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GREAT MINDS™

EUREKA MATH²®

Getting Started Guide

Level 7–8 Module 1

Getting *Started*

This Getting Started Guide provides contextual information as you review *Eureka Math*$^{2®}$. Follow along as we explore the contents of the *Teach*, *Learn*, and *Apply* books. The guide also highlights some **key components of the digital experience** that are seamlessly integrated into *Eureka Math*^{2}.

Exponentially *More*

Eureka Math® revolutionized math teaching in the United States. The curriculum has helped students understand the why behind the math, not just the how. It has become the most widely used K–5 math curriculum in the country—so why would we change it? Because we listened to feedback from our dedicated team of *Eureka Math* teachers throughout the country and studied the findings of current educational research. Armed with this knowledge, we decided to expand the accessibility and efficacy of our materials so that even more students can achieve greatness in math.

Eureka Math^2 is exponentially more efficient. Exponentially more engaging. Exponentially more accessible. And this adds up to exponentially more knowledge and joy for students and teachers alike.

Teachability^2 + *Engagement*^{2} + *Accessibility*^{2} = *Joy*^{2}

Thinking and Talking *About Math*

The teacher–writers who crafted *Eureka Math²* realize the value of student discourse. Starting in kindergarten, *Eureka Math²* students engage with the teacher and one another to make their thinking visible. Students work in pairs and groups as they engage in various instructional routines and participate in whole class discussions to explore mathematical ideas. The Talking Tool, detailed on the inside cover of every *Learn* book, provides sentence frames and sentence starters to help guide student discourse.

Similar to the Talking Tool, the Thinking Tool, on the inside back cover of the *Learn* book, is a scaffold to support students in developing and applying metacognitive skills. It provides a set of questions students can ask themselves before, during, and after engaging in a task.

Thinking and talking about math helps students better understand the topics they learn. These activities are key factors in creating an equitable classroom culture and helping students find the joy in mathematics.

How Students *Build Knowledge*

Eureka Math² is organized into three coherent stories that build from year to year: A Story of Units® for Grade Levels K–5, A Story of Ratios® for Grade Levels 6–8, and A Story of Functions® for Grade Levels 9–12.

To prepare students for high school mathematics, districts are encouraged to have a well-crafted, compacted course in which the standards from grades 7 and 8 are intentionally combined to create a new, accelerated learning experience. *Eureka Math²*'s Level 7–8 course provides seamless, accelerated coverage of two grade levels of standards and mathematical practices into one academic year. This course is organized into six modules. Within each module, related lessons are organized into topics.

A close look at the module map reveals that the major work of the grade level is delivered earlier in the school year. This allows students to have ample opportunities to establish strong foundational knowledge. *Eureka Math²* reinforces this knowledge later in the year by connecting supporting content to major grade-level work and providing students with real-world context.

Implement with Fidelity and *Confidence*

The same team of teacher–writers who crafted *Eureka Math²* also developed an Implementation Guide to help educators bring the curriculum into their classrooms. The guide provides a detailed map of the resources built into the curriculum and offers advice on preparing to teach each module. **Access the full Grade Level 6–Algebra I/Mathematics I Implementation Guide**.

Below we'll highlight some of the information covered in the Implementation Guide to help you explore *Eureka Math²* Level 7–8 Module 1.

An Intentional and Meaningful Integration *of Digital Learning*

The *Eureka Math²* writers strategically integrated digital components within Grade Levels 6–Algebra I/Mathematics I lessons so that technology enhances instruction and facilitates powerful mathematical conversations. The curriculum's digital platform includes teacher facilitation slides that display lesson visuals such as mathematical representations, images, videos, or digital interactives. Context videos that apply the module's math in real-life scenarios are integrated into the curriculum.

In addition to the wordless context videos and animations, Level 7–8 incorporates dynamic digital lessons within the *Learn* content about once per topic. These lessons allow students to further explore as they build digital mathematical models, document their thinking, and finally share their learning with peers in the classroom mathematical community. Digital lessons are semi-synchronous, meaning students can experiment and reflect on their thinking independently and with peers before discussing them as a class. As students document their thinking on the presentation slides, teachers can preview student responses on their own devices. Teachers can then display chosen student screens to help facilitate class discussion.

