BIG IDEAS
MATH®
Green
A Common Core Curriculum
Ron Larson
Laurie Boswell

BIG IDEAS LEARNING®
Erie, Pennsylvania
BigIdeasLearning.com
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About the Cover
The cover images on the Big Ideas Math series illustrate the advancements in aviation from the hot-air balloon to spacecraft. This progression symbolizes the launch of a student's successful journey in mathematics. The sunrise in the background is representative of the dawn of the Common Core era in math education, while the cradle signifies the balanced instruction that is a pillar of the Big Ideas Math series.

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2 3 4 5 6 7 8 9 10 WEB 20 19 18 17 16
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**Ron Larson** is a professor of mathematics at Penn State Erie, The Behrend College, where he has taught since receiving his Ph.D. in mathematics from the University of Colorado. Dr. Larson is well known as the lead author of a comprehensive program for mathematics that spans middle school, high school, and college courses. His high school programs are published by Big Ideas Learning, and his college and Advanced Placement books are published by Cengage Learning. Ron's numerous professional activities keep him in constant touch with the needs of students, teachers, and supervisors. Ron and Laurie Boswell began writing together in 1992. Since that time, they have authored over two dozen textbooks. In their collaboration, Ron is primarily responsible for the pupil edition and Laurie is primarily responsible for the teaching edition of the text.

**Laurie Boswell** is the former Head of School at Riverside School in Lyndonville, Vermont. In addition to textbook authoring, 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 is a Tandy Technology Scholar. 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.

ABOUT THE BOOK

The revised *Big Ideas Math* series uses the same research-based strategy of a balanced approach to instruction that made the first *Big Ideas Math* series so successful. This approach opens doors to abstract thought, reasoning, and inquiry as students persevere to answer the Essential Questions that introduce each section. The foundation of the program is the Common Core Standards for Mathematical Content and Standards for Mathematical Practice. Students are subtly introduced to “Habits of Mind” that help them internalize concepts for a greater depth of understanding. These habits serve students well not only in mathematics, but across all curricula throughout their academic careers.

The *Big Ideas Math* series exposes students to highly motivating and relevant problems. Woven throughout the series are the depth and rigor students need to prepare for career-readiness and other college-level courses. In addition, the *Big Ideas Math* series prepares students to meet the challenge of PARCC and Smarter Balanced testing.

We consider the *Big Ideas Math* series to be the crowning jewel of 30 years of achievement in writing educational materials.

---

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**Laurie Boswell**
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---

**Areas of Polygons**

**Essential Question**

How can you determine the area of a parallelogram?

**What do you notice?**

- The areas of a triangle and a parallelogram are equal. The formula for finding the area of a parallelogram is also the formula for finding the area of a triangle.

**What is your answer?**

- Area of the parallelogram

---

**Finding Distances From the Mean**

**Essential Question**

How can you compare two sets of exam scores?

**ACTIVITY: Finding Distances From the Mean**

1. Create a table to compare the exam scores.

<table>
<thead>
<tr>
<th>Student</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>75</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>B</td>
<td>85</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>C</td>
<td>95</td>
<td>100</td>
<td>105</td>
</tr>
</tbody>
</table>

**Work with a partner.**

- Use the information in Activity 1.

**ACTIVITY: Using Distances from the Mean**

- Compare the exam scores.

**IN YOUR OWN WORDS**

- What do you notice about the exam scores?

**ACTIVITY: Graphing from a Ratio Table**

<table>
<thead>
<tr>
<th>Ratio</th>
<th>1:2</th>
<th>2:3</th>
<th>3:4</th>
<th>4:5</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>2</td>
<td>4</td>
<td>6</td>
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<td>10</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>9</td>
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<td>15</td>
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<tr>
<td>4</td>
<td>8</td>
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<td>16</td>
<td>20</td>
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<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

**Comparing and Graphing Ratios**

**Essential Question**

How can you compare two ratios?

