can you use the graph to determine the quantities involved and the relationship between the quantities?

Water Flow in the Okavango Delta

Flow rate (m³ per sec) vs Month (Jan–Jul)
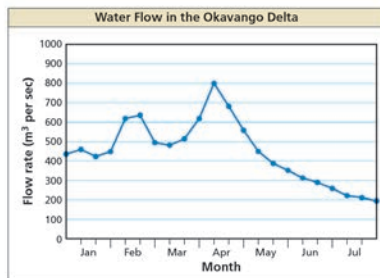
Apply your knowledge with **Modeling Real Life**, **Dig Deeper**, and other non-routine problems to achieve deep levels of learning. Apply your knowledge to different contexts, see connections between ideas, and justify your thinking.

Develop foundational concepts with discovery in **Explore It!**

Build procedural fluency with clear **Key Ideas** and **Examples**, followed by abundant opportunities to practice skills in **Self-Assessment**, **Practice**, and **Review & Refresh**.

7 33. **MODELING REAL LIFE** A city's commuter system
MTR has three zones. Zone 1 serves people living within 3 miles of the city's center. Zone 2 serves those between 3 and 7 miles from the center. Zone 3 serves those more than 7 miles from the center. *(See Example 6.)*

Zone 3
Zone 1
Zone 2
0   4 mi

a. Graph this situation in a coordinate plane where each unit corresponds to 1 mile. Locate the city's center at the origin.

b. Determine which zone serves people whose homes are represented by the points (3, 4), (6, 5), (1, 2), (0, 3), and (1, 6).

EXAMPLE 2   Combining Like Terms to Solve an Equation   ▶ WATCH

Solve $-12 = 9x - 6x + 15$. Check your solution.

SOLUTION

$-12 = 9x - 6x + 15$	Write the equation.
$-12 = 3x + 15$	Combine like terms.
Undo the addition. → $\underline{-15\qquad -15}$	Subtraction Property of Equality
$-27 = 3x$	Simplify.
Undo the multiplication. → $\dfrac{-27}{3} = \dfrac{3x}{3}$	Division Property of Equality
$-9 = x$	Simplify.

Check
$-12 = 9x - 6x + 15$
$-12 \overset{?}{=} 9(-9) - 6(-9) + 15$
$-12 = -12$ ✓

▶ The solution is $x = -9$.

What is Fluency?

Fluency is more than the memorization of facts or procedures. Fluency builds on a foundation of conceptual understanding, strategic reasoning, and problem-solving to achieve automaticity. You connect your conceptual understanding with strategies and methods that make sense to you.

2 Quadratic Functions

2.1 Transformations of Quadratic Functions
2.2 Characteristics of Quadratic Functions
2.3 Writing Quadratic Functions
2.4 Modeling with Quadratic Functions

NATIONAL GEOGRAPHIC EXPLORER
Jennifer Lopez

Jennifer Lopez is a technologist and data scientist with a mission to use citizen science to help unravel secrets of the cosmos. She is a founding member of NASA's Datanaut Corps, which inspires future engineers, data scientists, and entrepreneurs to engage with NASA in solving data challenges.

• What is a technologist? What is a data scientist?
• What is in-space manufacturing?
• Why is in-space manufacturing crucial to the success of long-term exploration missions in space?

STEM
Radio telescopes can be used to study the compositions of stars, planets, and moons. In the Performance Task, you will design a radio telescope and use a quadratic equation to describe its

Begin every chapter discovering the research from a National Geographic Explorer and thinking about the world around you. Apply what you learn in the chapter with a related **Performance Task**.

Why Fluency Matters

By building fluency in arithmetic, you can efficiently use foundational skills to solve deeper, more meaningful problems about the world around you. Fluency will contribute to your success not only in school, but also in your daily life.

2 Performance Task
Stargazing

Explore   Did You Know?   Performance Task

RADIO TELESCOPES

Distant Radio Source

Focal Point

Parabolic Dish

Modeling Real Life, **Dig Deeper**, and other non-routine problems help you apply and deepen your learning.

