Big Ideas Learning

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Modeling Real Life

Grades K–5

Big Ideas Learning

Meaningful Coherence From a Single-Authorship Team

Big Ideas Math: Modeling Real Life by Big Ideas Learning is a comprehensive math program that empowers teachers and promotes student ownership so that all learners can succeed in math.

Written by renowned authors, Dr. Ron Larson and Dr. Laurie Boswell, *Big Ideas Math: Modeling Real Life* provides a cohesive, coherent, and rigorous mathematics curriculum for students in Kindergarten through Grade 8, successfully preparing students for Big Ideas Learning's high school math curriculum. Program resources, both digital and print, are thoughtfully designed to have the highest impact on learning for all students in any setting.

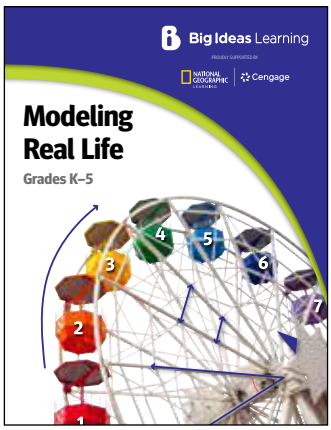
Ron Larson, Ph.D.

Laurie Boswell, Ed.D.

On the Cover

Connecting Math to the Real World

The amusement park ride on the cover incorporates real-world applications of counting, shapes, angles, parallel lines, and measurement.

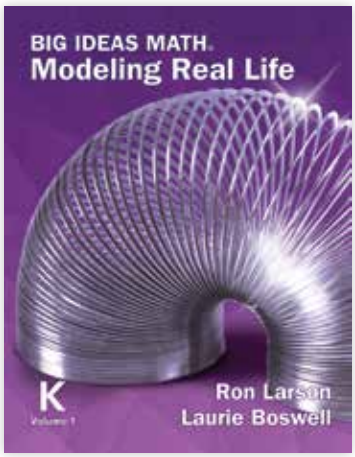


Big Ideas Learning provides:

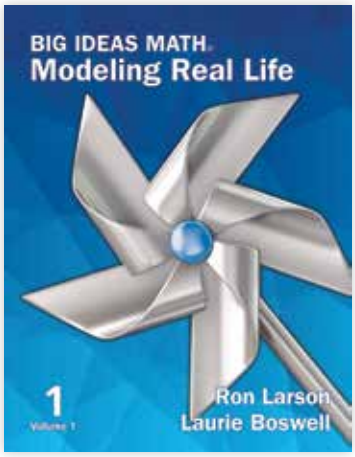
- Meaningful coherence from one authorship team
- Integrated Mathematical Practices
- Highest-impact teaching strategies
- Supportive and engaging learning tools

Elementary Math

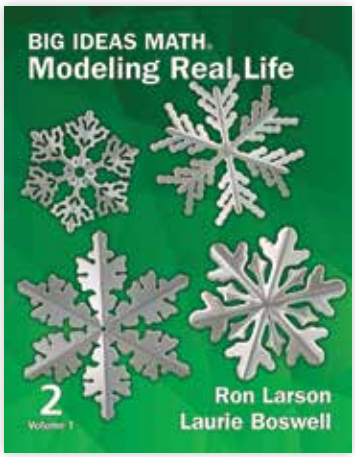
Common Core Edition Also Available!



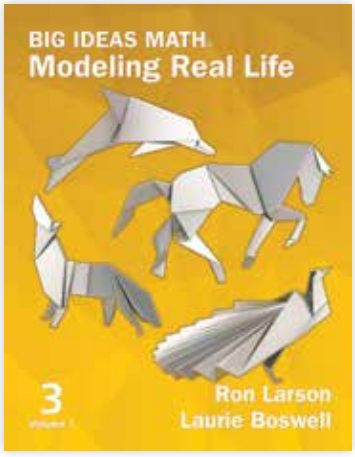
GRADE K



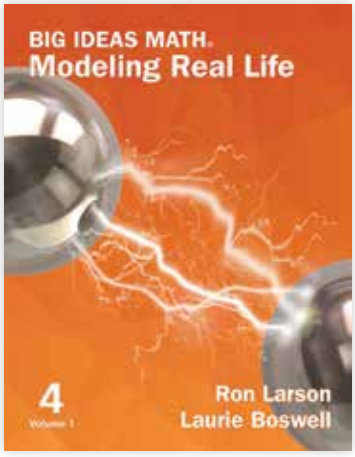
GRADE 1



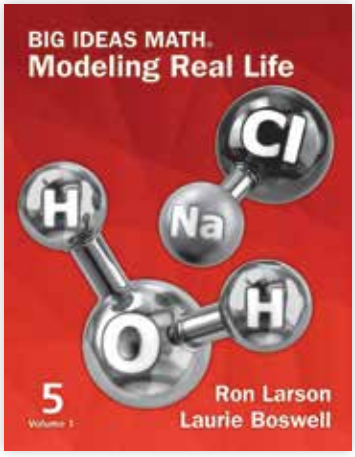
GRADE 2



GRADE 3



GRADE 4



GRADE 5

Big Ideas Math: Modeling Real Life

Big Ideas Math: Modeling Real Life is built on a foundation of the most widely accepted research, including pedagogical components of Professor John Hattie's *Visible Learning* research. This pedagogical foundation helps form a clear, concise, and comprehensive vertically aligned solution.

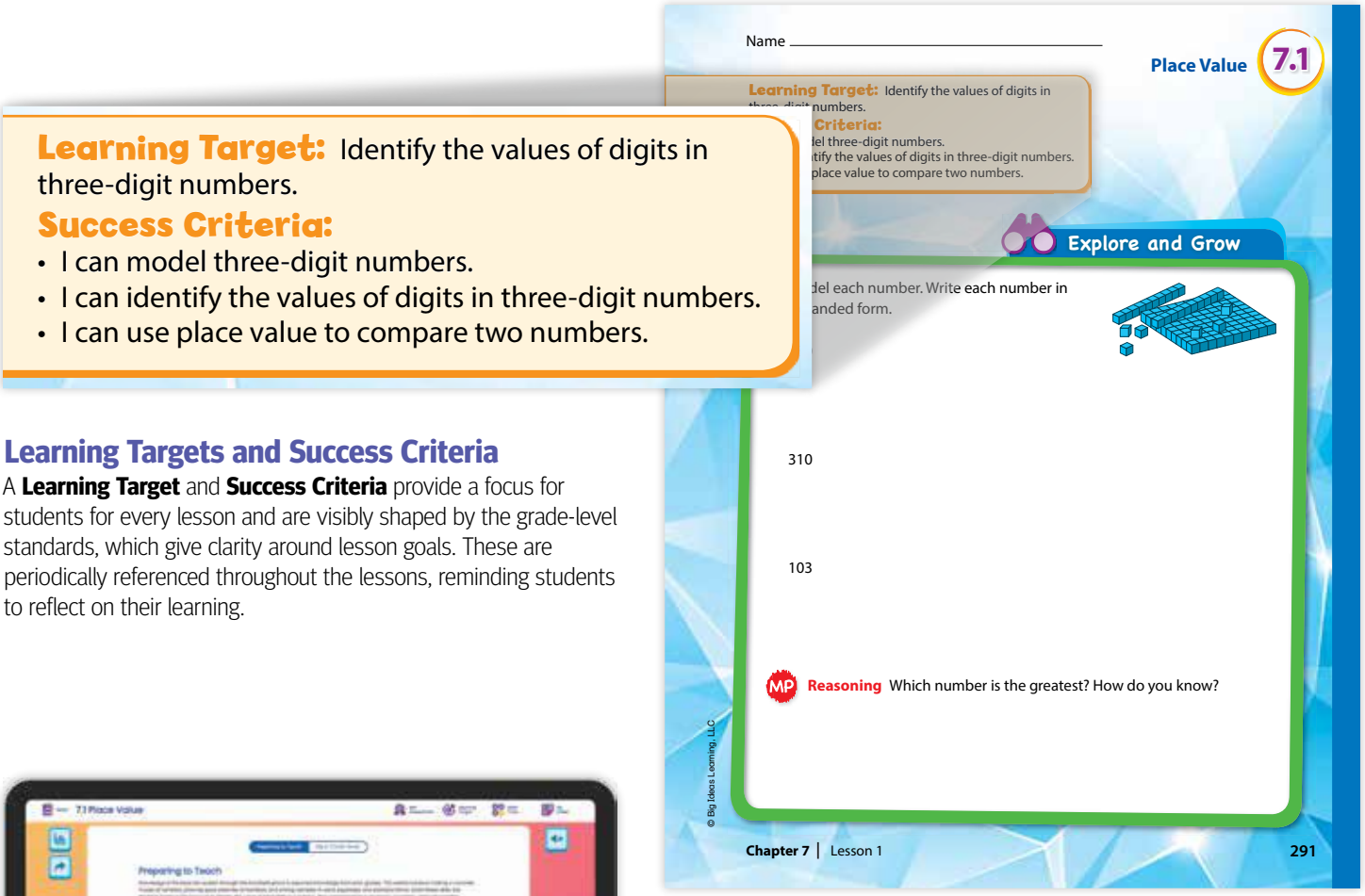
▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Focus and Coherence From a Single-Authorship Team

From Kindergarten through Algebra 2, Ron Larson and Laurie Boswell developed a logical and comprehensive progression of focused math topics that results in meaningful coherence from course to course.

Focus

Big Ideas Math: Modeling Real Life features rich lessons, activities, and assessments aligned to grade-level standards, while simultaneously supporting and engaging students in the major work of the course.



Learning Targets and Success Criteria

A **Learning Target** and **Success Criteria** provide a focus for students for every lesson and are visibly shaped by the grade-level standards, which give clarity around lesson goals. These are periodically referenced throughout the lessons, reminding students to reflect on their learning.