Eureka Math² Equip™, a companion product to *Eureka Math²*, is a digital diagnostic tool that offers a Pre-Module Assessment for every student. It identifies learning gaps and provides teachers with tailored content to address them so that all students can access grade-level content.

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Bringing Fine Art *into Math*

Among all math curricula, *Eureka Math²* is unique in its integration of fine art. The cover of each module features an impressive work of fine art that is visually or conceptually connected to the math. Level 7 8 features the painting *Vue de Constantinople, La Corne d'Or (Gold Coast) matin* by pointillist Paul Signac, 1907, and a note on the inside cover helps students understand how the artwork is connected to the math they will learn.

A Map to the *Learning*

Every *Teach* book begins with an Overview. In Level 7–8 Module 1, the Overview begins on page 2. The Overview pages note any previous knowledge students use and build upon in the module, summarize the student learning taking place in each topic in the module, and show where in the curriculum students will next access the module's learning to build new layers of understanding and more complex knowledge.

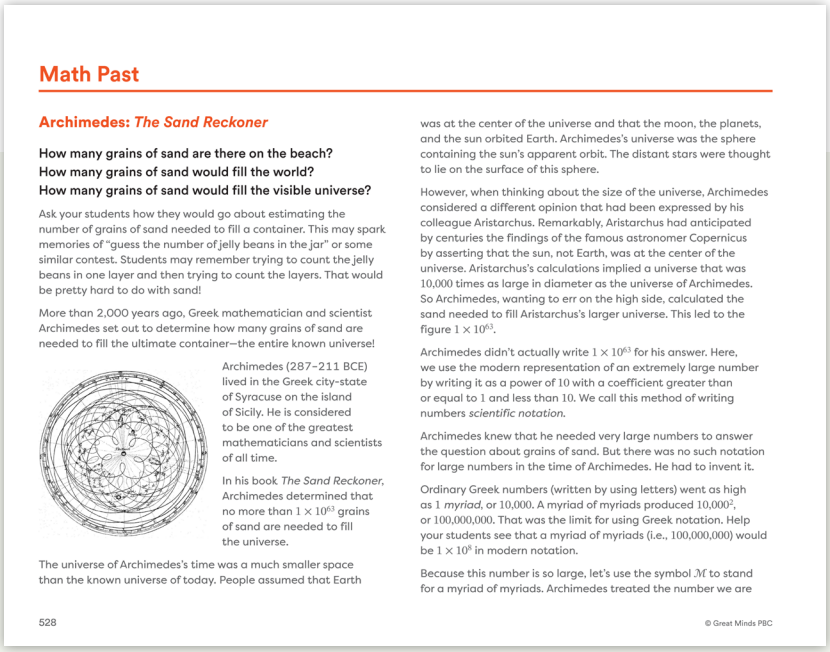
Following the Overview is the Why section. The Why section gives insight into the decisions made during the writing of the module, helping you understand the underlying structure of the module, the flow of the content, and the coherence of the different parts of the curriculum.

What Does Understanding *Look Like?*

Beginning on page 12, the *Teach* book highlights the Achievement Descriptors addressed in the module. Achievement Descriptors are clear, concise, standards-aligned descriptions that detail what students should know and be able to do based on the instruction. The first page of each lesson identifies the Achievement Descriptors aligned with that lesson. Proficiency Indicators for each Achievement Descriptor support teachers in interpreting student work in the module. The Proficiency Indicators begin on page 510 in the Level 7–8 Module 1 *Teach* book.

History *of the Math*

Math Past is another way that *Eureka Math*^{2} helps students build knowledge—by telling the history of some of the big ideas that shape the mathematics in the module. Math Past frames mathematics as a human endeavor by telling the story of the discipline through artifacts, discoveries, and other contributions from cultures around the world. Math Past provides material that can inform your teaching and offers lesson-specific ideas about engaging students in the history of mathematics. The Math Past summary for Level 7–8 Module 1 begins on page 528 of the *Teach* book.