69. **DIG DEEPER** The function $t(r) = -35 \ln\left(1 - \dfrac{r}{100}\right)$ represents the time (in minutes) it takes to recharge a tablet battery from 0% to r% of its full charge.

a. Use technology to graph t for $0 < r < 100$ and for $0 < t < 350$.

b. How long will it take to recharge the battery to 40% of its full charge?

c. Describe what happens to $t(r)$ as r increases in this situation.
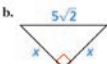
with B.E.S.T. Mathematics

Procedural Fluency

In previous grades, you solidified your understanding of arithmetic operations, found reliable methods for solving, and worked toward becoming independently fluent to solve problems. This program provides ample opportunities for you to practice and achieve fluency in any skills from prior grades, with support resources such as the **Skills Trainer**.

> Use procedures and standard algorithms to solve math problems and justify your thinking.

EXAMPLE 1 Finding Side Lengths in 45°-45°-90° Triangles

Find the value of x. Write your answer in simplest form.

a.

b.

SOLUTION

a. By the Triangle Sum Theorem, the measure of the third angle must be 45°, so the triangle is a 45°-45°-90° triangle.

$$\text{hypotenuse} = \text{leg} \cdot \sqrt{2} \qquad \text{45°-45°-90° Triangle Theorem}$$
$$x = 8 \cdot \sqrt{2} \qquad \text{Substitute.}$$
$$x = 8\sqrt{2} \qquad \text{Simplify.}$$

▶ The value of x is $8\sqrt{2}$.

b. By the Base Angles Theorem and the Corollary to the Triangle Sum Theorem, the triangle is a 45°-45°-90° triangle.
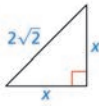
$$\text{hypotenuse} = \text{leg} \cdot \sqrt{2} \qquad \text{45°-45°-90° Triangle Theorem}$$
$$5\sqrt{2} = x \cdot \sqrt{2} \qquad \text{Substitute.}$$
$$\frac{5\sqrt{2}}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}} \qquad \text{Division Property of Equality}$$
$$5 = x \qquad \text{Simplify.}$$

▶ The value of x is 5.

SELF-ASSESSMENT **1** I don't understand yet. **2** I can do it with help. **3** I can do it on my own. **4** I can teach

Find the missing side length(s). Write your answer(s) in simplest form.

1.

2.

3.

4.

GO DIGITAL
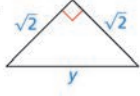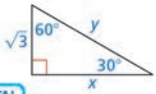
> Practice using standard algorithms to solve exercises in **Self-Assessment**, **Practice**, and **Review & Refresh**.

9 Chapter Review with CalcChat®

Chapter Learning Target:	Understand right triangles and trigonometry.
Chapter Success Criteria:	◆ I can use the Pythagorean Theorem to solve problems.
	◆ I can find side lengths in special right triangles.
	■ I can explain how similar triangles are used with trigonometric ratios.
	■ I can use trigonometric ratios to solve problems.

◆ Surface
■ Deep

SELF-ASSESSMENT **1** I don't understand yet. **2** I can do it with help. **3** I can do it on my own. **4** I can teach someone else.

> This cumulative practice feature gives you an opportunity to independently practice using accurate and efficient procedures.

9.1 The Pythagorean Theorem (pp. 453–460)

Learning Target: Understand and apply the Pythagorean Theorem.

Find the value of x. Then tell whether the side lengths form a Pythagorean triple.

1.

2.

3.

4.

Tell whether the triangle is a right triangle.

5.

6.

Vocabulary
pictorial proof
Pythagorean triple

Encouraging Mathematical Mindsets

Developing proficiency in the **Mathematical Thinking and Reasoning (MTR) Standards** is about becoming a mathematical thinker. Actively learn to ask why, and to reason and communicate with others as you learn. Use this guide to develop proficiency with each standard.

