

**BIG IDEAS**  
**MATH**<sup>®</sup>  
**Modeling Real Life**

**Grade 4**

Common Core Edition

**Volume 1**

**Ron Larson**  
**Laurie Boswell**



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A handwritten signature of Ron Larson in black ink, written in a cursive style.



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A handwritten signature of Laurie Boswell in black ink, written in a cursive style.

Dr. Ron Larson and Dr. Laurie Boswell began writing together in 1992. Since that time, they have authored over four dozen textbooks. This successful collaboration allows for one voice from Kindergarten through Algebra 2.

# Contributors, Reviewers, and Research

Big Ideas Learning would like to express our gratitude to the mathematics education and instruction experts who served as our advisory panel, contributing specialists, and reviewers during the writing of *Big Ideas Math: Modeling Real Life*. Their input was an invaluable asset during the development of this program.

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## Research

Ron Larson and Laurie Boswell used the latest in educational research, along with the body of knowledge collected from expert mathematics instructors, to develop the *Modeling Real Life* series. The pedagogical approach used in this program follows the best practices outlined in the most prominent and widely accepted educational research, including:

- *Visible Learning*  
John Hattie © 2009
- *Visible Learning for Teachers*  
John Hattie © 2012
- *Visible Learning for Mathematics*  
John Hattie © 2017
- *Principles to Actions: Ensuring Mathematical Success for All*  
NCTM © 2014
- *Adding It Up: Helping Children Learn Mathematics*  
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- *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching*  
Jo Boaler © 2015
- *What Works in Schools: Translating Research into Action*  
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- *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*  
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- *Principles and Standards for School Mathematics*  
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- *Rigorous PBL by Design: Three Shifts for Developing Confident and Competent Learners*  
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- Common Core State Standards for Mathematics  
National Governors Association Center for Best Practices and Council of Chief State School Officers © 2010
- *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

# Standards for Mathematical Practice



## 1 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.
- In *Modeling Real Life* examples and exercises, students **MAKE SENSE OF PROBLEMS** using problem-solving strategies, such as drawing a picture, circling knowns, and underlining unknowns. They also use a formal problem-solving plan: understand the problem, make a plan, and solve and check.

## 2 Reason abstractly and quantitatively.

- Visual problem-solving models help students create a coherent representation of the problem.
- *Explore and Grows* allow students to investigate concepts to understand the **REASONING** behind the rules.
- Exercises encourage students to apply **NUMBER SENSE** and explain and justify their **REASONING**.

## 3 Construct viable arguments and critique the reasoning of others.

- *Explore and Grows* help students make conjectures, use **LOGIC**, and **CONSTRUCT ARGUMENTS** to support their conjectures.
- Exercises, such as *You Be The Teacher* and *Which One Doesn't Belong?*, provide students the opportunity to **CRITIQUE REASONING**.

## 4 Model with mathematics.

- Real-life situations are translated into pictures, diagrams, tables, equations, and graphs to help students analyze relations and to draw conclusions.
- Real-life problems are provided to help students apply the mathematics they are learning to everyday life.
- **MODELING REAL LIFE** examples and exercises help students see that math is used across content areas, other disciplines, and in their own experiences.

## 5 Use appropriate tools strategically.

- Students can use a variety of hands-on manipulatives to solve problems throughout the program.
- A variety of tools, such as number lines and graph paper, manipulatives, and digital tools, are available as students **CHOOSE TOOLS** and consider how to approach a problem.

## 6 Attend to precision.

- **PRECISION** exercises encourage students to formulate consistent and appropriate reasoning.
- Cooperative learning opportunities support precise communication.

## 7 Look for and make use of structure.

- *Learning Targets* and *Success Criteria* at the start of each chapter and lesson help students understand what they are going to learn.
- *Explore and Grows* provide students the opportunity to see **PATTERNS** and **STRUCTURE** in mathematics.
- Real-life problems help students use the **STRUCTURE** of mathematics to break down and solve more difficult problems.

## 8 Look for and express regularity in repeated reasoning.

- Opportunities are provided to help students make generalizations through **REPEATED REASONING**.
- Students are continually encouraged to check for reasonableness in their solutions.

# Achieve the Core

## Meeting Proficiency

As standards shift to prepare students for college and careers, the importance of focus, coherence, and rigor continues to grow.

**FOCUS** *Big Ideas Math: Modeling Real Life* emphasizes a narrower and deeper curriculum, ensuring students spend their time on the major topics of each grade.

**COHERENCE** The program was developed around coherent progressions from Kindergarten through eighth grade, guaranteeing students develop and progress their foundational skills through the grades while maintaining a strong focus on the major topics.

**RIGOR** *Big Ideas Math: Modeling Real Life* uses a balance of procedural fluency, conceptual understanding, and real-life applications. Students develop conceptual understanding in every *Explore and Grow*, continue that development through the lesson while gaining procedural fluency during the *Think and Grow*, and then tie it all together with *Think and Grow: Modeling Real Life*. Every set of practice problems reflects this balance, giving students the rigorous practice they need to be college- and career-ready.

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## Major Topics in Grade 4

### Operations and Algebraic Thinking

- Use the four operations with whole numbers to solve problems.

### Number and Operations in Base Ten

- Generalize place value understanding for multi-digit whole numbers.
- Use place value understanding and properties of operations to perform multi-digit arithmetic.

### Number and Operations—Fractions

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- Understand decimal notation for fractions, and compare decimal fractions.

Use the color-coded Table of Contents to determine where the major topics, supporting topics, and additional topics occur throughout the curriculum.

- Major Topic
- Supporting Topic
- Additional Topic



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- Major Topic
- Supporting Topic
- Additional Topic



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### Multiplication Quest

**Directions:**

1. Players take turns rolling a die. Players solve problems on their boards to race the knights to their castles.
2. On your turn, solve the next multiplication problem in the row of your roll.
3. The first player to get a knight to a castle wins!

		$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 629 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 5,107 \\ \times 6 \\ \hline \end{array}$	
		$\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 56 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 248 \\ \times 1 \\ \hline \end{array}$	$\begin{array}{r} 3,816 \\ \times 8 \\ \hline \end{array}$	

# 4

## Multiply by Two-Digit Numbers

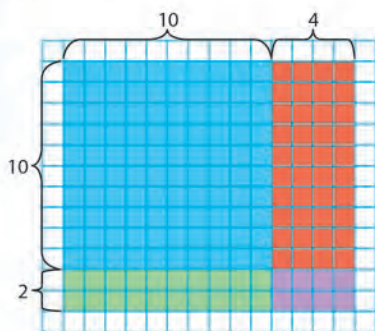
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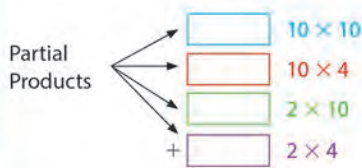
### Think and Grow: Use Area Models to Multiply

**Example** Use an area model and partial products to find  $12 \times 14$ .

Model the expression. Break apart 12 as  $10 + 2$  and 14 as  $10 + 4$ .



Add the area of each rectangle to find the product for the whole model.



Why does the sum of the partial products represent the sum of the whole area?



So,  $12 \times 14 = \underline{\hspace{2cm}}$ .

— Add the partial products.

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- Major Topic
- Supporting Topic
- Additional Topic

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- Major Topic
- Supporting Topic
- Additional Topic

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- Major Topic
- Supporting Topic
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