BIG IDEAS MATH®

Ron Larson
Laurie Boswell

🌐 A COMMON CORE CURRICULUM

BIG IDEAS MATH®
Ron Larson
Laurie Boswell
Algebra 1
A Common Core Curriculum

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

BIG IDEAS MATH®
Ron Larson
Laurie Boswell
Algebra 2
A Common Core Curriculum

BIG IDEAS LEARNING®

NATIONAL GEOGRAPHIC LEARNING | CENGAGE

Empower Learning with *Big Ideas Math*®

Designed to the Common Core State Standards, **Big Ideas Math Algebra 1, Geometry,** and **Algebra 2** is a robust and research-based program that uses the Standards for Mathematical Practice as its foundation. It ensures that students not only grasp key mathematical concepts, but enjoy making connections between concepts and the world around them.

The pedagogical approach used in this program follows the best practices outlined in the most prominent and widely accepted educational research including John Hattie's *Visible Learning*, NCTM's *Principles to Actions*, Jo Boaler's *Mathematical Mindsets*, Wiggins and McTighe's *Understanding by Design*, and others.

Big Ideas Math offers a program that:

INSPIRES
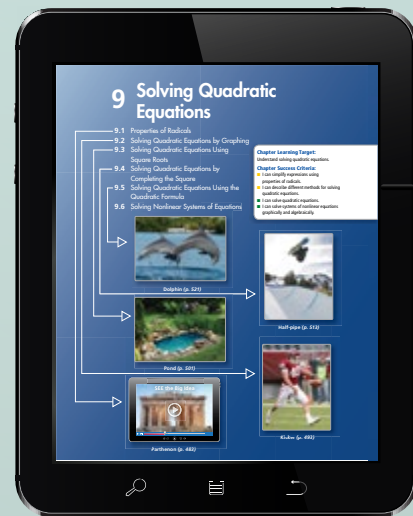*Elevate student learning with a balanced approach*

ENGAGES
Captivate student learning with innovative technology

EMPOWERS
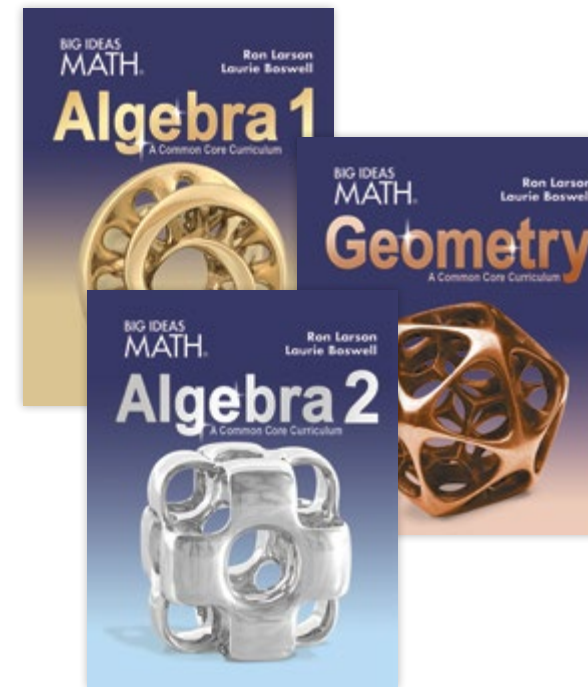*Make learning visible through student accountability*

GROWS
Positively impact student performance in mathematics
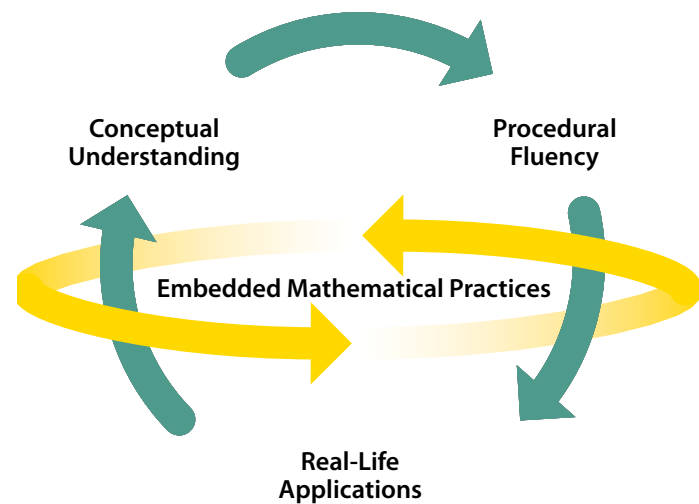
PANTHERA TIGRIS SUMATRAE
White Tiger