1

Actively Participate in Effortful Learning by staying engaged and maintaining a positive mindset when working to solve tasks. Ask questions and analyze the problem in a way that makes sense, persevering and modifying as needed, and support each other during challenging tasks or when attempting a new method or approach.

Look for labels such as:
- Analyze a Problem
- Ask a Question
- Persevere
- Stay Positive
- Help a Classmate

EXPLORE IT! Graphing a Linear Inequality in Two Variables

Work with a partner. You have $60 to spend on sand and gravel to make a pen for your dog.

1 MTR ANALYZE A PROBLEM

If you used only sand, about how much could you purchase? If you used only gravel, about how much could you purchase? What are the advantages and disadvantages of each for a dog pen?
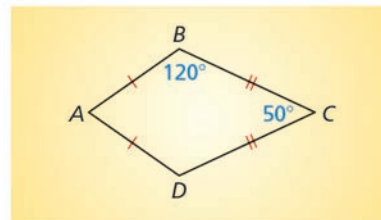
Sand
$8/ft³

Gravel
$7.50/ft³

a. Use an inequality to represent the situation.

b. Identify several solu... the inequality. Plot y... in the coordinate pla...

1 MTR 20. HELP A CLASSMATE Explain to a classmate how to find $m\angle A$.

B
120°
A
50° C
D

BUILDING TO FULL UNDERSTANDING

Throughout each course, you have opportunities to demonstrate specific aspects of the Mathematical Thinking and Reasoning Standards. Labels throughout the book indicate gateways to those aspects. Collectively, these opportunities will lead students to a full understanding of each standard. Developing these mindsets and habits will give meaning to the mathematics you learn.

2

Demonstrate Understanding by Representing Problems in Multiple Ways through modeling and by using objects, drawings, tables, and graphs to represent solutions. Progress from choosing representations to using algorithms and equations to connect concepts with models.

Look for labels such as:
- Model a Problem
- Use Another Method
- Multiple Representations
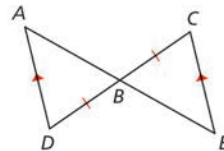- Choose a Representation
- Make a Connection

EXAMPLE 2 Using the ASA Congruence Theorem ▶WATCH

Write a proof.

Given $\overline{AD} \parallel \overline{EC}$, $\overline{BD} \cong \overline{BC}$

Prove $\triangle ABD \cong \triangle EBC$

SOLUTION

| STATEMENTS	REASONS
1. $\overline{AD} \parallel \overline{EC}$	1. Given
A 2. $\angle D \cong \angle C$	2. Alternate Interior Angles Theorem
S 3. $\overline{BD} \cong \overline{BC}$	3. Given
A 4. $\angle ABD \cong \angle EBC$	4. Vertical Angles Congruence Theorem
5. $\triangle ABD \cong \triangle EBC$	5.

2 MTR USE ANOTHER METHOD
Use the AAS Congruence Theorem to prove that $\triangle ABD \cong \triangle EBC$.

3 MTR 51. ADAPT A PROCEDURE You and your friend plan to meet each other at the water fountain in a park. Write a system of equations that represents a possible route you take to the fountain and a possible route your friend takes to the fountain. Is the solution of your system the fountain? Justify your answer.

• Water Fountain
You
Your Friend
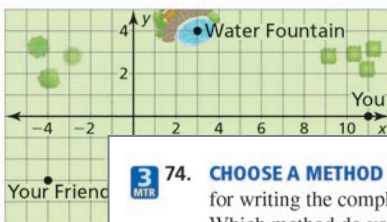
When you **Complete Tasks with Mathematical Fluency**, you select efficient methods to complete tasks accurately and with confidence. You stay flexible, using feedback to improve efficiency and adapting procedures to new concepts.

3

Look for labels such as:
- Choose a Method
- Select Methods
- Maintain Accuracy
- Adapt a Procedure
- Reflect on Your Method

3 MTR 74. CHOOSE A METHOD Describe the methods shown for writing the complex expression in standard form. Which method do you prefer? Explain.