Laurie's Notes: Preparing to Teach

At the beginning of each lesson, the **Preparing to Teach** feature in **Laurie's Notes** makes connections to the threads of major topics for the course. This reminds teachers of students' prior knowledge and helps focus each lesson on the current topics.

Coherence

A single-authorship team ensures a coherent program with an intentional progression of content within and between grade levels. Students build new understanding on foundations from prior grades and connect concepts throughout the year.

Progressions Through the Grades Chart

Teachers gain insight into where their students have come from and where they are going next with the **Progressions Through the Grades** chart. With this information, teachers are assured that what they are teaching has a purpose and meaning for that particular point in the curriculum.

Through the Grades		
Grade 1	**Grade 2**	**Grade 3**
• Solve addition and subtraction word problems within 20. • Determine the unknown number to complete addition and subtraction equations. • Use strategies to add within 100.	• Solve one- and two-step word problems within 100. • Use strategies to fluently add and subtract within 100. • Use strategies to add up to 4 two-digit numbers.	• Solve one-step word problems involving measurement. • Solve one- and two-step word problems involving data. • Solve two-step word problems involving the four operations. • Use strategies to fluently add and subtract within 1,000.

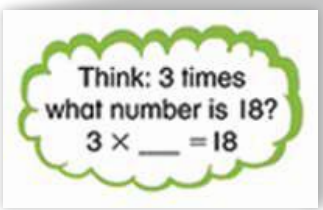
Seamless Progressions Between Grades

One author team thoughtfully wrote each course, creating a seamless progression of content from Kindergarten through Algebra 2.

	Operations and Algebraic Thinking			
Algebra and Functions	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. *Chapters 5–7*	Solve problems involving addition and subtraction within 20. Apply properties of operations. Work with addition and subtraction equations. *Chapters 1–5, 10, 11*	Solve problems involving addition and subtraction within 20. Work with equal groups of objects. *Chapters 1–6, 15*	Solve problems involving multiplication and division within 100. Apply properties of multiplication. Solve problems involving the four operations, and identify and explain patterns in arithmetic. *Chapters 1–5, 8, 9, and 14*

Intentional Sequence Within Each Grade

This intentional progression of content results in coherence within the grade. Each lesson builds on prior learning as new concepts are introduced, providing an easy way for students to form connections.



▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Rigor Through a Balanced Approach

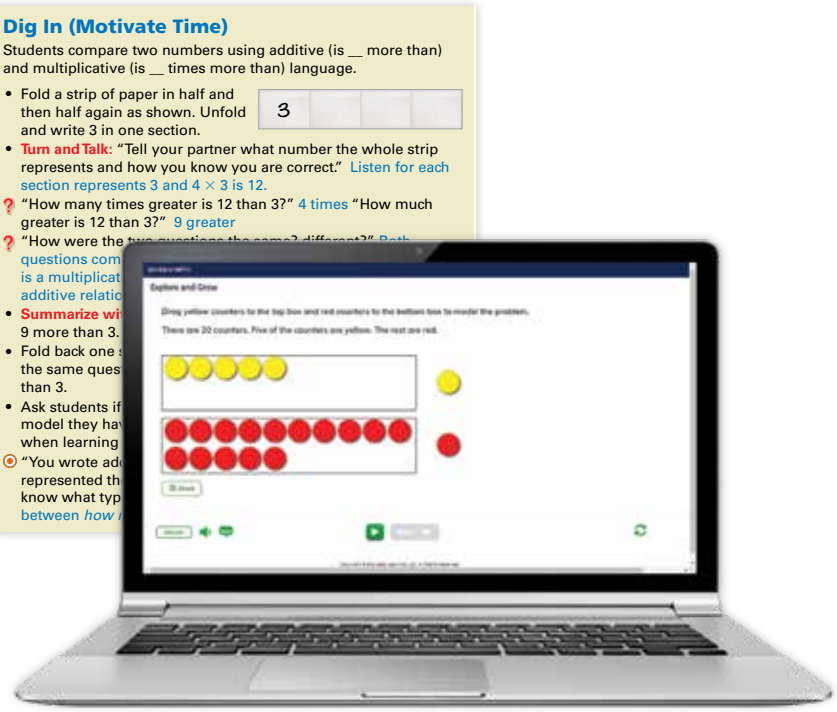
Conceptual Understanding and Procedural Fluency

A truly rigorous program provides a balance of the three aspects of rigor: conceptual understanding, procedural fluency, and application. Every lesson in the *Big Ideas Math: Modeling Real Life* program was intentionally written with the following elements to support this balance.

Conceptual Understanding

Each lesson contains a **Dig In** from **Laurie's Notes** to help teachers launch the lesson. These **Dig Ins** help build conceptual understanding and connect students' prior knowledge to the concepts in the lesson.

Students develop conceptual understanding as they investigate new topics during the **Explore and Grows.** Through discovery learning, the use of manipulatives, and mathematical conversations, students develop deeper levels of understanding.

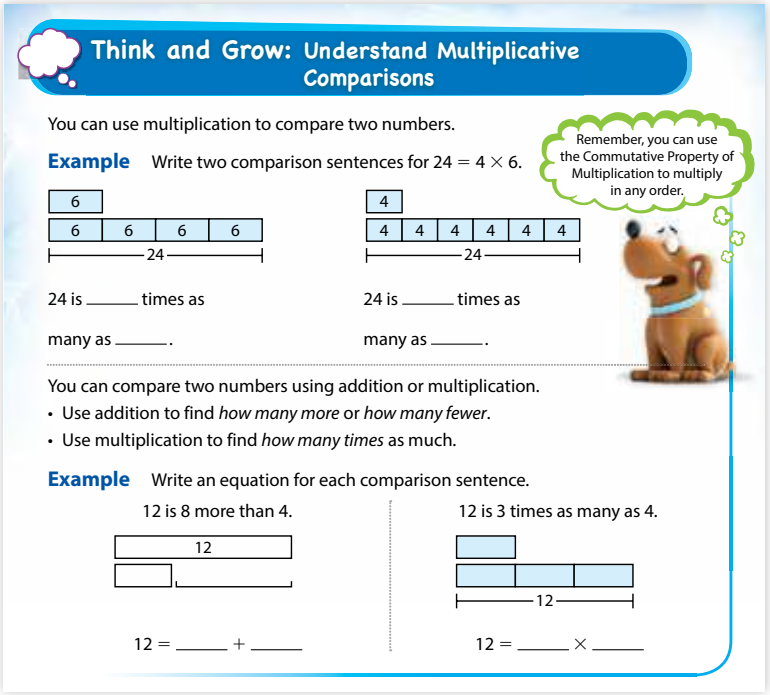


Math Tools

Teachers and students can use the point-of-use **Math Tools** to support students' conceptual development.

Procedural Fluency

Following the Explore and Grow, students solidify their learning with clear, stepped-out teaching through **Key Ideas** and **Think and Grow** examples.



Scaffolding and Differentiating

Students demonstrate what they have learned in the **Show and Grow,** allowing teachers to determine how to scaffold and differentiate during the **Apply and Grow.** During the Apply and Grow, students will complete both conceptual and procedural questions and exercises.

Visit **NGL.Cengage.com/BigIdeas** to learn more.

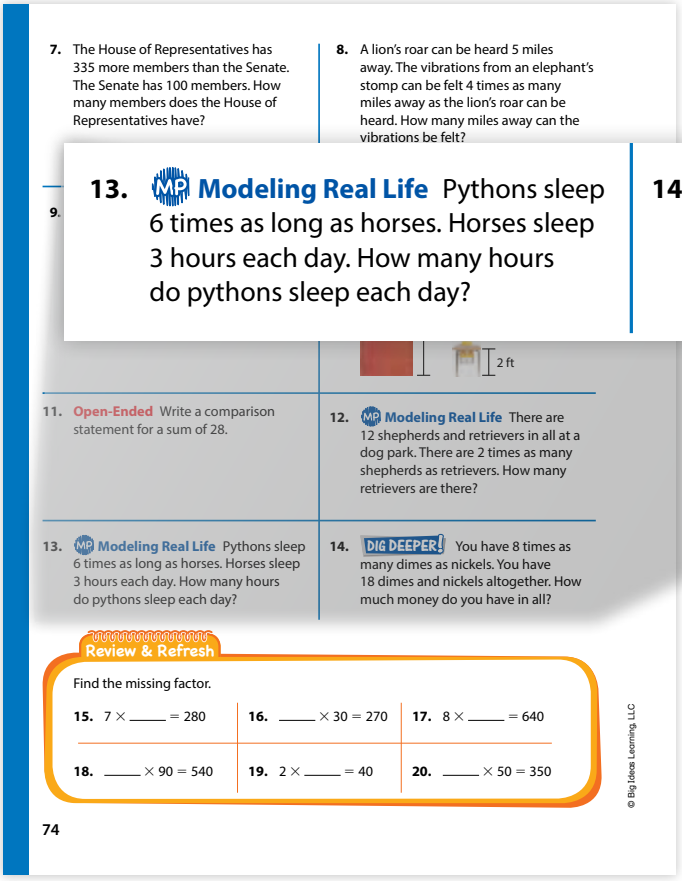
Rigor Through a Balanced Approach

Real-Life Application

Big Ideas Math: Modeling Real Life emphasizes real-life application, balancing the three aspects of rigor.

Modeling Real Life

Every lesson contains a **Think and Grow: Modeling Real Life** example. This provides students with a relevant real-world problem that brings together their conceptual understanding and procedural fluency as they seek to apply and transfer their knowledge.



13. Modeling Real Life Pythons sleep 6 times as long as horses. Horses sleep 3 hours each day. How many hours do pythons sleep each day?