**ACTIVITY: Interpreting Distances from the Mean**

- Graph the points on a coordinate plane.

- What do you notice about the graph?

**ACTIVITY: Using Distances from the Mean**

- Compare the exam scores.

**IN YOUR OWN WORDS**

- How can you use the graph to find how many drops of red are needed to make the mixture?

---

**Mean Absolute Deviation**

**Essential Question**

How can you use the mean to describe the data?

**ACTIVITY: Finding Outliers From the Mean**

1. Create a table to compare the exam scores.

<table>
<thead>
<tr>
<th>Student</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>75</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>B</td>
<td>85</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>C</td>
<td>95</td>
<td>100</td>
<td>105</td>
</tr>
</tbody>
</table>

**Work with a partner.**

- Use the information in Activity 1.

---
Common Core State Standards for Mathematical Practice

Make sense of problems and persevere in solving them.
- Multiple representations are presented to help students move from concrete to representative and into abstract thinking
- Essential Questions help students focus and analyze
- In Your Own Words provide opportunities for students to look for meaning and entry points to a problem

Reason abstractly and quantitatively.
- Visual problem solving models help students create a coherent representation of the problem
- Opportunities for students to decontextualize and contextualize problems are presented in every lesson

Construct viable arguments and critique the reasoning of others.
- Error Analysis; Different Words, Same Question; and Which One Doesn't Belong features provide students the opportunity to construct arguments and critique the reasoning of others
- Inductive Reasoning activities help students make conjectures and build a logical progression of statements to explore their conjecture

Model with mathematics.
- Real-life situations are translated into diagrams, tables, equations, and graphs to help students analyze relations and to draw conclusions
- Real-life problems are provided to help students learn to apply the mathematics that they are learning to everyday life

Use appropriate tools strategically.
- Graphic Organizers support the thought process of what, when, and how to solve problems
- A variety of tool papers, such as graph paper, number lines, and manipulatives, are available as students consider how to approach a problem
- Opportunities to use the web, graphing calculators, and spreadsheets support student learning

Attend to precision.
- On Your Own questions encourage students to formulate consistent and appropriate reasoning
- Cooperative learning opportunities support precise communication

Look for and make use of structure.
- Inductive Reasoning activities provide students the opportunity to see patterns and structure in mathematics
- Real-world problems help students use the structure of mathematics to break down and solve more difficult problems

Look for and express regularity in repeated reasoning.
- Opportunities are provided to help students make generalizations
- Students are continually encouraged to check for reasonableness in their solutions

Go to BigIdeasMath.com for more information on the Common Core State Standards for Mathematical Practice.
## Common Core State Standards for Mathematical Content for Grade 6

### Chapter Coverage for Standards

<table>
<thead>
<tr>
<th>Domain</th>
<th>Ratios and Proportional Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Understand ratio concepts and use ratio reasoning to solve problems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain</th>
<th>The Number System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</td>
</tr>
<tr>
<td></td>
<td>Compute fluently with multi-digit numbers and find common factors and multiples.</td>
</tr>
<tr>
<td></td>
<td>Apply and extend previous understandings of numbers to the system of rational numbers.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Domain</th>
<th>Expressions and Equations</th>
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<tbody>
<tr>
<td></td>
<td>Apply and extend previous understandings of arithmetic to algebraic expressions.</td>
</tr>
<tr>
<td></td>
<td>Reason about and solve one-variable equations and inequalities.</td>
</tr>
<tr>
<td></td>
<td>Represent and analyze quantitative relationships between dependent and independent variables.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain</th>
<th>Geometry</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Solve real-world and mathematical problems involving area, surface area, and volume.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain</th>
<th>Statistics and Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Develop understanding of statistical variability.</td>
</tr>
<tr>
<td></td>
<td>Summarize and describe distributions.</td>
</tr>
</tbody>
</table>

Go to [BigIdeasMath.com](http://www.bigideasmath.com) for more information on the Common Core State Standards for Mathematical Content.
I like talking about math, and working with a partner allows me to do that.
## Fractions and Decimals

With my eBook, I get to decide when I use technology and when I use print.