Method 1
$$4i(2 - 3i) + 4i(1 - 2i) = 8i - 12i^2 + 4i - 8i^2$$
$$= 8i - 12(-1) + 4i - 8(-1)$$
$$= 20 + 12i$$

Method 2
$$4i(2 - 3i) + 4i(1 - 2i) = 4i[(2 - 3i) + (1 - 2i)]$$
$$= 4i[3 - 5i]$$
$$= 12i - 20i^2$$
$$= 12i - 20(-1)$$
$$= 20 + 12i$$

Embedded Mathematical Thinking

4

When you **Engage in Discussions that Reflect on the Mathematical Thinking of Self and Others,** you analyze and compare your own mathematical ideas and thinking together with your peers. By recognizing errors and justifying results, you can construct possible arguments based on evidence.

Look for labels such as:
- Communicate Clearly
- Discuss Mathematical Thinking
- Error Analysis
- Compare Methods
- Construct an Argument
- Making an Argument
- Justify a Result
- Which One Doesn't Belong?
- Different Words, Same Question

EXPLORE IT! Displaying Data

Work with a partner. Analyze the data and then create a display that best represents the data. Explain your choice of data display.

a. The Montana Department of Fish, Wildlife & Parks reported the following numbers of claims made to retrieve elk killed on roadways.

adult male: 69   adult female: 178   calf: 52

b. The data below show the numbers of deer killed on roads in one region of Colorado from 2007 to 2018.

OBSERVED DEER FATALITIES

2007: 352	2011: 315	2015: 159
2008: 348	2012: 275	2016: 301
2009: 264	2013: 139	2017: 291
2010: 336	2014: 116	2018: 220

c. A yearlong study by volun... of animals killed by motor...

4 MTR COMPARE METHODS

Compare your data displays in parts (a)–(c) with other students. Can more than one display be appropriate for a set of data?

5

Use Patterns and Structure to Help Understand and Connect Concepts by focusing on details, finding logical order, or breaking down a problem into smaller parts. You often look for similarities between a new concept and something you learned before.

Look for labels such as:
- Make a Plan
- Relate Concepts
- Connecting Concepts
- Use a Similar Problem
- Decompose a Problem
- Patterns
- Structure

EXAMPLE 5 Finding the Surface Area of a Similar Solid ▶ WATCH

Prism A and prism B are similar. Find the surface area of prism B.

SOLUTION
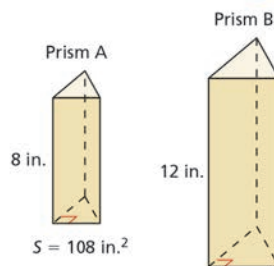
The scale factor is $k = \dfrac{\text{Height of prism B}}{\text{Height of prism A}}$

$= \dfrac{12}{8}$

$= \dfrac{3}{2}$

Prism A   8 in.   Prism B   12 in.

$S = 108 \text{ in.}^2$

Use the scale factor to find the surface area of prism B.

$\dfrac{\text{Surface area of prism B}}{\text{Surface area of prism A}} = k^2$ The ratio of the surface areas is k^2.

5 MTR RELATE CONCEPTS

Explain how your previous understanding of dilations and scale factors in two dimensions is related to finding surface areas of similar solids.

6 When you **Assess the Reasonableness of Solutions**, you are developing a habit of checking your calculations when solving problems. Estimate to determine possible solutions and use benchmarks to determine if a solution makes sense.

Look for labels such as:
- Assess Reasonableness
- Justifying Steps

EXPLORE IT! Transforming Graphs of Cubic and Quartic Functions

Work with a partner. The graphs of the parent cubic function $f(x) = x^3$ and the parent quartic function $g(x) = x^4$ are shown.
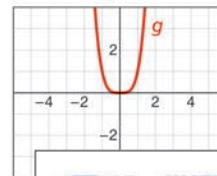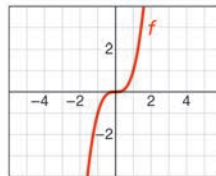
6 MTR ASSESS REASONABLENESS
Explain why it is reasonable that the range of f includes negative numbers, but the range of g does not.