14. DIG DEEPER! You have 8 times as many dimes as nickels. You have 18 dimes and nickels altogether. How much money do you have in all?

Grow Independent Problem Solvers

Students will then continue practicing through nonroutine problems, such as **Modeling Real Life** and **Dig Deeper,** which help students apply surface-level skills to gain a deeper understanding. These problems lead students to become independent problem solvers.

Problem-Solving Plan

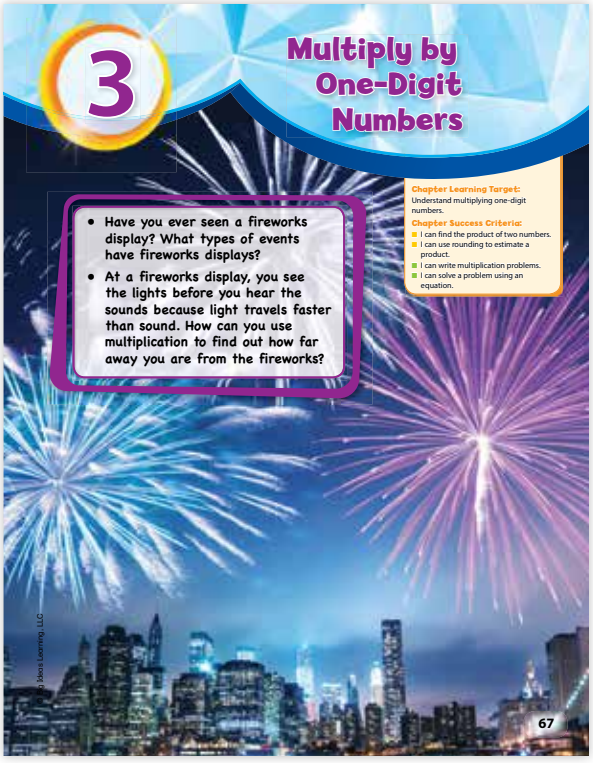
Through an emphasis on the **Problem-Solving Plan,** all students can be successful with application problems. Featured in many of the **Think and Grow: Modeling Real Life** examples, students become familiar with the process, helping them make sense of the problem and grow their confidence.

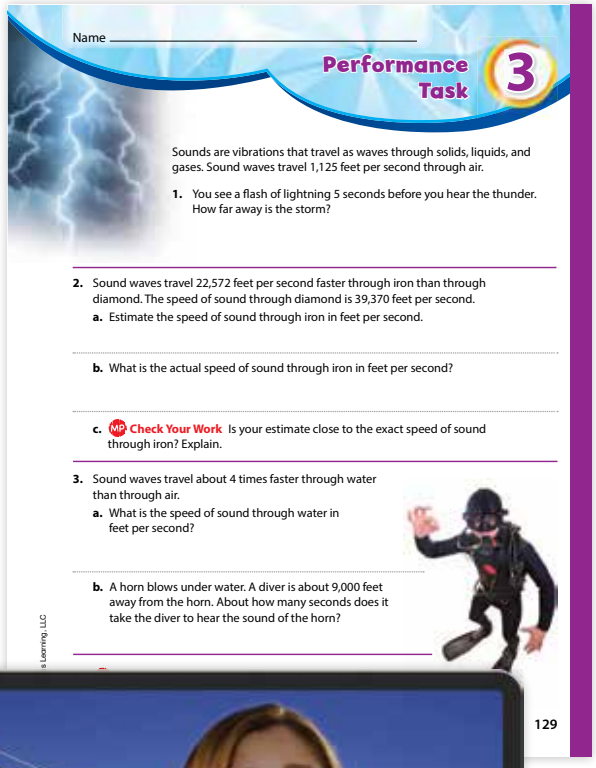
THE PROBLEM-SOLVING PLAN

1. **Understand the Problem**
   Think about what the problem is asking, what information you know, and how you might begin to solve.
2. **Make a Plan**
   Plan your solution pathway before jumping in to solve. Identify any relationships and decide on a problem-solving strategy.
3. **Solve and Check**
   As you solve the problem, be sure to evaluate your progress and check your answers. Throughout the problem-solving process, you must continually ask, "Does this make sense?" and be willing to change course if necessary.

Connecting to Real Life

Teachers can launch every chapter by having students think about their world. After the chapter, teachers can use the related **Performance Task** to connect students to what they just learned.





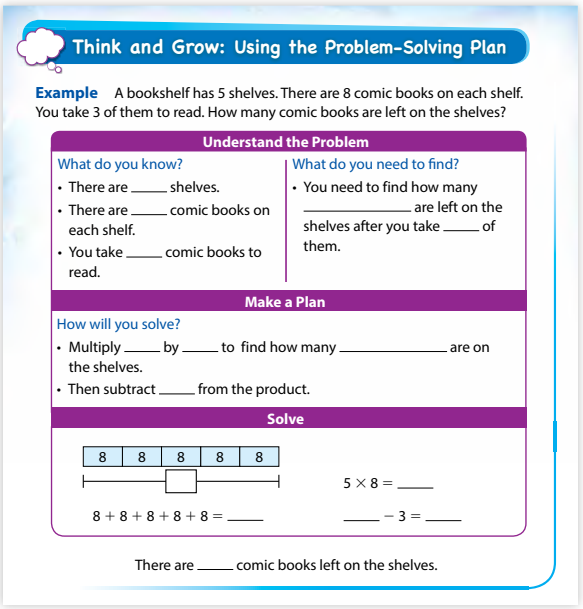
STEAM Videos

Starting in Grade 3, students can watch STEAM Videos online and complete the corresponding STEAM Performance Task, giving them further opportunities to connect to real life through varying interests and scenarios.

▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Integrated Mathematical Practices

Developing proficiency in the Mathematical Practices is about becoming a mathematical thinker. Newton and Descartes, student-friendly math guides integrated throughout the program and in Math Musicals, help students use the Mathematical Practices by posing questions for students to consider as they learn to reason and communicate. MP labels throughout the book indicate gateways to those aspects. Collectively, these opportunities lead students to a full understanding of each Mathematical Practice.



Make Sense of Problems and Persevere in Solving Them

One way to **Make Sense of Problems and Persevere in Solving Them** is to use the Problem-Solving Plan. Students should take time to analyze the given information and what the problem is asking to help them plan a solution pathway.

3. MP **Reasoning** Newton has 10 tokens. Which equations can Newton use to make an array with his tokens?

$2 + 2 + 2 + 2 + 2 = 10$ $\quad$ $7 + 3 = 10$

$2 + 8 = 10$ $\quad$ $5 + 5 = 10$

Reason Abstractly and Quantitatively

Students **Reason Abstractly** when they explore an example using numbers and models to represent the problem. Other times, students **Reason Quantitatively** when they see relationships in numbers or models and draw conclusions about the problem.

Construct Viable Arguments and Critique the Reasoning of Others

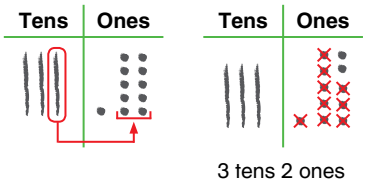
When students **Construct Viable Arguments and Critique the Reasoning of Others,** they make and justify conclusions and decide whether others' arguments are correct or flawed.

3. MP **YOU BE THE TEACHER** Is Newton correct? Explain.

$31 - 9 \stackrel{?}{=} 32$

Regroup?

Yes $\quad$ No



3 tens 2 ones

10. MP **Modeling Real Life** There are 40 chairs in the library. There are 30 fewer tables than chairs. How many tables are there?

Model With Mathematics

To **Model With Mathematics,** students apply the math they have learned to a real-life problem and interpret mathematical results in the context of the situation.

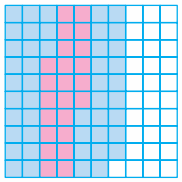
Use Appropriate Tools Strategically

To **Use Appropriate Tools Strategically,** students need to know what tools are available and think about how each tool might help them solve a mathematical problem. When students choose a tool to use, remind them that it may have limitations.

Think and Grow: Use Models to Multiply Decimals and Whole Numbers

Example Find 0.23×3.

Use a model. Shade 3 groups of 0.23.



$0.23 + 0.23 + 0.23 =$ _____

So, $0.23 \times 3 =$ _____.

MP Use Math Tools
What does each part of the model represent?

Show 123 two ways.

Hundreds	Tens	Ones
1	2	3

Hundreds	Tens	Ones
0	12	3

MP Communicate Clearly
Explain why 1 hundred, 2 tens, and 3 ones has the same value as 12 tens and 3 ones.

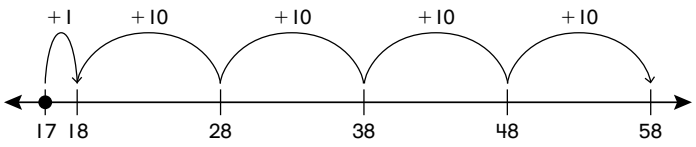
Attend to Precision

When students **Attend to Precision,** they are developing a habit of being careful in how they talk about concepts, label their work, and write their answers.

Look for and Make Use of Structure

Students **Look for and Make Use of Structure** by looking closely to see structure within a mathematical statement or stepping back for an overview to see how individual parts make one single object.

4. MP **Structure** Write an equation that matches the number line.



_____ + _____ = _____

13. DIG DEEPER! Write a multiplication equation shown by the partial products $0.14 + 0.2 + 2.1 + 3$.

MP Repeated Reasoning
What number patterns can help you identify the factors of the equation?