COVER: The Sumatran tiger (Panthera tigris sumatrae) is a rare tiger subspecies that inhabits the Indonesian island of Sumatra. It was classified as critically endangered by IUCN in 2008 as the population was estimated at 441 to 679 individuals, with no subpopulation larger than 50 individuals and a declining trend.

http://www.nationalgeographic.com.au/natgeosnap/18544-panthera-tigris-sumatrae.aspx

PHOTO CREDIT: MirasWonderland/ iStock by Getty Images

Expert Authors

The **Big Ideas Math** authors are dedicated to fostering curiosity and confidence in learners.

> *We created Big Ideas Math because we recognized the need for a truly balanced approach to learning, using discovery learning and scaffolded instruction.*
>
> —Ron Larson, Ph.D.

> *Big Ideas Math encourages productive struggle. It's not about being hard. The entire program is accessible for all students.*
>
> —Laurie Boswell, Ed.D.

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

Ron Larson, Ph.D., is well known as the lead author of a comprehensive program for mathematics that spans school mathematics 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.

Laurie Boswell, Ed.D., 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.

Program Philosophy: Rigor and Balance with Embedded Mathematical Practices

Conceptual Understanding — Procedural Fluency — Embedded Mathematical Practices — Real-Life Applications

The **Big Ideas Math** program balances conceptual understanding with procedural fluency. Real-life applications create connections to content and help turn mathematical learning into an engaging and meaningful way to explore the real world.

Embedded **Mathematical Practices** in grade-level content promote a greater understanding of how mathematical concepts are connected to each other and to real-life scenarios.

Mathematical Practices

Mathematically proficient students use dynamic geometry software strategically.
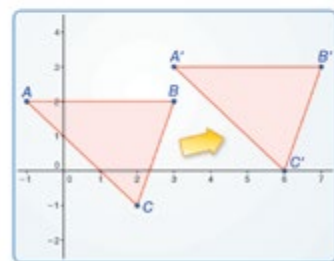
4.1 Translations

Essential Question How can you translate a figure in a coordinate plane?

EXPLORATION 1 Translating a Triangle in a Coordinate Plane

Work with a partner.

a. Use dynamic geometry software to draw any triangle and label it $\triangle ABC$.

b. Copy the triangle and *translate* (or slide) it to form a new figure, called an *image*, $\triangle A'B'C'$ (read as "triangle A prime, B prime, C prime").

c. What is the relationship between the coordinates of the vertices of $\triangle ABC$ and those of $\triangle A'B'C'$?

d. What do you observe about the side lengths and angle measures of the two triangles?

USING TOOLS STRATEGICALLY

To be proficient in math, you need to use appropriate tools strategically, including dynamic geometry software.

Sample

Points
$A(-1, 2)$
$B(3, 2)$
$C(2, -1)$

Segments
$AB = 4$
$BC = 3.16$
$AC = 4.24$

Angles
$m\angle A = 45°$
$m\angle B = 71.57°$
$m\angle C = 63.43°$

4.2 Reflections

Essential Question How can you reflect a figure in a coordinate plane?

EXPLORATION 1 Reflecting a Triangle Using a Reflective Device

Work with a partner. Use a straightedge to draw any triangle on paper. Label it $\triangle ABC$.

a. Use the straightedge to draw a line that does not pass through the triangle. Label it m.

b. Place a reflective device on line m.

c. Use the reflective device to plot the images of the vertices of $\triangle ABC$. Label the images of vertices A, B, and C as A', B', and C', respectively.

d. Use a straightedge to draw $\triangle A'B'C'$ by connecting the vertices.

Conceptual Understanding

Explorations and guiding Essential Questions encourage *conceptual understanding*.