6 MTR 87. JUSTIFYING STEPS Justify each step in the simplification of i^2.

Algebraic Step	Justification
$i^2 = \left(\sqrt{-1}\right)^2$	
$= -1$	

7 When you **Apply Mathematics to Real-World Contexts**, you connect concepts to everyday experiences and use models and methods to understand, represent, and solve problems.

Look for labels such as:
- Apply Mathematics
- Modeling Real Life
- Investigate
- Performance Task
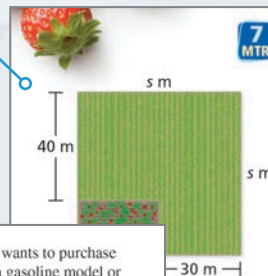
7 MTR EXAMPLE 4 Modeling Real Life ▶ WATCH

A farmer plants a rectangular strawberry patch in a corner of a square plot of land. The area of the strawberry patch is 600 square meters. What is the area of the square plot of land?

s m

40 m

s m

— 30 m —

SOLUTION

1. **Understand the Problem** You are given the area of a strawberry patch and a diagram showing dimensions of a plot of land that contains the strawberry patch. You are asked to find the total area of the plot of land.

2. **Make a Plan** The length of the strawberry patch is $(s - 30)$ meters, and the width is $(s - 40)$ meters. Write and solve an equation to find the side length s. Then use the solution to find the area of the square plot of land.

3. **Solve and Check** Use the formula for the area of a rectangle to write an equation. Then solve to find the side length s of the square plot of land.

$600 = (s - 30)(s - 40)$	Write an equation.
$600 = s^2 - 70s + 1200$	Multiply.

7 MTR 25. PERFORMANCE TASK Your family wants to purchase a new vehicle that comes in either a gasoline model or an electric model.

a. Using the information shown, the approximate number of miles your family drives per year, and gas and electricity prices in your area, determine which vehicle is a better buy. Use linear equations to support your answer.

b. Research other factors that affect the cost of vehicle ownership. How might these factors support or change your answer?

Gasoline
Price: $17,950
Fuel Economy:
26 mi/gal city
38 mi/gal highway

Electric
Price: $29,120
Fuel Economy:
31 kWh/100 mi

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Visible Learning Through Learning Targets,

Making Learning Visible

Knowing the learning intention of a chapter or section helps you focus on the purpose of an activity, rather than simply completing it in isolation. This program supports visible learning through the consistent use of Learning Targets and Success Criteria to ensure positive outcomes for all students.

Every chapter and section shows a **Learning Target** and related **Success Criteria**. These are purposefully integrated into each carefully written lesson.

Chapter Learning Target: Understand reasoning and proofs.

Chapter Success Criteria:
- ◆ I can use inductive and deductive reasoning.
- ◆ I can justify steps using algebraic reasoning.
- ■ I can explain postulates using diagrams.
- ■ I can prove geometric relationships.

2.3 Postulates and Diagrams

Learning Target: Interpret and sketch diagrams.

Success Criteria:
- • I can identify postulates represented by diagrams.
- • I can sketch a diagram given a verbal description.
- • I can interpret a diagram.

The **Self-Assessment** and **Chapter Review** remind you to rate your understanding of the Learning Targets. In the Chapter Review, you can review each section with a reminder of that section's Learning Target.

SELF-ASSESSMENT | **1** I don't understand yet. | **2** I can do it with help. | **3** I can do it on my own. | **4** I can teach someone else.

2.1 Conditional Statements *(pp. 65–72)* ▶ WATCH

Learning Target: Understand and write conditional statements.

Write the if-then form, the converse, the inverse, the contrapositive, and the biconditional of the conditional statement.

1. Two lines intersect in a point.
2. $4x + 9 = 21$ because $x = 3$.
3. Supplementary angles sum to 180°.
4. Right angles are 90°.