<table>
<thead>
<tr>
<th>What You Learned Before</th>
<th>53</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2.1 Multiplying Fractions</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>54</td>
</tr>
<tr>
<td>Lesson</td>
<td>56</td>
</tr>
<tr>
<td>Section 2.2 Dividing Fractions</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>62</td>
</tr>
<tr>
<td>Lesson</td>
<td>64</td>
</tr>
<tr>
<td>Section 2.3 Dividing Mixed Numbers</td>
<td></td>
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<tr>
<td>Activity</td>
<td>70</td>
</tr>
<tr>
<td>Lesson</td>
<td>72</td>
</tr>
<tr>
<td>Study Help/Graphic Organizer</td>
<td>76</td>
</tr>
<tr>
<td>2.1–2.3 Quiz</td>
<td>77</td>
</tr>
<tr>
<td>Section 2.4 Adding and Subtracting Decimals</td>
<td></td>
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<tr>
<td>Activity</td>
<td>78</td>
</tr>
<tr>
<td>Lesson</td>
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<tr>
<td>Section 2.5 Multiplying Decimals</td>
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<td>Activity</td>
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<td>Lesson</td>
<td>86</td>
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<tr>
<td>Section 2.6 Dividing Decimals</td>
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<td>Activity</td>
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<tr>
<td>Lesson</td>
<td>94</td>
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<td>2.4–2.6 Quiz</td>
<td>100</td>
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<tr>
<td>Chapter Review</td>
<td>101</td>
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<td>Chapter Test</td>
<td>104</td>
</tr>
<tr>
<td>Cumulative Assessment</td>
<td>105</td>
</tr>
</tbody>
</table>
Algebraic Expressions and Properties

I like that the Essential Question helps me begin thinking about the lesson.

What You Learned Before ........................................... 109
Section 3.1 Algebraic Expressions
Activity ................................................................. 110
Lesson ................................................................. 112
Section 3.2 Writing Expressions
Activity ................................................................. 118
Lesson ................................................................. 120
Study Help/Graphic Organizer .................................. 124
3.1–3.2 Quiz ......................................................... 125
Section 3.3 Properties of Addition and Multiplication
Activity ................................................................. 126
Lesson ................................................................. 128
Section 3.4 The Distributive Property
Activity ................................................................. 132
Lesson ................................................................. 134
Extension: Factoring Expressions ................................ 140
3.3–3.4 Quiz ......................................................... 142
Chapter Review ...................................................... 143
Chapter Test ......................................................... 146
Cumulative Assessment ............................................. 147
Areas of Polygons

What You Learned Before ........................................... 151
Section 4.1 Areas of Parallelograms
Activity ................................................................. 152
Lesson ................................................................. 154
Section 4.2 Areas of Triangles
Activity ................................................................. 158
Lesson ................................................................. 160
Study Help/Graphic Organizer ................................. 164
4.1–4.2 Quiz ......................................................... 165
Section 4.3 Areas of Trapezoids
Activity ................................................................. 166
Lesson ................................................................. 168
Extension: Areas of Composite Figures ..................... 172
Section 4.4 Polygons in the Coordinate Plane
Activity ................................................................. 174
Lesson ................................................................. 176
4.3–4.4 Quiz ......................................................... 180
Chapter Review ...................................................... 181
Chapter Test .......................................................... 184
Cumulative Assessment ............................................ 185

I really enjoy the projects at the end of the book because they help connect the math to other subjects, like science or art.
I like Newton and Descartes! The cartoons are funny and I like that they model the math that we are learning.