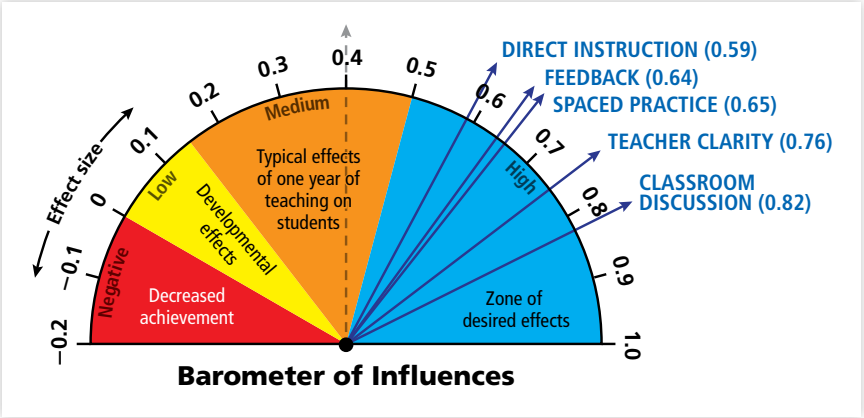
Look for and Express Regularity in Repeated Reasoning

When students **Look for and Express Regularity in Repeated Reasoning,** they can notice patterns and make generalizations. Remind students to keep in mind the goal of a problem, which will help them evaluate reasonableness of answers along the way.

Accelerating Learning for All Students

Five Highest-Impact Teaching Strategies

Big Ideas Math: Modeling Real Life incorporates the highest-impact teaching strategies from Professor John Hattie's *Visible Learning* research. Reinforced throughout the program, these five strategies are proven to have the greatest impact on student achievement, giving all students the opportunity to be successful.



Learning Target: Identify the values of digits in three-digit numbers.

Success Criteria:

- I can model three-digit numbers.
- I can identify the values of digits in three-digit numbers.
- I can use place value to compare two numbers.

Teacher Clarity

Learning Targets and **Success Criteria** are incorporated into every chapter and lesson, and visibly reflect the standards, allowing teachers to clearly communicate learning expectations.

Feedback

Providing timely and relevant feedback is crucial for students to make connections and further their understanding. Feedback helps students determine what they are learning, where they are in the learning, and where they are going next. In turn, students can also provide teachers with feedback using the **Self-Assessment** tool.

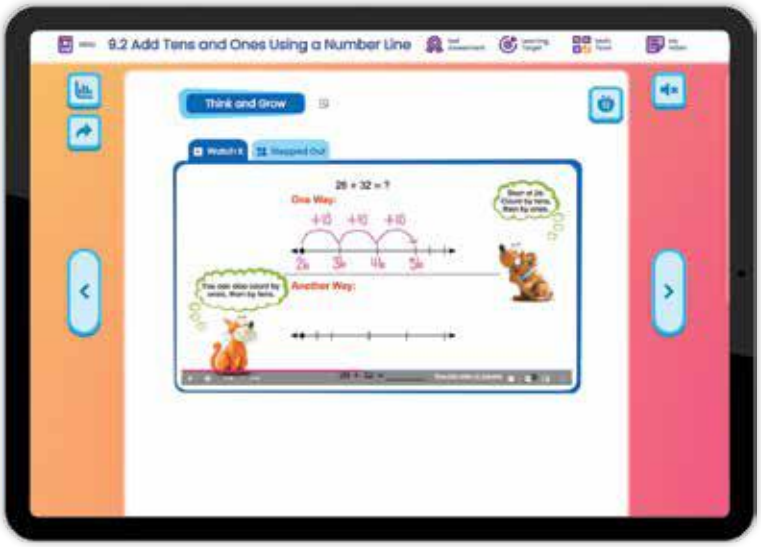
◉ "You have modeled multiplying by 2 and found the product. Sometimes the number of groups is 2, sometimes the size of the group is 2. Tell your partner what you learned today about multiplying a number by 2."

Classroom Discussion

When students participate in mathematical discourse, they hone their ability to reason, construct arguments, and critique each other's reasoning. **Turn and Talk,** found in **Laurie's Notes,** allows students to frequently analyze each other's mathematical thinking.

Explore and Grow

- **Turn and Talk:** "Describe the relationship between the number of red counters and yellow counters." Discuss and record valid statements:
  - There are many more red counters than yellow counters.
  - There are 10 more red counters than yellow counters.
  - There are 3 times as many red counters as yellow counters.



Direct Instruction

Every investigative **Explore and Grow** is followed by explicit instruction, allowing students to build their procedural fluency. **Think and Grow** examples have been carefully designed to ensure students meet the success criteria of each lesson.

Spaced Practice

Students must revisit concepts over time so deeper learning occurs. The **Review & Refresh** exercises in every lesson provide ongoing practice so students continue to focus on the major topics.

Review & Refresh

16. Circle groups of 4. Write a repeated addition equation to match.

____ groups of 4 ____ + ____ + ____ + ____ = ____

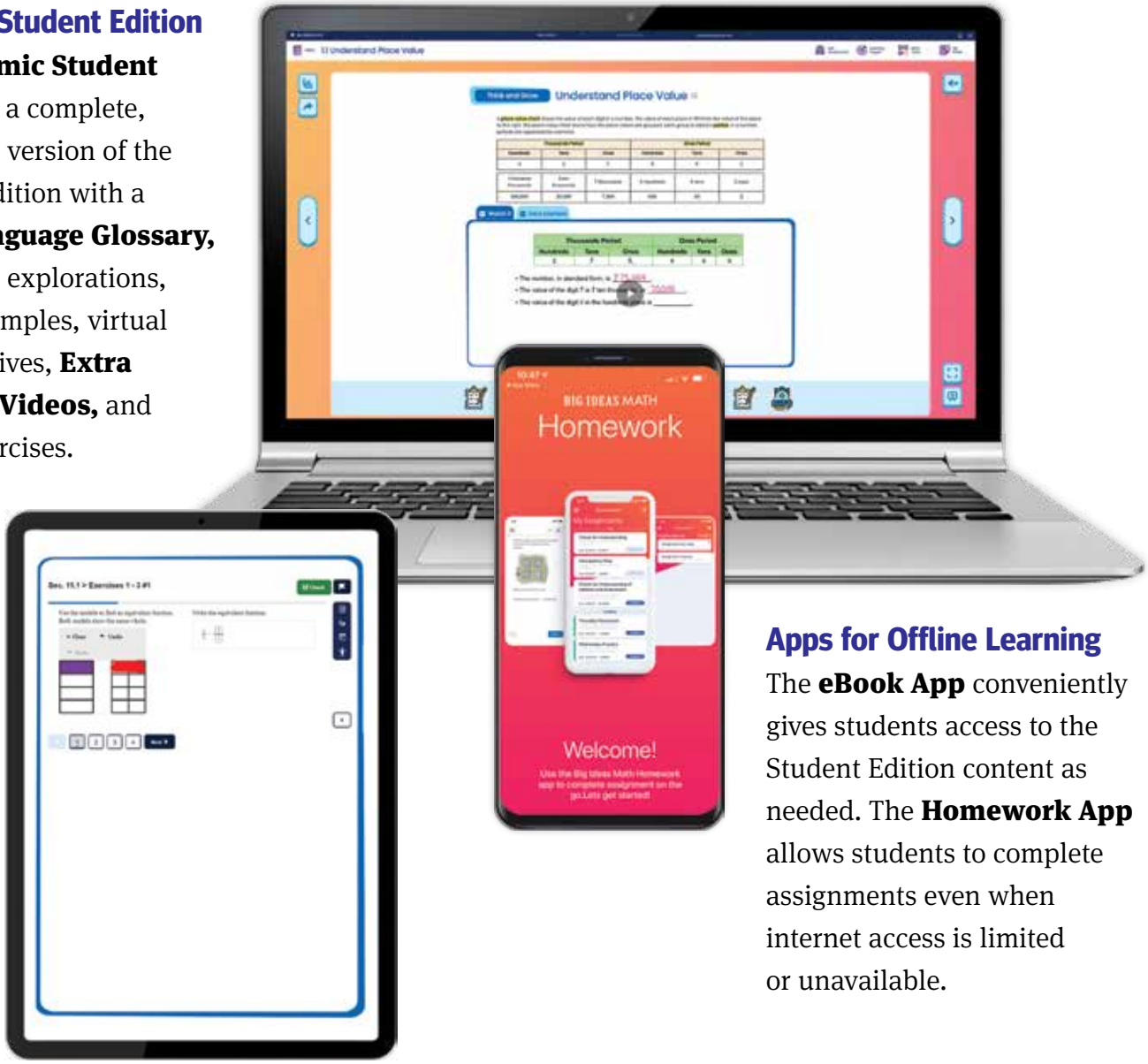
▸ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Flexible Resources Accessible Anywhere

Big Ideas Math: Modeling Real Life is powered by a robust technology platform that enhances instruction and includes interactive resources for facilitating and completing lessons, assessment options, and video support for both students and teachers.

Dynamic Student Edition

The **Dynamic Student Edition** is a complete, interactive version of the Student Edition with a **Multi-Language Glossary,** interactive explorations, digital examples, virtual manipulatives, **Extra Example Videos,** and digital exercises.