Decide whether the statement about the diagram is true. Explain your answer using the definitions you have learned.

5. S is the midpoint of $\overline{EF}$.

Vocabulary AZ VOCAB
- conditional statement
- if-then form
- hypothesis
- conclusion
- negation
- converse
- inverse
- contrapositive
- equivalent statements

QUESTIONS FOR LEARNING

As you progress through a section, you should be able to answer the following questions.
- • What am I learning?
- • Why am I learning this?
- • Where am I in my learning?
- • How will I know when I have learned it?
- • Where am I going next?

Success Criteria, and Self-Assessment

Chapter 4 Writing Linear Functions					
Learning Target: Understand writing linear functions.	1	2	3	4	
I can determine the slope of a line given ordered pairs, a graph, a table, or a context.	1	2	3	4	
I can write the equation of a line in different forms.	1	2	3	4	
I can write equations to model and solve real-life problems.	1	2	3	4	
I can interpret scatter plots and analyze lines of fit.	1	2	3	4	

Use a 4-point scale to rate your understanding of each success criterion. Keep track of your learning on paper or online.

| **1** I don't understand yet. | **2** I can do it with help. | **3** I can do it on my own. | **4** I can teach someone else. |

Self-Assessment

| 1 | I don't understand yet. | 2 | I can do it with help. | 3 | I can do it on my own. | 4 | I can teach someone else. |

➕ **Chapter 4 Writing Linear Functions**

➖ **4.1 Writing Equations in Slope-Intercept Form**

Learning Target	1	2	3	4
Understand writing linear functions.	○	○	◉	○

Success Criteria	1	2	3	4
I can determine the slope of a line given ordered pairs, a graph, a table, or a context.	○	○	○	◉
I can write the equation of a line in different forms.	○	◉	○	○
I can write equations to model and solve real-life problems.	○	○	◉	○
I can interpret scatter plots and analyze lines of fit.	○	○	◉	○

➕ **4.2 Solving Equations Using Multiplication or Division**

➕ **4.3 Solving Two-Step Equations**

Self-Assessments are included throughout every section, and in the **Chapter Review,** to help you take ownership of your learning and think about where to go next.

Ensuring Positive Outcomes

John Hattie's *Visible Learning* research consistently shows that using Learning Targets and Success Criteria can result in two years' growth in one year, ensuring positive outcomes for your learning and achievement.

Sophie Murphy, M.Ed., wrote the chapter-level Learning Targets and Success Criteria for this program. Sophie is currently completing her Ph.D. at the University of Melbourne in Australia with Professor John Hattie as her leading supervisor. Sophie completed her Master's thesis with Professor John Hattie in 2015. Sophie has over 20 years of experience as a teacher and school leader in private and public school settings in Australia.

Strategic Support for Online Learning

Get the Support You Need, When You Need It

There will be times throughout this course when you may need help. Whether you missed a section, did not understand the content, or just want to review, take advantage of the resources provided in the *Dynamic Student Edition.*

Use the **Self-Assessment** tool to keep track of your understanding of the section's Learning Target and Success Criteria.

Take notes throughout the section using the **My Notes** function. These notes will be organized by chapter and lesson.

Check your answers to selected exercises as you work through the lesson. Use the **Help** option to view the Digital Example and Extra Example videos.

Practice

Sec. 1.1 > Exercises 1 - 4 #1

Check | Solution | Guided Solution | Skills Review

Solve the equation.

$n + 3 = -7$

$n = \square$

Justify each step.

B I U ≡ ≡ T¹ T₂

0 / 10000 Word Limit

Calculator
Desmos
Sketchpad
Overview
Accessibility

> Close

Previous | 1 | 2 | 3 | 4 | 5 | 6 | Overview

Support powered by CalcChat and CalcView | Live Tutor

Use **tools** to help clearly show your work and emphasize your math knowledge.

Use **CalcChat®** to view worked-out solutions for select exercises. You can also chat with a live tutor.