# Ratios and Rates

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lesson</th>
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<tbody>
<tr>
<td>What You Learned Before</td>
<td>189</td>
</tr>
<tr>
<td>Section 5.1 Ratios</td>
<td>190</td>
</tr>
<tr>
<td>Section 5.2 Ratio Tables</td>
<td>196</td>
</tr>
<tr>
<td>Section 5.3 Rates</td>
<td>204</td>
</tr>
<tr>
<td>Section 5.4 Comparing and Graphing Ratios</td>
<td>210</td>
</tr>
<tr>
<td>Section 5.5 Percents</td>
<td>218</td>
</tr>
<tr>
<td>Section 5.6 Solving Percent Problems</td>
<td>224</td>
</tr>
<tr>
<td>Section 5.7 Converting Measures</td>
<td>232</td>
</tr>
<tr>
<td>5.1–5.4 Quiz</td>
<td>217</td>
</tr>
<tr>
<td>5.5–5.7 Quiz</td>
<td>238</td>
</tr>
<tr>
<td>Chapter Review</td>
<td>239</td>
</tr>
<tr>
<td>Chapter Test</td>
<td>242</td>
</tr>
<tr>
<td>Cumulative Assessment</td>
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</table>
# Integers and the Coordinate Plane

I really like the Big Ideas Math website! The online resources are a huge help when I get stuck or need extra help.

<table>
<thead>
<tr>
<th>Section</th>
<th>Activity</th>
<th>Lesson</th>
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<tr>
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<td>Integers</td>
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<td></td>
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<td>Lesson</td>
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<td>Comparing and Ordering Integers</td>
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<tr>
<td></td>
<td>Lesson</td>
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<td>256</td>
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<tr>
<td>6.3</td>
<td>Fractions and Decimals on the Number Line</td>
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<td>260</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>Lesson</td>
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<td></td>
<td>Study Help/Graphic Organizer</td>
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<td></td>
<td>6.1–6.3 Quiz</td>
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<td>6.4</td>
<td>Absolute Value</td>
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<td>The Coordinate Plane</td>
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<td></td>
<td>Lesson</td>
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<td></td>
<td>Extension: Reflecting Points in the Coordinate Plane</td>
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<td>282</td>
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<td></td>
<td>6.4–6.5 Quiz</td>
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<td>Cumulative Assessment</td>
<td></td>
<td></td>
<td>289</td>
</tr>
</tbody>
</table>
I like the real-life application exercises because they show me how I can use the math in my own life.

Equations and Inequalities

What You Learned Before ........................................... 293
Section 7.1 Writing Equations in One Variable
Activity ................................................................. 294
Lesson ................................................................. 296
Section 7.2 Solving Equations Using Addition or Subtraction
Activity ................................................................. 300
Lesson ................................................................. 302
Section 7.3 Solving Equations Using Multiplication or Division
Activity ................................................................. 308
Lesson ................................................................. 310
Section 7.4 Writing Equations in Two Variables
Activity ................................................................. 314
Lesson ................................................................. 316
Study Help/Graphic Organizer .......................... 322
7.1–7.4 Quiz ......................................................... 323
Section 7.5 Writing and Graphing Inequalities
Activity ................................................................. 324
Lesson ................................................................. 326
Section 7.6 Solving Inequalities Using Addition or Subtraction
Activity ................................................................. 332
Lesson ................................................................. 334
Section 7.7 Solving Inequalities Using Multiplication or Division
Activity ................................................................. 338
Lesson ................................................................. 340
7.5–7.7 Quiz ......................................................... 344
Chapter Review ..................................................... 345
Chapter Test ........................................................ 348
Cumulative Assessment ......................................... 349
Surface Area and Volume

What You Learned Before .................. 353

Section 8.1 Three-Dimensional Figures
Activity .................................................. 354
Lesson .................................................... 356

Section 8.2 Surface Areas of Prisms
Activity .................................................. 360
Lesson .................................................... 362
Study Help/Graphic Organizer ............. 366
8.1–8.2 Quiz ........................................... 367

