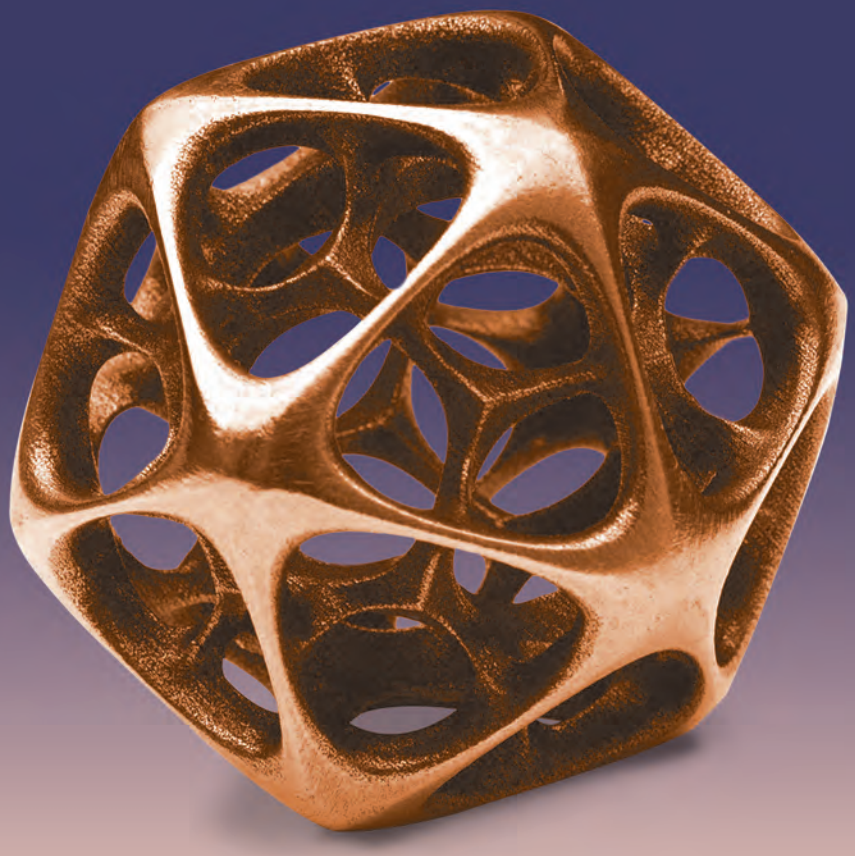
BIG IDEAS

MATH®

Geometry

A Common Core Curriculum

Ron Larson and Laurie Boswell



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Authors

Ron Larson, Ph.D., is well known as the lead author of a comprehensive program for mathematics that spans middle school, high school, and college courses. 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's numerous professional activities keep him actively involved in the mathematics education community and allow him to fully understand the needs of students, teachers, supervisors, and administrators.

Ron Larson

Laurie Boswell, Ed.D., is the Head of School and a mathematics teacher at the Riverside School in Lyndonville, Vermont. Dr. Boswell is a recipient of the Presidential Award for Excellence in Mathematics Teaching and has taught mathematics to students at all levels, from elementary through college. Dr. Boswell is a Tandy Technology Scholar and served on the NCTM Board of Directors from 2002 to 2005. She currently serves on the board of NCSM and is a popular national speaker.

Laurie Boswell

Dr. Ron Larson and **Dr. Laurie Boswell** began writing together in 1992. Since that time, they have authored over three dozen textbooks. In their collaboration, Ron is primarily responsible for the Student Edition while Laurie is primarily responsible for the Teaching Edition.