CalcChat

Algebra

Chapter 1
Section 1
Exercise 1

Chat

Hello, how can I help you?

Hi, I'm having trouble with exercise 1. Can you please assist me?

Use **CalcView®** to watch a video of a worked-out solution for any exercise with a blue triangle. A teacher will explain, step-by-step, how to solve the problem.

t	0	1	2	3	4	5	6	7	8	9
h										

HEIGHT OF 150 ft.

Assignment Details

SCORE	TIME
75%	**15:14** MINUTES
15/20 Points	Practice

Performance Summary

20% — INCORRECT (10% Unattempted)

10% — PARTIALLY CORRECT

When you submit an assignment or assessment digitally, use the suggested links to get additional support where you need it.

QUESTION	RESPONSE	SCORE	LEARNING TARGET
– 1	✓	1	Write and evaluate expressions involving exponents.

Find the value of the power.

$8^2 = $ 1 64 ✓

Support Option

⚙ Skills

Writing Expressions as Powers
See a stepped-out example ⤢   Practice skill ⤢

Finding Values of Powers
See a stepped-out example ⤢   Practice skill ⤢

	QUESTION	RESPONSE	SCORE	LEARNING TARGET
+	2	✓	1	Write and evaluate expressions involving exponents.
+	3	✓	1	Write and evaluate expressions involving exponents.
+	4	✓	1	Write and evaluate expressions involving exponents.
+	5	✗	0	Write and evaluate expressions involving exponents.
+	6	✓	1	Write and evaluate expressions involving exponents.
+	7	✓	1	Write and evaluate expressions involving exponents.

Choose a skill to review and watch a video to see a stepped-out example of that skill. Whether you get a problem incorrect, or want a second explanation, these videos can provide additional help with homework.

Choose a skill and launch the **Skills Trainer** for additional practice on that skill. Practicing similar problems with instant feedback can help build confidence when solving problems.

🏠 BIG IDEAS MATH

Skills Trainer > Grade 6 > Using Order of Operations with Exponents

stop

Evaluate the expression.

$16 - 2(14 + 2) \div 2^2 = $ 1 1 ✗

Correct answers:

1 8

Next

1 Basics of Geometry

Ecology
Design a wildlife reservation to provide a protected habitat for a tiger population.

Reasoning and Proofs

2

Climate Change

See how greenhouse gases warm the planet. Research some of the effects of climate change and write conditional statements based on your research.

3 Parallel and Perpendicular Lines

Geothermal Science
Find a location for a new power plant that will provide electricity to several cities.

Transformations

4

Entomology
Sketch a butterfly species
and show how to construct
a dilation of your sketch.

H means the entire section is honors.

H means that the section contains honors content.

5 Congruent Triangles

Diagnostic Technologies
Analyze a drawing of a virus known as a *bacteriophage*.

(H) means the entire section is honors.

(H) means that the section contains honors content.

Relationships Within Triangles

6

Archaeology
Use a fragment to find the
diameter of an ancient plate.

H means the entire section is honors.

H means that the section contains honors content.

7 Quadrilaterals and Other Polygons

Astrobiology
Use angle measures and side lengths to investigate polygons found in several different constellations.

Similarity

8

DNA and Genomes

Create a brochure for the African Burial Ground National Monument that includes a scale drawing of the site.

(H) means the entire section is honors.

(H) means that the section contains honors content.

9 Right Triangles and Trigonometry

Extinct Species
Work on a new woolly mammoth exhibit at a museum.

H means the entire section is honors.

H means that the section contains honors content.

Circles

10

Bioarchaeology
Find geometric relationships
in Stonehenge and analyze
their possible significance.

(H) means the entire section is honors.

(H) means that the section contains honors content.

11 Circumference and Area

Bioresource Engineering
Design your own center-pivot
irrigation system.

Surface Area and Volume

12

Additional Resources

Conservation Biology
Design an artificial bat cave and estimate the number of hibernating bats that it can accommodate.