Apps for Offline Learning

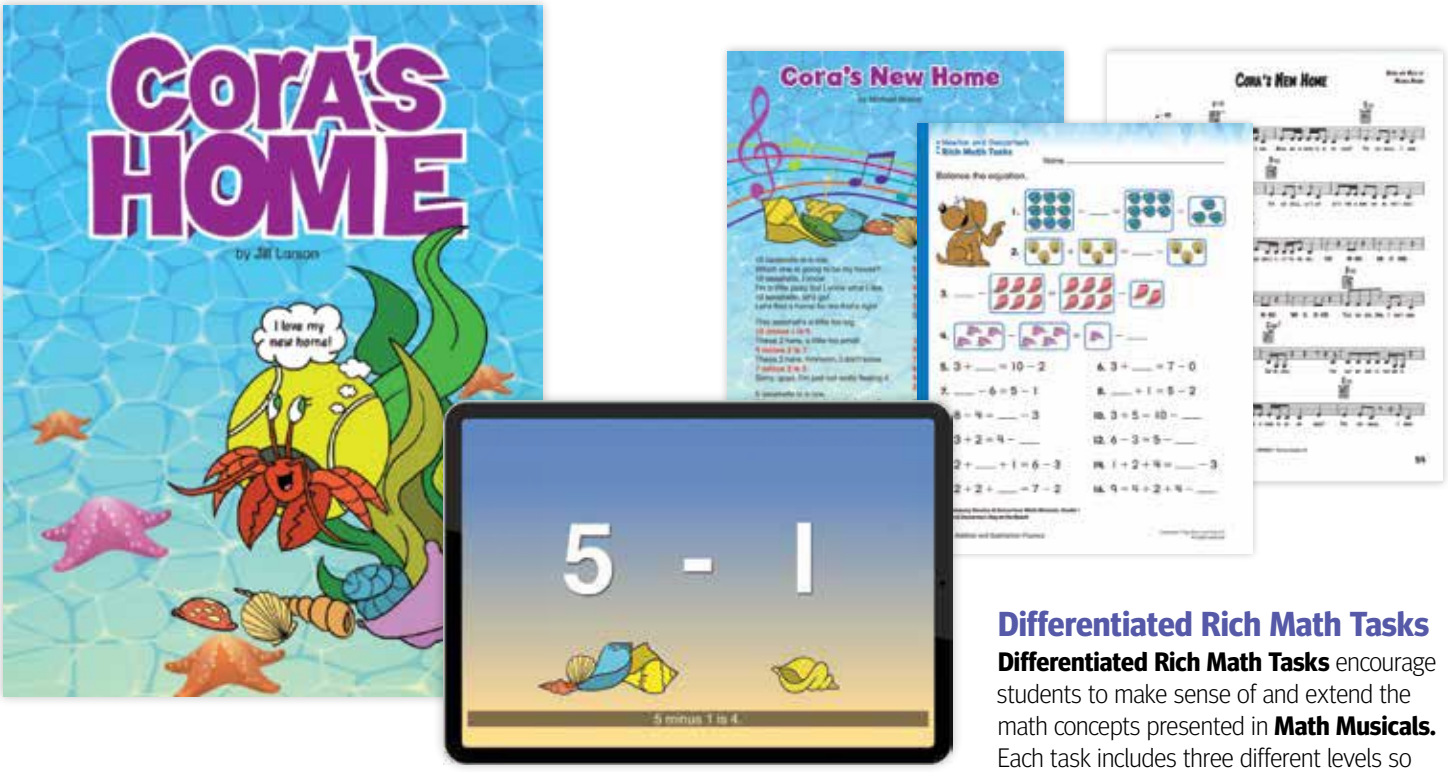
The **eBook App** conveniently gives students access to the Student Edition content as needed. The **Homework App** allows students to complete assignments even when internet access is limited or unavailable.

Assignment Builder

The **Assignment Builder** gives teachers the flexibility to create digital assignments and assessments that match the print resources or develop their own questions. The parity between the print and digital ensures teachers can provide equitable access to course content for all students. The embedded tools in the assignments provide students with optional support so that all students can be successful.

Newton and Descartes's Math Musicals With Differentiated Rich Math Tasks

Math Musicals offer elementary students a fun and engaging connection between math, music, and literature. Two furry friends, Newton and Descartes, team up in these educational stories and songs to bring mathematics to life!



Differentiated Rich Math Tasks

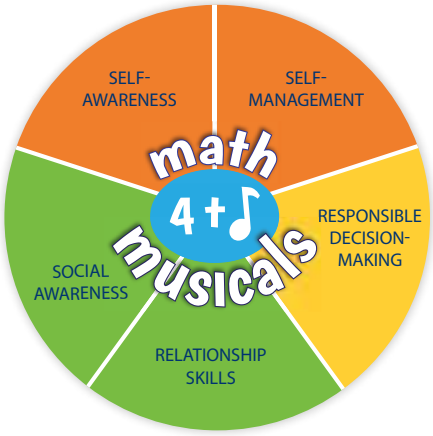
Differentiated Rich Math Tasks encourage students to make sense of and extend the math concepts presented in **Math Musicals.** Each task includes three different levels so students can complete tasks that are designed to challenge them.

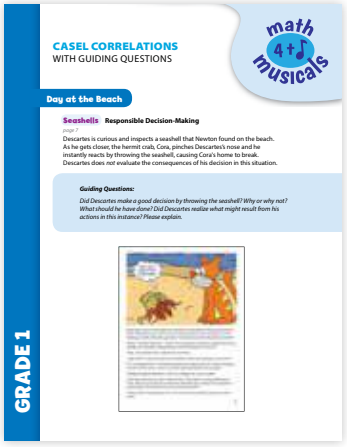
Explore Math Musicals!

MathMusicals.com

Support for Social and Emotional Learning (SEL) with Newton and Descartes

Students tap into rich characters, relationships, and emotions with **Math Musicals,** providing a landscape for developing SEL skills. Use the **SEL Guiding Questions for Math Musicals** found online for additional SEL support!





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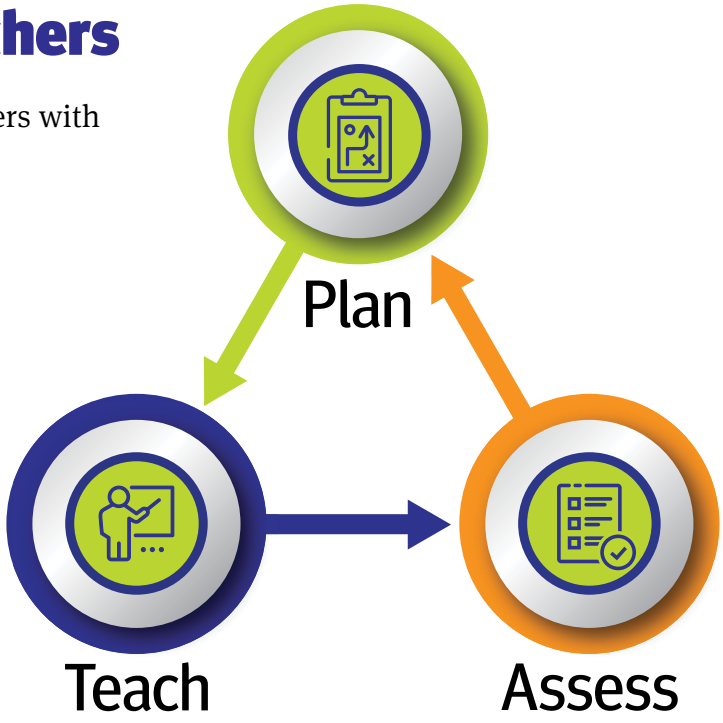
Support to Empower Teachers

Big Ideas Math: Modeling Real Life provides teachers with everything they need to plan, teach, and assess to accelerate learning for all students.