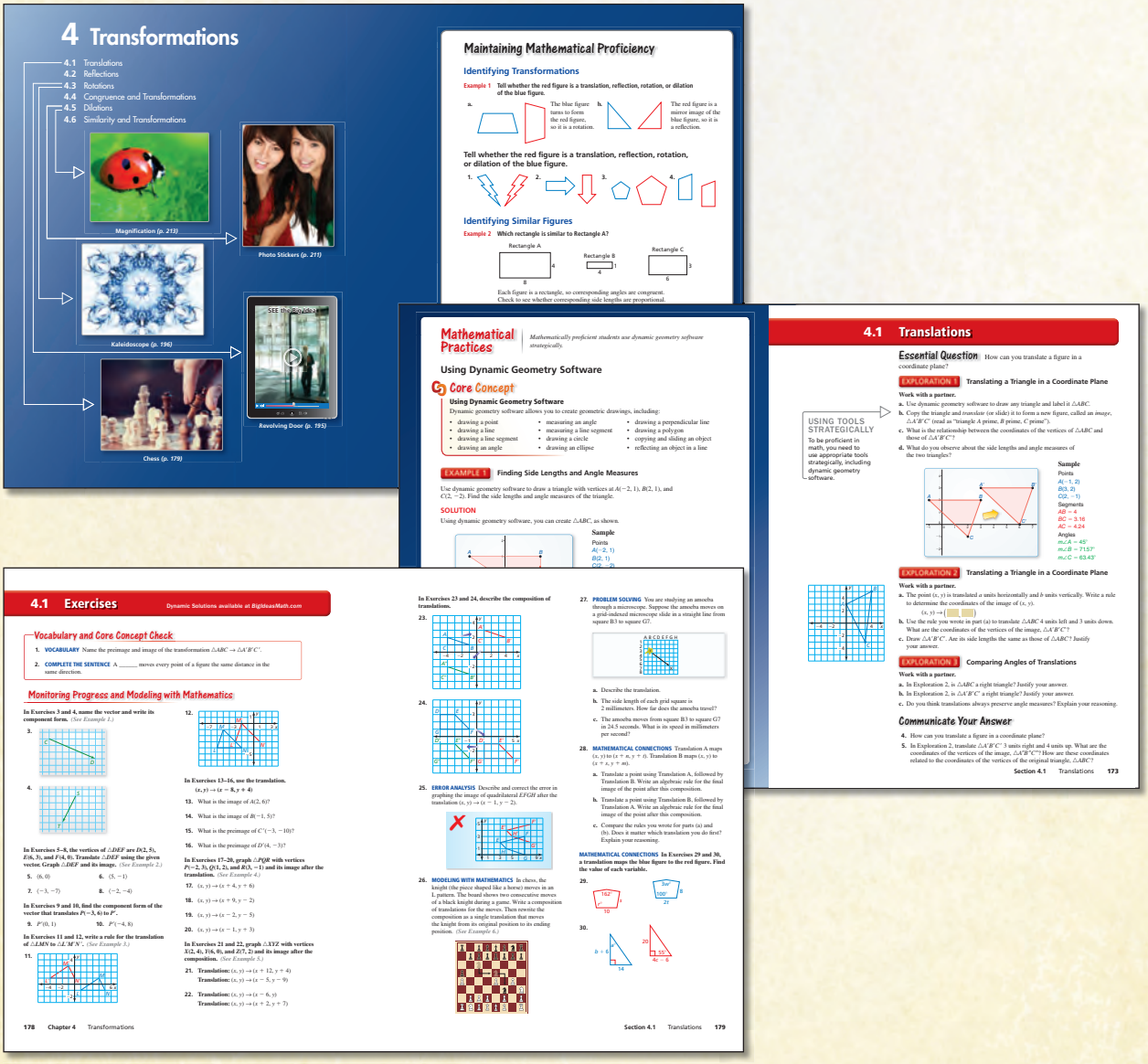
For the Student

Welcome to *Big Ideas Math Geometry*. From start to finish, this program was designed with you, the learner, in mind.

As you work through the chapters in your Geometry course, you will be encouraged to think and to make conjectures while you persevere through challenging problems and exercises. You will make errors—and that is ok! Learning and understanding occur when you make errors and push through mental roadblocks to comprehend and solve new and challenging problems.

In this program, you will also be required to explain your thinking and your analysis of diverse problems and exercises. You will master content through engaging explorations that will provide deeper understanding, concise stepped-out examples, and rich thought-provoking exercises. Being actively involved in learning will help you develop mathematical reasoning and use it to solve math problems and work through other everyday challenges.

We wish you the best of luck as you explore Geometry. We are excited to be a part of your preparation for the challenges you will face in the remainder of your high school career and beyond.



Big Ideas Math High School Research

Big Ideas Math Algebra 1, *Geometry*, and *Algebra 2* is a research-based program providing a rigorous, focused, and coherent curriculum for high school students. Ron Larson and Laurie Boswell utilized their expertise as well as the body of knowledge collected by additional expert mathematicians and researchers to develop each course.

The pedagogical approach to this program follows the best practices outlined in the most prominent and widely-accepted educational research and standards, including:

Achieve, ACT, and The College Board

Adding It Up: Helping Children Learn Mathematics
National Research Council ©2001

Common Core State Standards for Mathematics
National Governors Association Center for Best Practices and the Council of Chief State School Officers ©2010

Curriculum Focal Points and the *Principles and Standards for School Mathematics* ©2000
National Council of Teachers of Mathematics (NCTM)

Project Based Learning
The Buck Institute

Rigor/Relevance Framework™
International Center for Leadership in Education

Universal Design for Learning Guidelines
CAST ©2011

Big Ideas Learning would like to express our gratitude to the mathematics education and instruction experts who served as consultants during the writing of *Big Ideas Math Algebra 1*, *Geometry*, and *Algebra 2*. Their input was an invaluable asset during the development of this program.

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Common Core State Standards for Mathematical Practice

Make sense of problems and persevere in solving them.

- *Essential Questions* help students focus on core concepts as they analyze and work through each *Exploration*.
- Section opening *Explorations* allow students to struggle with new mathematical concepts and explain their reasoning in the *Communicate Your Answer* questions.

Reason abstractly and quantitatively.

- *Reasoning*, *Critical Thinking*, *Abstract Reasoning*, and *Problem Solving* exercises challenge students to apply their acquired knowledge and reasoning skills to solve each problem.
- *Thought Provoking* exercises test the reasoning skills of students as they analyze and interpret perplexing scenarios.