Math Past

Archimedes: *The Sand Reckoner*

How many grains of sand are there on the beach?
How many grains of sand would fill the world?
How many grains of sand would fill the visible universe?

Ask your students how they would go about estimating the number of grains of sand needed to fill a container. This may spark memories of "guess the number of jelly beans in the jar" or some similar contest. Students may remember trying to count the jelly beans in one layer and then trying to count the layers. That would be pretty hard to do with sand!

More than 2,000 years ago, Greek mathematician and scientist Archimedes set out to determine how many grains of sand are needed to fill the ultimate container—the entire known universe!

Archimedes (287–211 BCE) lived in the Greek city-state of Syracuse on the island of Sicily. He is considered to be one of the greatest mathematicians and scientists of all time.

In his book *The Sand Reckoner*, Archimedes determined that no more than 1×10^{63} grains of sand are needed to fill the universe.

The universe of Archimedes's time was a much smaller space than the known universe of today. People assumed that Earth was at the center of the universe and that the moon, the planets, and the sun orbited Earth. Archimedes's universe was the sphere containing the sun's apparent orbit. The distant stars were thought to lie on the surface of this sphere.

However, when thinking about the size of the universe, Archimedes considered a different opinion that had been expressed by his colleague Aristarchus. Remarkably, Aristarchus had anticipated by centuries the findings of the famous astronomer Copernicus by asserting that the sun, not Earth, was at the center of the universe. Aristarchus's calculations implied a universe that was $10{,}000$ times as large in diameter as the universe of Archimedes. So Archimedes, wanting to err on the high side, calculated the sand needed to fill Aristarchus's larger universe. This led to the figure 1×10^{63}.

Archimedes didn't actually write 1×10^{63} for his answer. Here, we use the modern representation of an extremely large number by writing it as a power of 10 with a coefficient greater than or equal to 1 and less than 10. We call this method of writing numbers *scientific notation.*

Archimedes knew that he needed very large numbers to answer the question about grains of sand. But there was no such notation for large numbers in the time of Archimedes. He had to invent it.

Ordinary Greek numbers (written by using letters) went as high as 1 *myriad*, or $10{,}000$. A myriad of myriads produced $10{,}000^2$, or $100{,}000{,}000$. That was the limit for using Greek notation. Help your students see that a myriad of myriads (i.e., $100{,}000{,}000$) would be 1×10^8 in modern notation.

Because this number is so large, let's use the symbol $\mathcal{M}$ to stand for a myriad of myriads. Archimedes treated the number we are

528

Dive into a *Topic*

It's time to dive into a topic to better understand the *Eureka Math²* learning design. On page 16 in the Level 7–8 Module 1 *Teach* book, we begin with Topic A: Add and Subtract Rational Numbers. Every topic begins with an overview summarizing the expected development as students engage with the upcoming content. In the Topic A overview, teachers can see that students explore the addition and subtraction of rational numbers. Students use decomposition and properties of operations to evaluate addition expressions with integers and then with rational numbers. They can then formalize the concept that every subtraction expression can be written as an equivalent addition expression.

The teacher can also see how this learning will continue throughout the topic with the sequence of related lessons through the brief Progression of Lessons listed on page 17.

Students begin each new topic in the *Learn* book with a Topic Opener, an illustration created in collaboration with Ben Orlin, the author and illustrator of *Math with Bad Drawings*. The Topic Opener is designed to build anticipation for math by piquing curiosity in a humorous context. In Level 7–8 Module 1 Topic A, this feature starts on page 5 of the *Learn* book.

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In the last lesson of the topic, students extend their understanding of integer subtraction to subtract rational numbers. At first, they model subtraction expressions by using a number line. Then they incorporate other familiar strategies, such as decomposition, to evaluate expressions and note that these strategies also work for rational numbers.

In topic B, students use their understanding of addition and subtraction to develop strategies to multiply and divide rational numbers.