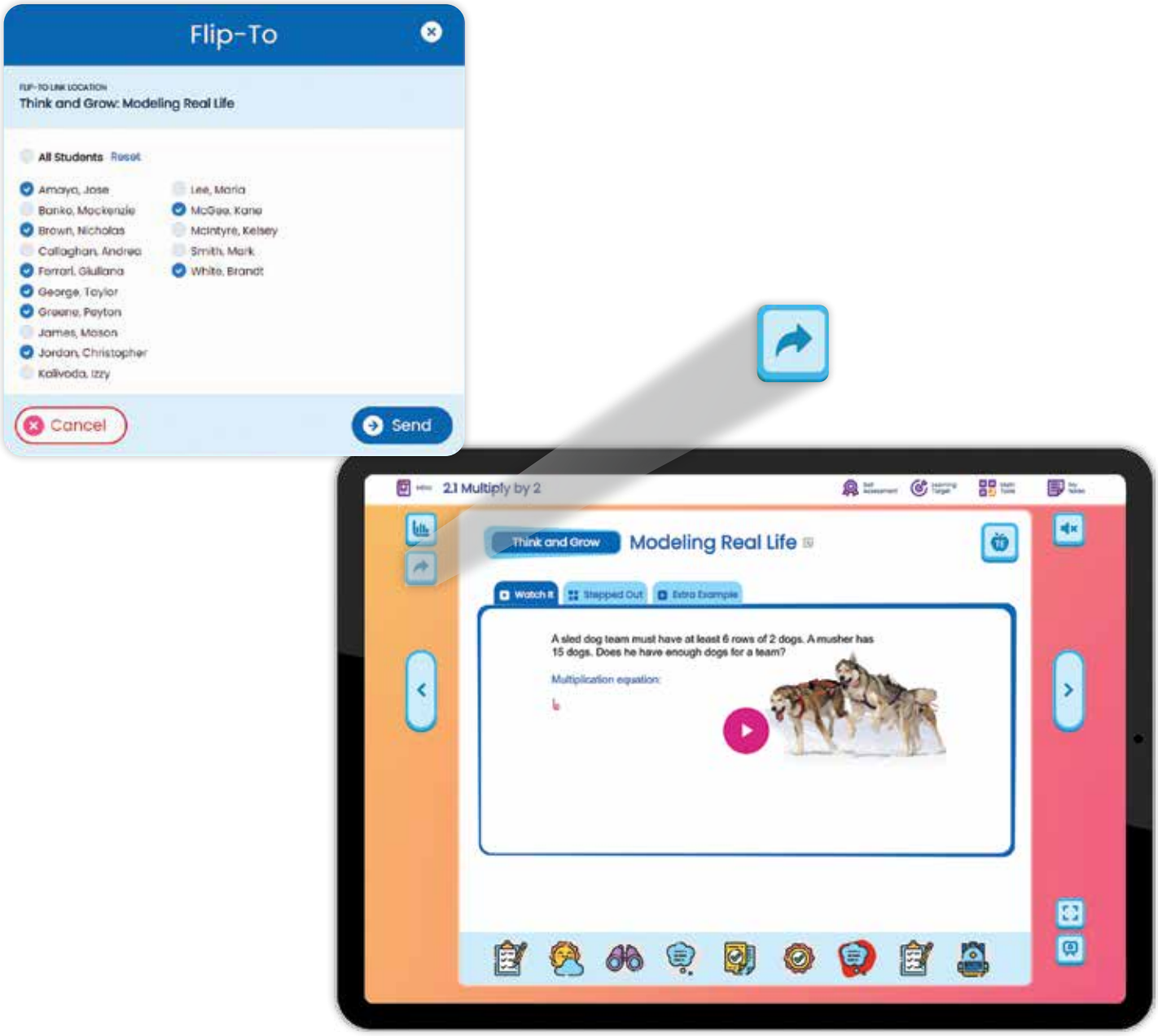


Plan Efficiently

Written by master educator and author Dr. Laurie Boswell, **Laurie's Notes** offer teachers point-of-use support through content overviews, motivation techniques, teaching strategies, questions to ask students for discussion, closures, and more! Laurie's Notes also include specific support for the Mathematical Practices, so teachers can ensure students are using them on a daily basis.

Teach Effectively

Teachers use the **Dynamic Classroom** to facilitate lessons using the engaging explorations, digital examples, and interactive practice all at their fingertips. They can even use the **Flip-To** feature to send students directly to a specific place in their **Dynamic Student Edition,** which makes managing a classroom full of devices a breeze.



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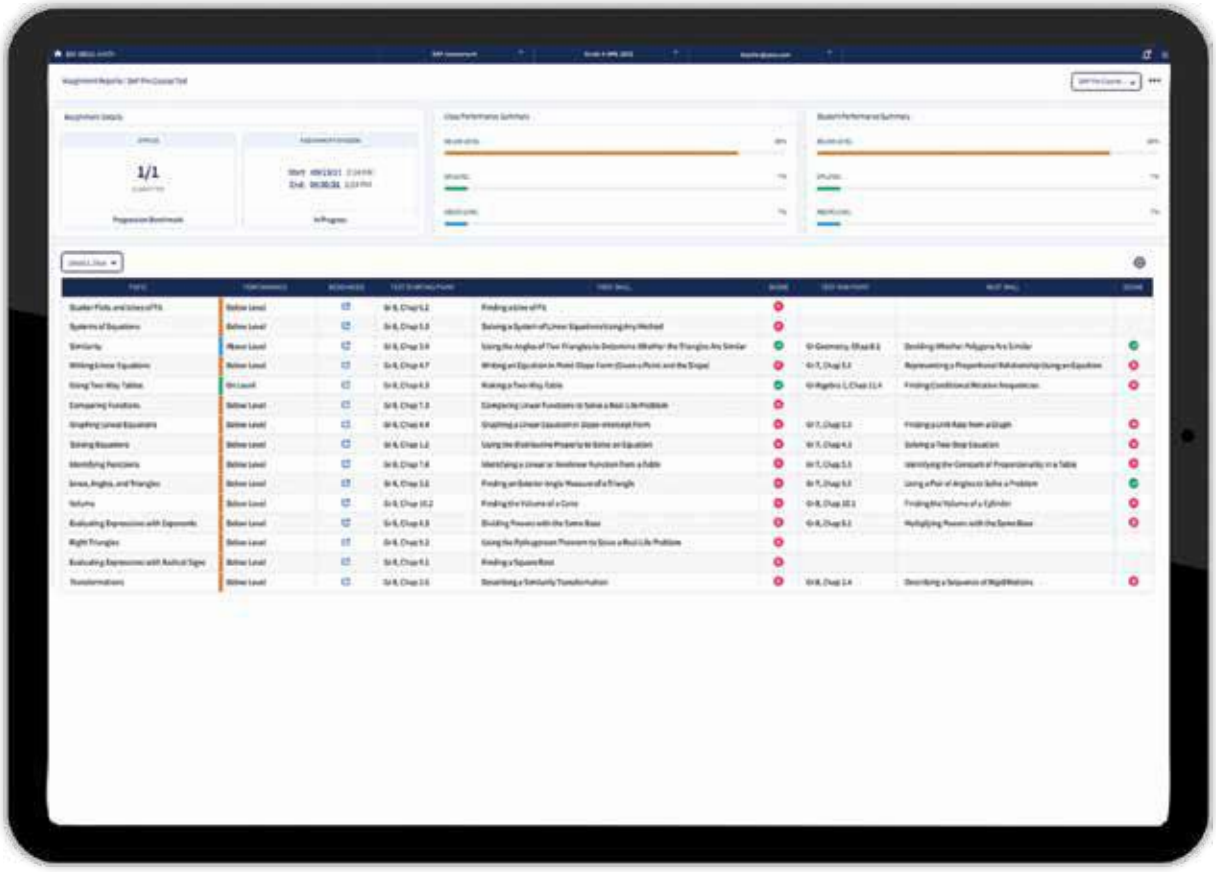
Rich Assessments

Improving Student Outcomes

Big Ideas Math: Modeling Real Life is supported by a rich collection of assessment tools for diagnostic, formative, and summative assessment. Consistent and frequent checkpoints allow teachers to evaluate where students are in their learning, while real-time results and progressive reporting are easily accessible on the digital platform.

Diagnostic Assessment



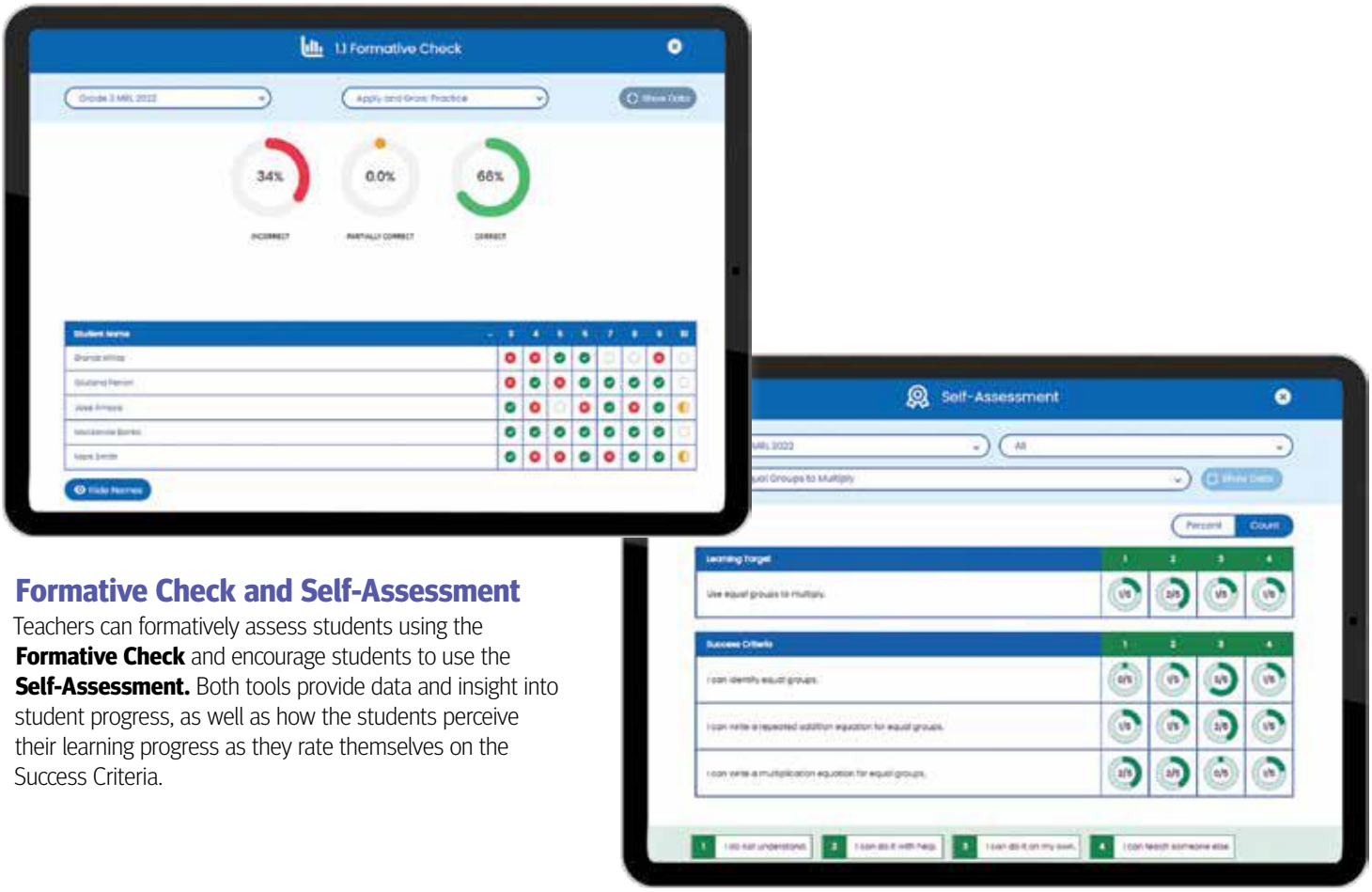
DAP Assessment

The **DAP (Diagnostic Adaptive Progression) Assessment** measures learning across grades and gives teachers full insight into where students fall on the continuum of skills. With this cohesive and effective test, questions adapt based on student responses. The detailed report suggests resources to use with students who need support, empowering teachers with information to become even more effective in their instruction.