4.2 Lesson

What You Will Learn
- Perform reflections.
- Perform glide reflections.
- Identify lines of symmetry.
- Solve real-life problems involving reflections.

Core Vocabulary
reflection, p. 182
line of reflection, p. 182
glide reflection, p. 184
line symmetry, p. 185
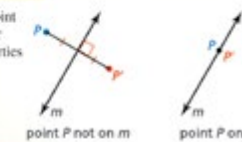line of symmetry, p. 185

Performing Reflections

Core Concept

Reflections

A **reflection** is a transformation that uses a line like a mirror to reflect a figure. The mirror line is called the **line of reflection**.

A reflection in a line m maps every point P in the plane to a point P', so that for each point one of the following properties is true.

- If P is not on m, then m is the perpendicular bisector of $\overline{PP'}$, or
- If P is on m, then $P = P'$.

point P not on m point P on m

Procedural Fluency

Scaffolded lessons allow for *procedural fluency* and provide the opportunity to use clear, precise mathematical language.

Solving Real-Life Problems

EXAMPLE 6 Finding a Minimum Distance

You are going to buy books. Your friend is going to buy CDs. Where should you park to minimize the distance you both will walk?

SOLUTION

Reflect B in line m to obtain B'. Then draw $\overline{AB'}$. Label the intersection of $\overline{AB'}$ and m as C. Because AB' is the shortest distance between A and B' and $BC = B'C$, park at point C to minimize the combined distance, $AC + BC$, you both have to walk.

Real-Life Applications

*Real-life applications* provide students with opportunities to create connections between classroom lessons and realistic scenarios.

3 Graphing Linear Functions

3.1 Functions
3.2 Linear Functions
3.3 Function Notation
3.4 Graphing Linear Equations in Standard Form
3.5 Graphing Linear Equations in Slope-Intercept Form
3.6 Transformations of Graphs of Linear Functions
3.7 Graphing Absolute Value Functions

Chapter Learning Target: Understand graphing linear functions.

Chapter Success Criteria:
- I can determine whether relations are functions.
- I can identify linear functions.
- I can graph linear equations.
- I can describe transformations of graphs of linear functions.

Learning Targets and Success Criteria

Learning Targets and *Success Criteria* encourage students to self-assess and evaluate their learning. Students and teachers receive guidance and clarity for moving from surface level to deep level.

Ignite Learning with Dynamic Technology
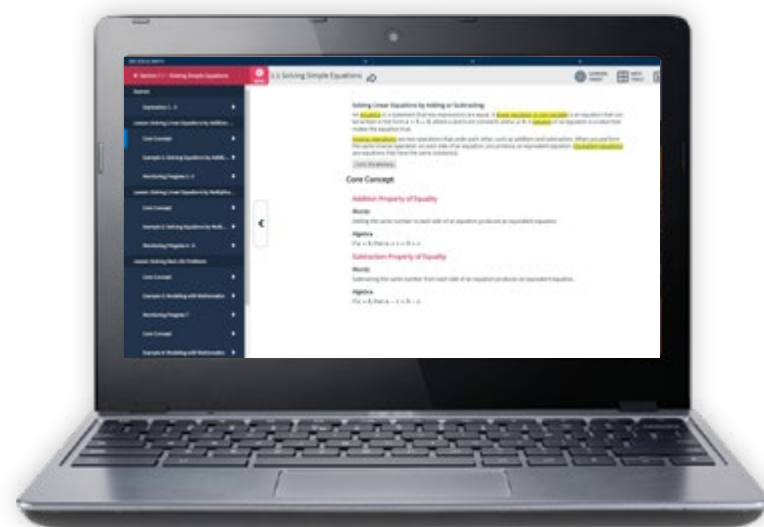
Dynamic Classroom

The **Dynamic Classroom** mimics the students' **Dynamic Student Edition**, with additional resources and support for teachers. Point-of-use **Laurie's Notes** guide instruction, providing motivation suggestions, teaching tips, questions to ask the students, closure strategies, and more! **Dynamic Investigations** and **Digital Examples** from the textbook create a 21st-century classroom atmosphere that engages students.
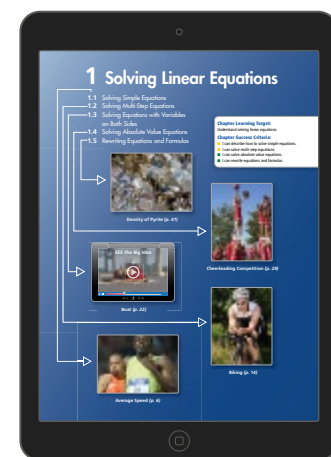
Dynamic Student Edition eBook