Progression of Lessons

Lesson 1	Adding Integers and Rational Numbers
Lesson 2	KAKOOMA® with Rational Numbers
Lesson 3	Finding Distances to Find Differences
Lesson 4	Subtracting Integers
Lesson 5	Subtracting Rational Numbers

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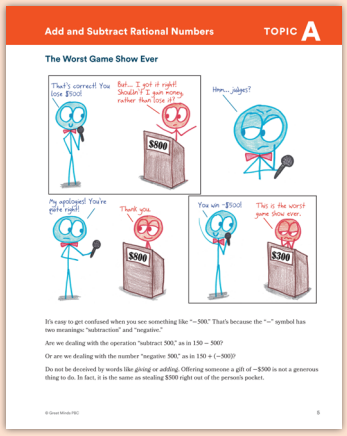


Add and Subtract Rational Numbers TOPIC A

The Worst Game Show Ever

It's easy to get confused when you see something like "−500." That's because the "−" symbol has two meanings: "subtraction" and "negative."

Are we dealing with the operation "subtract 500," as in 150 − 500?

Or are we dealing with the number "negative 500," as in 150 + (−500)?

Do not be deceived by words like *giving* or *adding*. Offering someone a gift of −$500 is not a generous thing to do. In fact, it is the same as stealing $500 right out of the person's pocket.

5

Lesson Structure *and Support*

Every lesson in Grade Level 6–Algebra I/Mathematics I is organized into four sections, providing the teacher with a clear lesson plan for the day's learning.

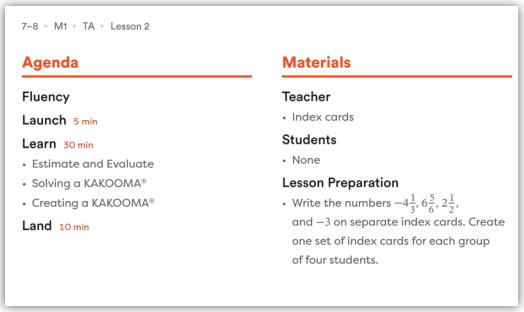
- **Fluency** opens each lesson and provides distributed practice with previously learned material. This practice prepares students for new learning by activating prior knowledge and bridging small learning gaps.
- **Launch** creates an accessible entry point to the day's learning with activities that build context and create productive struggle, which helps build new knowledge.
- **Learn** presents new math concepts related to the lesson objective, usually through a series of instructional segments.
- **Land** provides time for teachers to facilitate a brief closing discussion and for students to complete the Exit Ticket.

The lesson's margin notes provide information about facilitation, differentiation, and coherence. The curriculum has six types of margin notes: Teacher Notes, Universal Design for Learning, Language Support, Differentiation, Promoting the Standards for Mathematical Practice, and Math Past.

Dive into a *Lesson*

The lesson overview on page 46 helps teachers prepare to teach Level 7–8 Module 1 Lesson 2.

- The **Lesson at a Glance** is a snapshot of the lesson framed through what students should know, understand, and do while engaging with the lesson.
- The **Key Question** helps focus instruction and classroom discourse.
- The **Achievement Descriptors** appear again, this time mapping what students should know and be able to do based on the instruction of the specific lesson to the standards covered.
- An image of the **Exit Ticket** from the end of the lesson shows what this formative assessment includes.



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Agenda

Fluency

Launch 5 min

Learn 30 min

- Estimate and Evaluate
- Solving a KAKOOMA®
- Creating a KAKOOMA®

Land 10 min

Materials

Teacher

- Index cards

Students

- None

Lesson Preparation

- Write the numbers $-4\frac{1}{3}$, $6\frac{5}{6}$, $2\frac{1}{2}$, and -3 on separate index cards. Create one set of index cards for each group of four students.

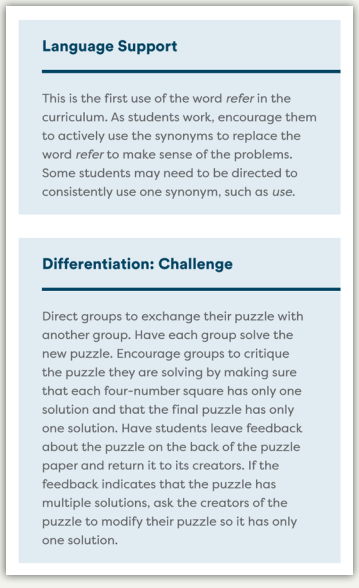
Page 48 lays out the learning agenda as well as the materials list and lesson preparation notes. These are all shared up front to help teachers feel organized and ready for the lesson from the start.