Construct viable arguments and critique the reasoning of others.

- Students must justify their responses to each *Essential Question* in the *Communicate Your Answer* questions at the end of each *Exploration* set.
- Students are asked to construct arguments and critique the reasoning of others in specialized exercises, including *Making an Argument*, *How Do You See It?*, *Drawing Conclusions*, *Reasoning*, *Error Analysis*, *Problem Solving*, and *Writing*.

Model with mathematics.

- Real-life scenarios are utilized in *Explorations*, *Examples*, *Exercises*, and *Assessments* so students have opportunities to apply the mathematical concepts they have learned to realistic situations.
- *Modeling with Mathematics* exercises allow students to interpret a problem in the context of a real-life situation, often utilizing tables, graphs, visual representations, and formulas.

Use appropriate tools strategically.

- Students are provided opportunities for selecting and utilizing the appropriate mathematical tool in *Using Tools* exercises. Students work with graphing calculators, dynamic geometry software, models, and more.
- A variety of tool papers and manipulatives are available for students to use in problems as strategically appropriate.

Attend to precision.

- *Vocabulary and Core Concept Check* exercises require students to use clear, precise mathematical language in their solutions and explanations.
- The many opportunities for cooperative learning in this program, including working with partners for each *Exploration*, support precise, explicit mathematical communication.

Look for and make use of structure.

- *Using Structure* exercises provide students with the opportunity to explore patterns and structure in mathematics.
- *Proof* exercises require students to understand and apply the structure of geometric theorems to solve each problem.

Look for and express regularity in repeated reasoning.

- Students are continually encouraged to evaluate the reasonableness of their solutions and their steps in the problem-solving process.
- Stepped-out *Examples* encourage students to maintain oversight of their problem-solving process and pay attention to the relevant details in each step.

Go to *BigIdeasLearning.com* for more information on the Common Core State Standards for Mathematical Practice.

Common Core State Standards for Mathematical Content for Geometry

Chapter Coverage for Standards

Conceptual Category Geometry

- Congruence

Conceptual Category Geometry

- Similarity, Right Triangles, and Trigonometry

Conceptual Category Geometry

- Circles

Conceptual Category Geometry

- Expressing Geometric Properties with Equations

Conceptual Category Geometry

- Geometric Measurement and Dimension

Conceptual Category Statistics and Probability

- Probability

Go to *BigIdeasLearning.com* for more information on the Common Core State Standards for Mathematical Content.

1 Basics of Geometry

See the Big Idea
Learn how bridges are designed using compression and tension.

2 Reasoning and Proofs

See the Big Idea
Tigers and humans display obvious differences between males and females. Use logic to determine whether other mammals do.

3 Parallel and Perpendicular Lines

See the Big Idea
Discover why parallel lines and reference points are so important to builders.

4 Transformations

See the Big Idea
Investigate the rotational symmetry of revolving doors and discover why this technology allows skyscrapers to be built.

5 Congruent Triangles

See the Big Idea
Learn how to use triangle congruence in a model hang glider challenge.

6 Relationships Within Triangles

See the Big Idea
Discover why triangles are used in building for strength.

7 Quadrilaterals and Other Polygons

See the Big Idea
Explore what the refractive index, reflected light, and light dispersion have to do with diamonds.

8 Similarity

See the Big Idea
Discover how many different ways you can scale a model.

9 Right Triangles and Trigonometry

See the Big Idea
Test the accuracy of two measurement methods and discover which one prevails.

Circles 10

See the Big Idea

Utilize trilateration to find the epicenters of historical earthquakes and discover where they lie on known fault lines.

11 Circumference, Area, and Volume

See the Big Idea

Analyze the population density in various parts of Los Angeles—as viewed from an observation point high in the hills of Santa Monica.

12 Probability

See the Big Idea
Learn about caring for trees at an arboretum.

How to Use Your Math Book

Get ready for each chapter by **Maintaining Mathematical Proficiency** and reviewing the **Mathematical Practices**. Begin each section by working through the **EXPLORATIONS** to **Communicate Your Answer** to the **Essential Question**. Each **Lesson** will explain **What You Will Learn** through **EXAMPLES**, **Core Concepts**, and **Core Vocabulary**.

Answer the **Monitoring Progress** questions as you work through each lesson. Look for STUDY TIPS, COMMON ERRORS, and suggestions for looking at a problem ANOTHER WAY throughout the lessons. We will also provide you with guidance for accurate mathematical READING and concept details you should REMEMBER.

Sharpen your newly acquired skills with **Exercises** at the end of every section. Halfway through each chapter you will be asked **What Did You Learn?** and you can use the Mid-Chapter **Quiz** to check your progress. You can also use the **Chapter Review** and **Chapter Test** to review and assess yourself after you have completed a chapter.

Apply what you learned in each chapter to a **Performance Task** and build your confidence for taking standardized tests with each chapter's **Cumulative Assessment**.

For extra practice in any chapter, use your *Online Resources*, *Skills Review Handbook*, or your *Student Journal*.