The **Dynamic Student Edition eBook** is a complete electronic version of the Student Edition that includes interactive digital resources. The eBook allows students to navigate through the textbook, highlight important information, and add notes or bookmarks. While this eBook is available off-line, with a data or internet connection, students can access embedded, digital enhancements.

Audio available in English and Spanish

Dynamic Investigations

The **Dynamic Investigations** in the **Big Ideas Math** program allow students and teachers to interactively complete the **Big Ideas Math** Explorations.

CREATE CONNECTIONS THROUGH EXPLORATION!

Real-Life STEM Videos

Every chapter in the **Big Ideas Math** program contains a **Real-Life STEM Video** allowing students to further engage with mathematical concepts. Students learn about the Parthenon, natural disasters, solar power, and more!

ENCOURAGE CURIOSITY WITH STEM CONCEPTS!
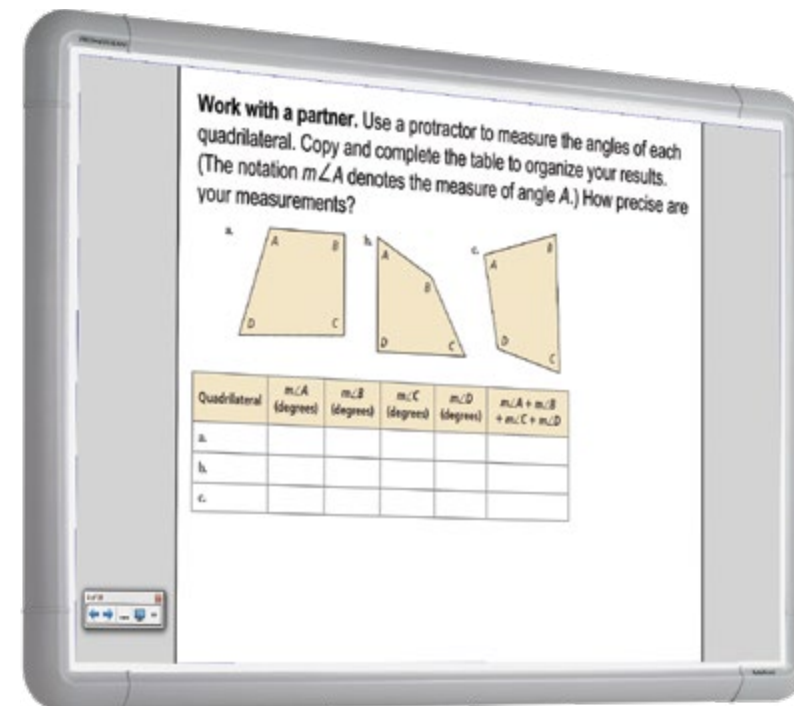
Dynamic Teaching Tools

These tools feature the **Interactive Whiteboard Lesson Library**. Teachers can present any **Big Ideas Math** lesson from an interactive whiteboard. Standard whiteboard lessons and customizable templates are included.

VISUALLY RICH PRESENTATIONS!

The *Big Ideas Math* Dynamic Assessment System

Homework and Assessment That Informs

- Includes multiple, customizable assignments for each chapter, which can contain teacher-created items
- Assign homework and assessments for the entire class or a select group of students
- Offers progress monitoring assessments for an adaptive testing experience