Prerequisite Skills Practice

With the **Prerequisite Skills Practice,** teachers can identify prior skills where students may need more support before starting grade-level content.

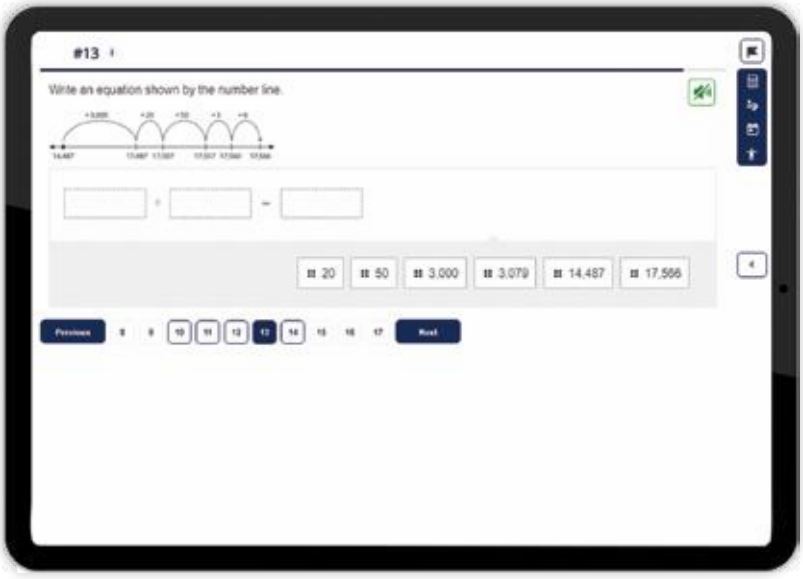
Formative Assessment



Formative Check and Self-Assessment

Teachers can formatively assess students using the **Formative Check** and encourage students to use the **Self-Assessment.** Both tools provide data and insight into student progress, as well as how the students perceive their learning progress as they rate themselves on the Success Criteria.

Summative Assessment



Dynamic Assessment System

Teachers can assign practice and assessments aligned to course content or create their own assignments, including writing their own questions. Assignments are automatically scored and provide detailed reports on performance and standards.

Assessment Book

Chapter Tests, Pre- and Post-Course Tests, and Course Benchmark Tests from the **Assessment Book** assess course content and can be assigned periodically throughout the year to show growth. Digital versions can be customized online in the Assignment Builder.

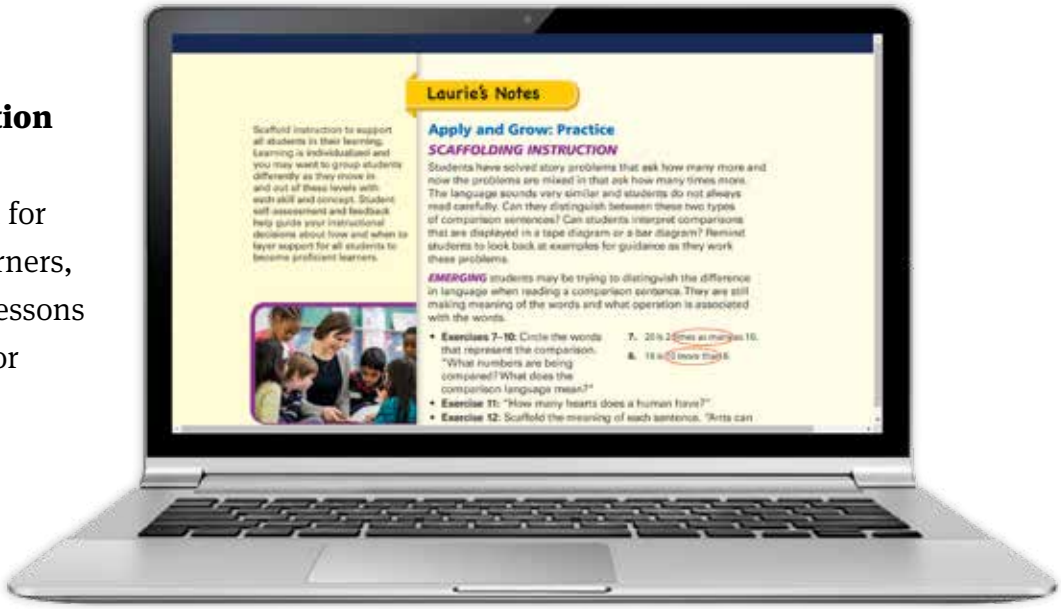
▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

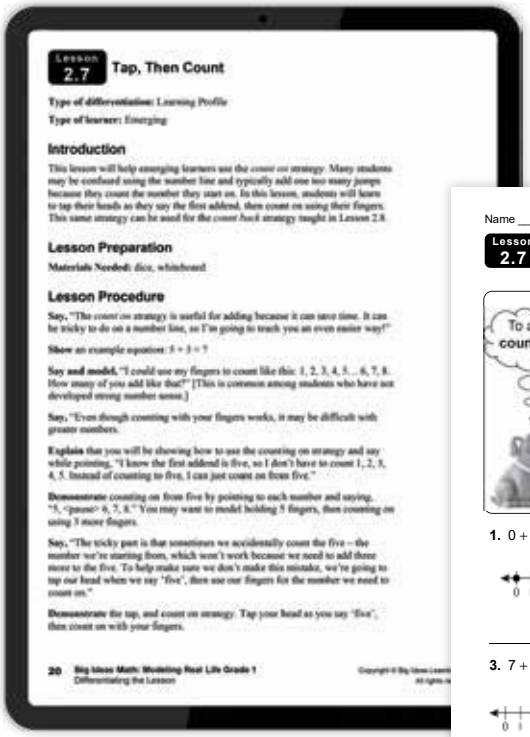
Reach All Learners

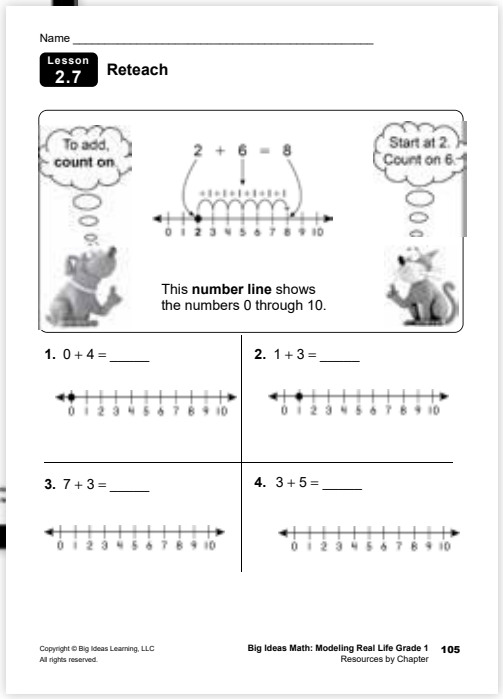
Big Ideas Math: Modeling Real Life ensures teachers can easily meet the needs of all learners through differentiation and intervention strategies and resources.

Scaffolding Instruction

Using **Scaffolding Instruction** in **Laurie's Notes,** teachers can provide specific support for Emerging and Proficient learners, with options for extending lessons by adding even more rigor for Advanced students.





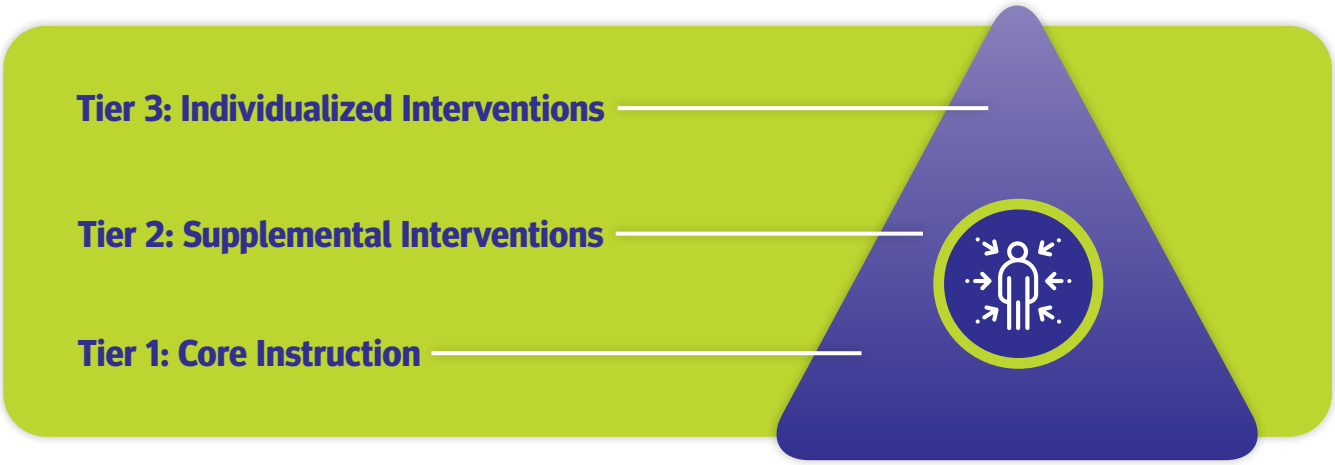


Built-In Differentiation

Resources found online and in the **Resources by Chapter,** such as Reteach, Extra Practice, and Enrichment and Extension, as well as Differentiating the Lesson, provide teachers with materials they can use with their students that are directly related to the lesson goals but also targeted to students' needs.

Timely Intervention Support

Through a multitude of print and digital resources, *Big Ideas Math: Modeling Real Life* completely supports the Response to Intervention and Multi-Tiered System of Supports models. With resources for students at every tier, including access to the entire K–12 curriculum online, teachers can target students with specific support to get them back on track at any point.