Section 8.3 Surface Areas of Pyramids
Activity .................................................. 368
Lesson .................................................... 370

Section 8.4 Volumes of Rectangular Prisms
Activity .................................................. 374
Lesson .................................................... 376
8.3–8.4 Quiz ........................................... 380
Chapter Review ..................................... 381
Chapter Test .......................................... 384
Cumulative Assessment ..................... 385

I like playing the games in the Game Closet! They are a fun way to practice concepts we are learning in class.
With the BigIdeasMath.com website I don’t have to worry if I forget my book or my workbook at school.
## Data Displays

**What You Learned Before** ........................................ 433

<table>
<thead>
<tr>
<th>Section 10.1 Stem-and-Leaf Plots</th>
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<tbody>
<tr>
<td>Activity .......................... 434</td>
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<tr>
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<td>Lesson .................... 442</td>
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<td>10.1–10.2 Quiz ........... 449</td>
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<tr>
<td>Lesson ............................ 452</td>
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<tr>
<td>Extension: Choosing Appropriate Measures 456</td>
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<thead>
<tr>
<th>Section 10.4 Box-and-Whisker Plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity .......................... 458</td>
</tr>
<tr>
<td>Lesson ............................ 460</td>
</tr>
<tr>
<td>10.3–10.4 Quiz ................... 466</td>
</tr>
<tr>
<td>Chapter Review .................. 467</td>
</tr>
<tr>
<td>Chapter Test ..................... 470</td>
</tr>
<tr>
<td>Cumulative Assessment ............. 471</td>
</tr>
</tbody>
</table>

## Appendix A: My Big Ideas Projects

<table>
<thead>
<tr>
<th>Section A.1 Literature Project</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A.2 History Project</td>
<td>A4</td>
</tr>
<tr>
<td>Section A.3 Art Project</td>
<td>A6</td>
</tr>
<tr>
<td>Section A.4 Science Project</td>
<td>A8</td>
</tr>
</tbody>
</table>

| Selected Answers | A10 |
| Key Vocabulary Index | A45 |
| Student Index | A46 |
| Mathematics Reference Sheet | B1 |
How to Use Your Math Book

- Read the **Essential Question** in the activity.
- Discuss the **Math Practice** question with your partner.
- Work with a partner to decide **What Is Your Answer?**
- Now you are ready to do the **Practice** problems.
- Find the **Key Vocabulary** words, highlighted in yellow.
  - Read their definitions. Study the concepts in each **Key Idea**.
  - If you forget a definition, you can look it up online in the **Multi-Language Glossary** at BigIdeasMath.com.
- After you study each **EXAMPLE**, do the exercises in the **On Your Own**.
  - Now you’re Ready to do the exercises that correspond to the example.
  - As you study, look for a **Study Tip** or a **Common Error**.
- The exercises are divided into 3 parts.
  - **Vocabulary and Concept Check**
  - **Practice and Problem Solving**
  - **Fair Game Review**
  - If an exercise has a 1 next to it, look back at Example 1 for help with that exercise.
  - More help is available at **Check It Out**.
- Find a **QR Code**. Scan the Real-Life STEM Video QR Code® to view a video and the corresponding Performance Task.
- To help study for your test, use the following.
  - **Quiz**
  - **Study Help**
  - **Chapter Review**
  - **Chapter Test**
Use this Scavenger Hunt to find where things are in Chapter 1.

Find an EXAMPLE of greatest common factor.

Find the definition of a numerical expression.

Find a Practice about prime and composite numbers.

Find a Question about expressions.

Find a Problem Solving question about a FIELD TRIP.

Find the answer in the back of the book.

Which examples help with Exercise 6 on page 20?

How many questions are on the Chapter Test?

Find 2 Quiz(es).

Find an Essential Question.

Find an On Your Own about 6 + 2^4 - 1.

Find an Now You’re Ready Exercises 12–20.