RESTORE STUDENT CONFIDENCE!
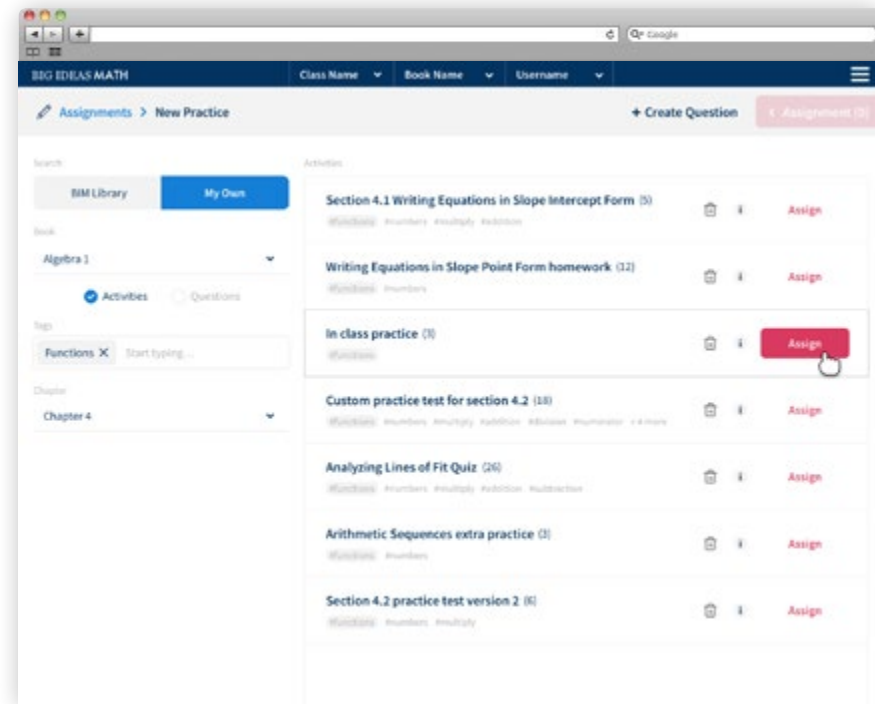
Direct Ties to Remediation

- Includes direct links to Lesson Tutorial Videos
- Allows students to access live chat tutors for selected exercises

Assessment Reporting with Precision

- Offers real-time reporting at both the class and student levels
- Organizes progress details in a variety of reports, including Questions, Standards, Skills, and Performance
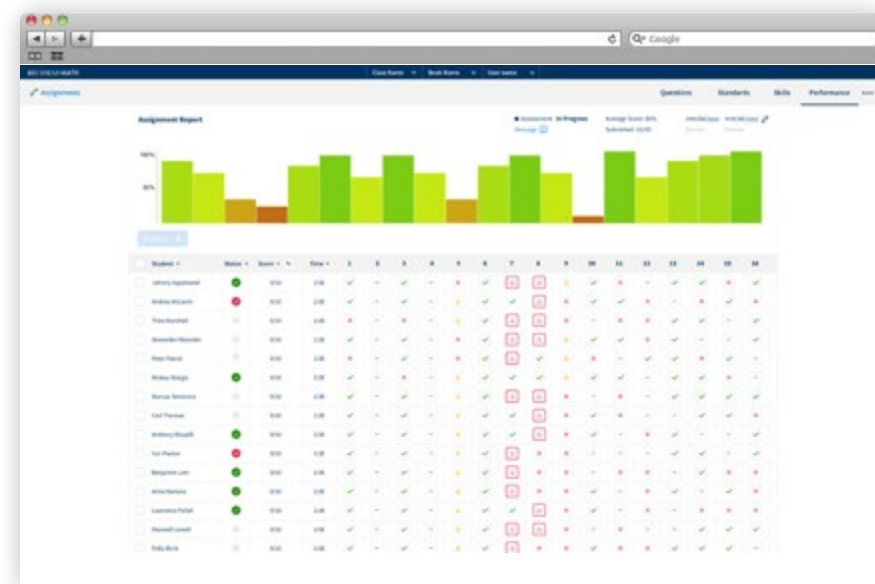
Formative practice has to have feedback and action.

Use assessments to drive instructional decisions.