During the Lesson 2 Fluency exercise on page 49, students add integers to prepare for adding rational numbers by using decomposition.

In Launch, students are put in groups and given a set of numbered index cards. Each group is asked to identify the number that is the sum of two other numbers. Then the class discusses the strategies students used during the activity and the importance of estimation.

In Learn, students start by estimating and finding the sum of rational numbers by applying properties of operations. Completing this activity as a class helps set students up for success in the next part of the lesson. In the remainder of the Learn segment, students play the game KAKOOMA®. In this game, students add rational numbers to find the missing values and solve the puzzle.

As students grow their confidence in solving KAKOOMA® puzzles, they move on to creating their own. Before students begin this work, teachers should review the teacher margin note provided on page 59 that offers differentiation ideas for students who need additional enrichment or challenge.



Language Support

This is the first use of the word *refer* in the curriculum. As students work, encourage them to actively use the synonyms to replace the word *refer* to make sense of the problems. Some students may need to be directed to consistently use one synonym, such as *use*.

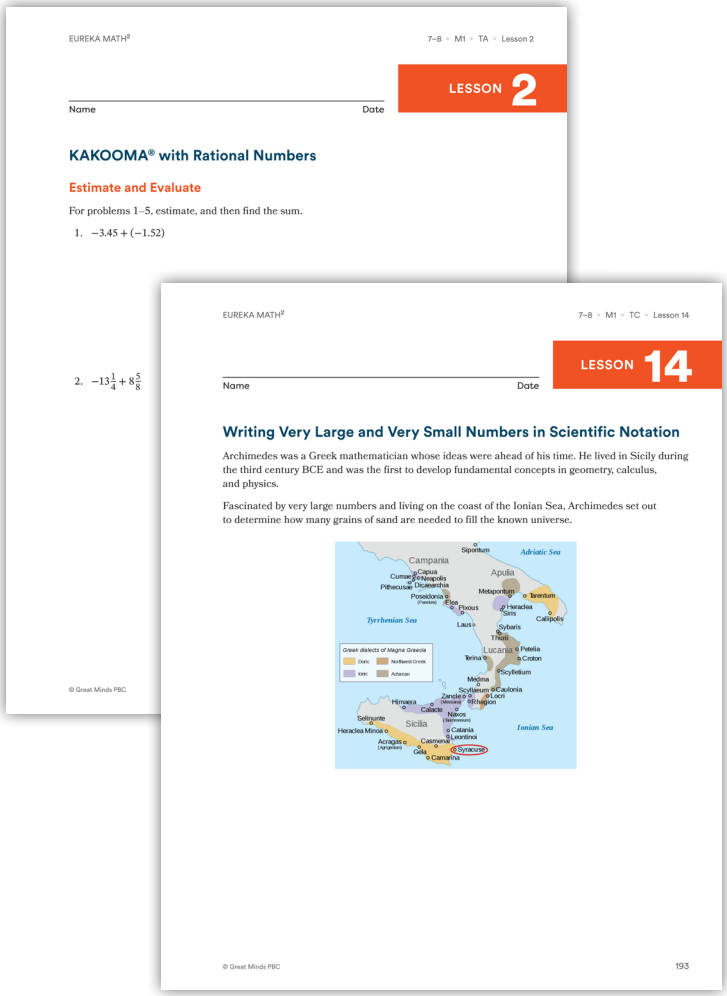
Differentiation: Challenge

Direct groups to exchange their puzzle with another group. Have each group solve the new puzzle. Encourage groups to critique the puzzle they are solving by making sure that each four-number square has only one solution and that the final puzzle has only one solution. Have students leave feedback about the puzzle on the back of the puzzle paper and return it to its creators. If the feedback indicates that the puzzle has multiple solutions, ask the creators of the puzzle to modify their puzzle so it has only one solution.

The Student Experience:
Learn

On page 29 of the *Learn* book, students begin the Launch portion of the lesson. Notice the Lesson 2 heading in the top corner of the page that indicates the beginning of a lesson.