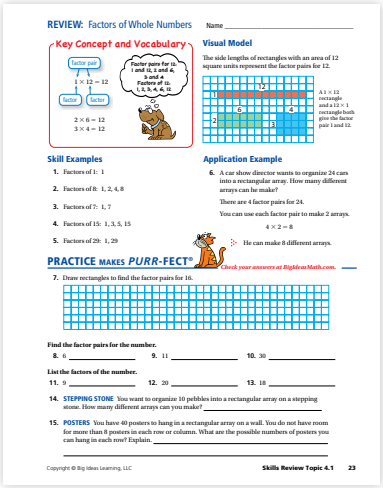


Digital Opportunities for Reinforcement and Enrichment

Big Ideas Math: Modeling Real Life offers a variety of digital resources for skill development, review, and enrichment. The **Skills Trainer** provides opportunities for students to review or extend skills from Kindergarten through Algebra 2. **Interactive Tools,** such as base ten blocks, linking cubes, and fraction models, help students make connections by visualizing key concepts.

Skills Review for Success

The **Skills Review Handbook** includes examples and practice to review concepts from Kindergarten through Grade 8. It can be used for remediation, enrichment, and differentiation. Available in print or digitally, the handbook provides students with an additional opportunity for review and practice.


REVIEW: Factors of Whole Numbers

Name _____

Key Concept and Vocabulary

Visual Model

The side lengths of rectangles with an area of 12 square units represent the factor pairs for 12.

Skill Examples

1. Factors of 1: 1
2. Factors of 8: 1, 2, 4, 8
3. Factors of 7: 1, 7
4. Factors of 15: 1, 3, 5, 15
5. Factors of 29: 1, 29

Application Example

6. A car show director wants to organize 24 cars into a rectangular array. How many different arrays can be made?

There are 4 factor pairs for 24.

You can use each factor pair to make 2 arrays.

$4 \times 2 = 8$

He can make 8 different arrays.

PRACTICE MAKES *PURR*-FECT®

Check your answers at BigIdeasMath.com.

7. Draw rectangles to find the factor pairs for 16.

Find the factor pairs for the number.

8. 6 _____ 9. 11 _____ 10. 30 _____

List the factors of the number.

11. 9 _____ 12. 20 _____ 13. 18 _____

14. STEPPING STONE You want to organize 10 pebbles into a rectangular array on a stepping stone. How many different arrays can you make? _____

15. POSTERS You have 40 posters to hang in a rectangular array on a wall. You do not have room for more than 8 posters in each row or column. What are the possible numbers of posters you can hang in each row? Explain. _____

▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Ensure Success for English Language Learners

In the Teaching Edition, teachers will find leveled **ELL Support** for Beginner, Intermediate, and Advanced ELL students for every lesson, which is in addition to the leveled Scaffolding Instruction notes.

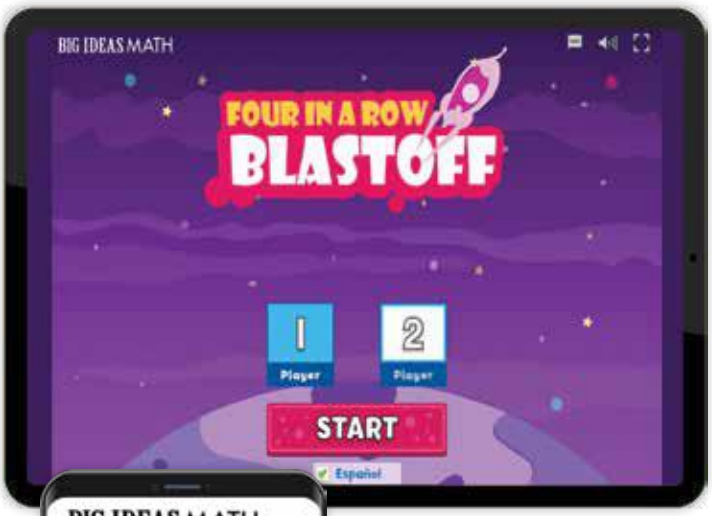
Support for Spanish-Speaking Students

The Spanish Student Edition, in both print and digital, is a carefully developed translation of the complete student program. In addition, a full assessment suite in Spanish ensures formative and summative assessment can be delivered effectively.

ELL Support

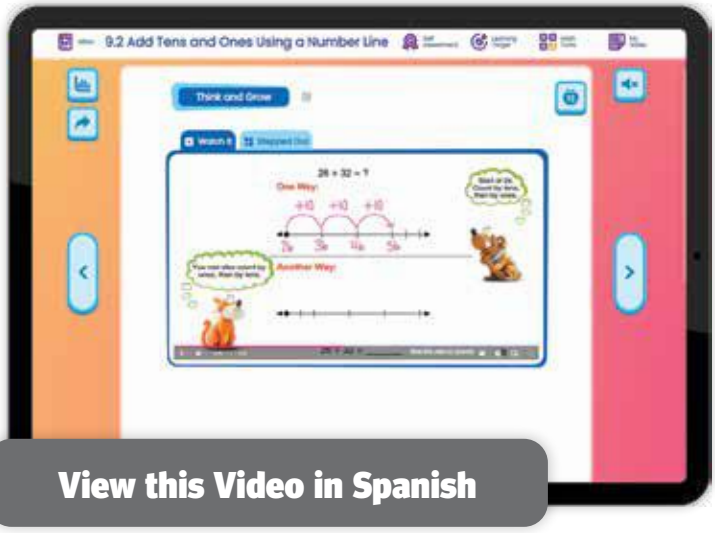
After completing the example, have students work in pairs to complete Exercises 1–3. Have one student ask another, "How many jumps of five do you make? What is the answer?" Have them alternate roles for each exercise.

Beginner students may answer using numbers.
Intermediate students may answer using phrases, such as, "eight times."
Advanced students may answer with sentences, such as, "I make eight jumps of five."



School-to-Home Connections

Family Letters and the **Multi-Language Glossary** are available in 16 languages, including Spanish, providing parents with the information and tools they need to help their students succeed. The **Game Library** contains English and Spanish interactive games with audio, making math fun at home!



Digital Language Support

Spanish audio is also available in the **Dynamic Classroom** to enhance the Digital Examples, Extra Example Videos, practice, assessments, and more!

Program Resources

Big Ideas Math: Modeling Real Life provides all teachers and students with access to all materials on one digital platform in addition to easily accessible print resources.

Student Resources

Student Edition*

Dynamic Student Edition

Interactive Tools
Interactive Explorations
Digital Examples
Tutorial Extra Example Videos◆
Self-Assessments

Additional Resources

Vocabulary Flash Cards*
Graphic Organizers
Math Tool Paper

Skills Trainer

Skills Review Handbook

Game Library*

Multi-Language Glossary*

STEAM Videos◆

eBook App

Homework App

Teacher Resources

Teaching Edition

Resources by Chapter

Family Letter*
Warm-Ups
Extra Practice
Reteach
Enrichment and Extension
Chapter Self-Assessment◆

Assessment Book

Prerequisite Skills Practice*
Pre- and Post-Course Tests*
Course Benchmark Tests*
Chapter Tests*

Instructional Resources

Vocabulary Cards
Activities
Blackline Masters

Skills Review Handbook

Newton and Descartes's Math Musicals with Differentiated Rich Math Tasks

Manipulative Kit

Literature Kit

Dynamic Classroom

Laurie's Notes
Interactive Tools
Interactive Explorations
Digital Examples with PowerPoints
Formative Check
Self-Assessment
Flip-To
Digital Warm-Ups and Closures

Dynamic Assessment System

Practice
Assessments
DAP Assessment
Performance and Standard Reports

Answer Presentation Tool

Additional Resources

Lesson Plans
Differentiating the Lesson
Pacing Guides
Worked-Out Solutions Key◆
Family Letters*

Video Support for Teacher

Life on Earth Videos
Professional Development Videos
Concepts and Tools Videos

* Available online in Spanish
◆ Available for Grades 3–5
▪ Indicates Print/Hands-On Resources

▶ Visit **NGL.Cengage.com/BigIdeas** to learn more.

Big Ideas Learning

K–12 Programs Designed to Meet the Needs of All Learners

Big Ideas Learning provides a cohesive, coherent, and rigorous mathematics curriculum to empower teachers and support student learning from kindergarten through high school.

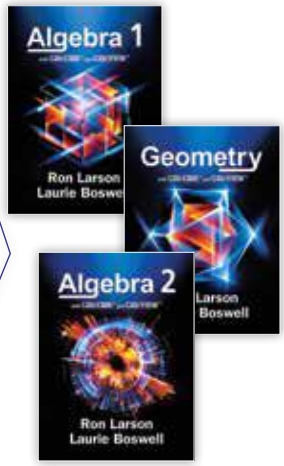
Written by a renowned, single-authorship team, these programs encourage students to become strategic thinkers as they prepare for college- and career-readiness.

Big Ideas Math
Modeling Real Life Grades K–5

Big Ideas Math
Modeling Real Life Grades 6–8

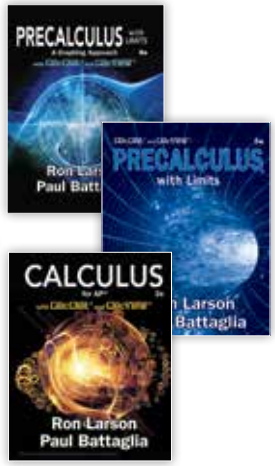
Advanced middle school courses available!

Big Ideas Learning
Grades 9–12



Integrated Mathematics courses also available!

Precalculus
AP® Calculus



Common Core Edition available for Kindergarten through Algebra 2

Learn more!
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