—Laurie Boswell, Ed. D.
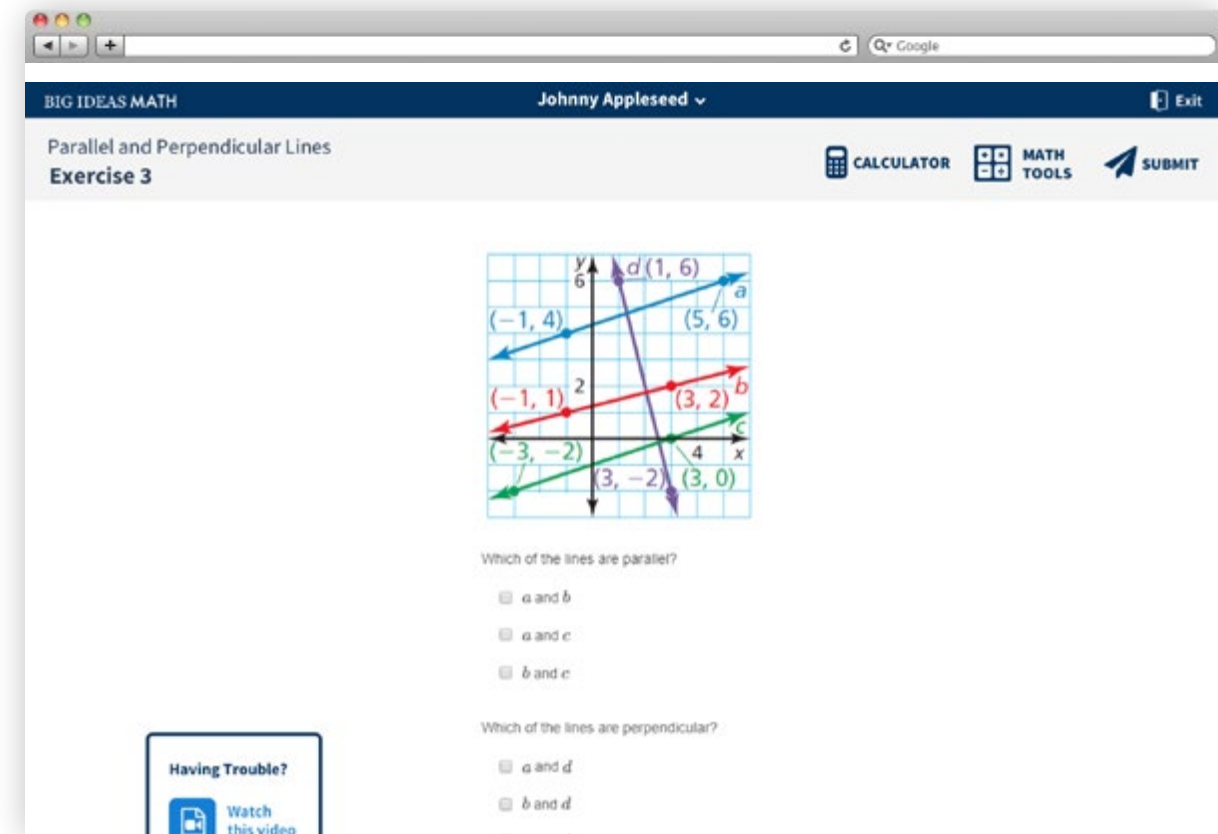
Intuitive Design and Delivery

- Provides embedded tools for students
- Includes auto-scored, technology-enhanced items such as drag and drop, graphing, point plotting, multiple select, and fill in the blank using math expressions
- Allows teachers to include reminders or notes to students

Preparation for the Journey Toward High-Stakes Testing

Each chapter of the **Big Ideas Math** program features question types frequently found on standardized tests. The balanced approach to instruction also helps students develop the habits of mind required to be successful on high-stakes tests.

Exercises
The Exercises in the **Big Ideas Math** program provide students with opportunities to use multiple approaches to solve problems.

Dynamic Assessment System
This tool allows teachers to provide customizable homework directly related to the **Big Ideas Math** program. Assignments are automatically scored and students have access to immediate remediation on homework questions.

Explorations
The Explorations that begin each section require students to use higher-level thinking to work through each problem and to explain their reasoning in the solution.

Cumulative Assessments
Each chapter in the **Big Ideas Math** program includes a Cumulative Assessment. The questions in each assessment were carefully chosen to represent problem types and reasoning patterns frequently found on standardized tests.

Quizzes and Tests
The Quizzes and Tests in the **Big Ideas Math** program assess the concepts students learned in each lesson.

Online Test Practice
Self-grading tests are available online, allowing students to receive immediate feedback on their progress.

Performance Tasks
Each chapter of the **Big Ideas Math** program contains a Performance Task in the Assessment Book and an online Performance Task that correlates to the STEM video of the chapter. Each Performance Task allows students to work with multiple standards.

Alternative Assessments
Alternative Assessments provide teachers with the opportunity to assess students on the same content in a variety of ways.

Robust Print Support for All Learners

Student Edition
The Student Edition was designed using the Universal Design for Learning Guidelines (CAST © 2011) and features carefully chosen images that increase student engagement and enhance the mathematical content.

Teaching Edition
The Teaching Edition provides teachers with complete support for every **Big Ideas Math** lesson. Master educator Laurie Boswell incorporates instructional insights and recommendations in Laurie's Notes.

Student Journal   *Available in English and Spanish*
This consumable workbook serves as a valuable resource where students can solve extra practice problems, take notes, and internalize new concepts by expressing their findings in their own words.

Resources by Chapter
- Start Thinking
- Warm Up
- Cumulative Review Warm Up
- Extra Practice (Practice A and B)
- Enrichment and Extension
- Puzzle Time
- Family Communication Letters
  Available in English and Spanish

Assessment Book
- Prerequisite Skills Test with Item Analysis
- Pre-Course Test with Item Analysis
- Mid-Chapter Quizzes
- Chapter Tests
- Alternative Assessments with Scoring Rubrics
- Performance Tasks
- Cumulative Tests
- Post Course Test with Item Analysis

**ACCESS ALL PRINT COMPONENTS ONLINE AT BIGIDEASMATH.COM!**

K–12 Programs

Big Ideas Math programs offer a seamless articulation from elementary through high school. With a consistent author voice from level to level, students make connections through cohesive progressions and rich instruction.

Big Ideas Math uses a balanced approach to engage students' inquiring minds and empower them to become mathematical thinkers in their daily lives.
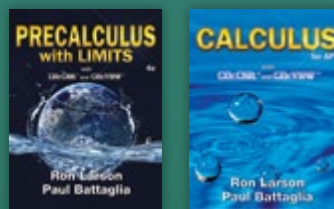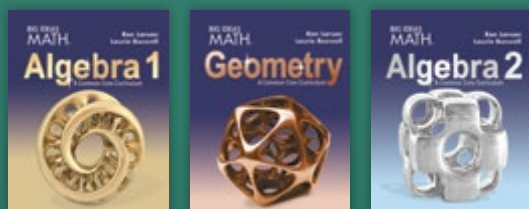
Big Ideas Math: Modeling Real Life for Grades K–5
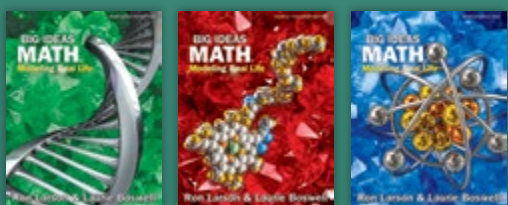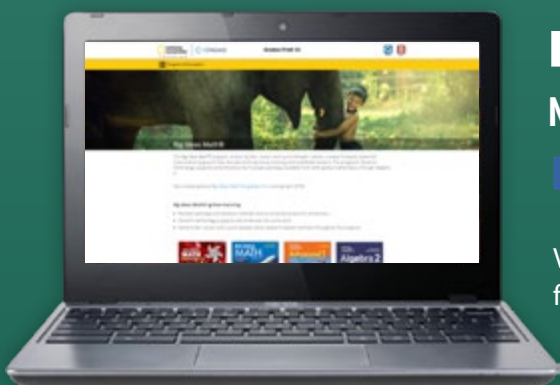
Advanced middle school courses available!

Big Ideas Math: Modeling Real Life for Grades 6–8

Integrated Mathematics courses also available!

Precalculus / AP® Calculus

National Geographic Learning® proudly represents *Big Ideas Math* programs.

Learn more!

NGL.Cengage.com/BigIdeas

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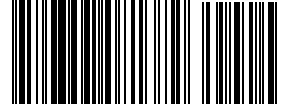
APR/18