Let's look at readability. You will notice that the student materials are intentionally designed to be readable while maintaining the rigor that you've come to expect from Great Minds® curricula. We have reduced wordiness— eliminating unnecessary wording entirely—and we have been intentional in our language choices and sentence length.



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LESSON 2

Name Date

KAKOOMA® with Rational Numbers

Estimate and Evaluate

For problems 1–5, estimate, and then find the sum.

1. $-3.45 + (-1.52)$

2. $-13\frac{1}{4} + 8\frac{5}{8}$

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7–8 ▸ M1 ▸ TC ▸ Lesson 14

LESSON 14

Name Date

Writing Very Large and Very Small Numbers in Scientific Notation

Archimedes was a Greek mathematician whose ideas were ahead of his time. He lived in Sicily during the third century BCE and was the first to develop fundamental concepts in geometry, calculus, and physics.

Fascinated by very large numbers and living on the coast of the Ionian Sea, Archimedes set out to determine how many grains of sand are needed to fill the known universe.

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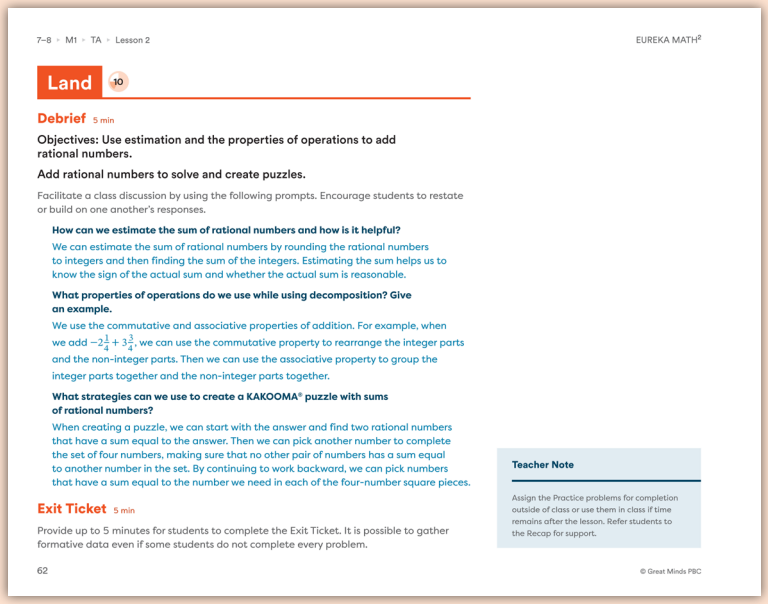

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Land 10

Debrief 5 min

Objectives: Use estimation and the properties of operations to add rational numbers.

Add rational numbers to solve and create puzzles.

Facilitate a class discussion by using the following prompts. Encourage students to restate or build on one another's responses.

How can we estimate the sum of rational numbers and how is it helpful?

We can estimate the sum of rational numbers by rounding the rational numbers to integers and then finding the sum of the integers. Estimating the sum helps us to know the sign of the actual sum and whether the actual sum is reasonable.

What properties of operations do we use while using decomposition? Give an example.

We use the commutative and associative properties of addition. For example, when we add $-2\frac{1}{4} + 3\frac{3}{4}$, we can use the commutative property to rearrange the integer parts and the non-integer parts. Then we can use the associative property to group the integer parts together and the non-integer parts together.

What strategies can we use to create a KAKOOMA® puzzle with sums of rational numbers?

When creating a puzzle, we can start with the answer and find two rational numbers that have a sum equal to the answer. Then we can pick another number to complete the set of four numbers, making sure that no other pair of numbers has a sum equal to another number in the set. By continuing to work backward, we can pick numbers that have a sum equal to the number we need in each of the four-number square pieces.

Exit Ticket 5 min

Provide up to 5 minutes for students to complete the Exit Ticket. It is possible to gather formative data even if some students do not complete every problem.

Teacher Note

Assign the Practice problems for completion outside of class or use them in class if time remains after the lesson. Refer students to the Recap for support.

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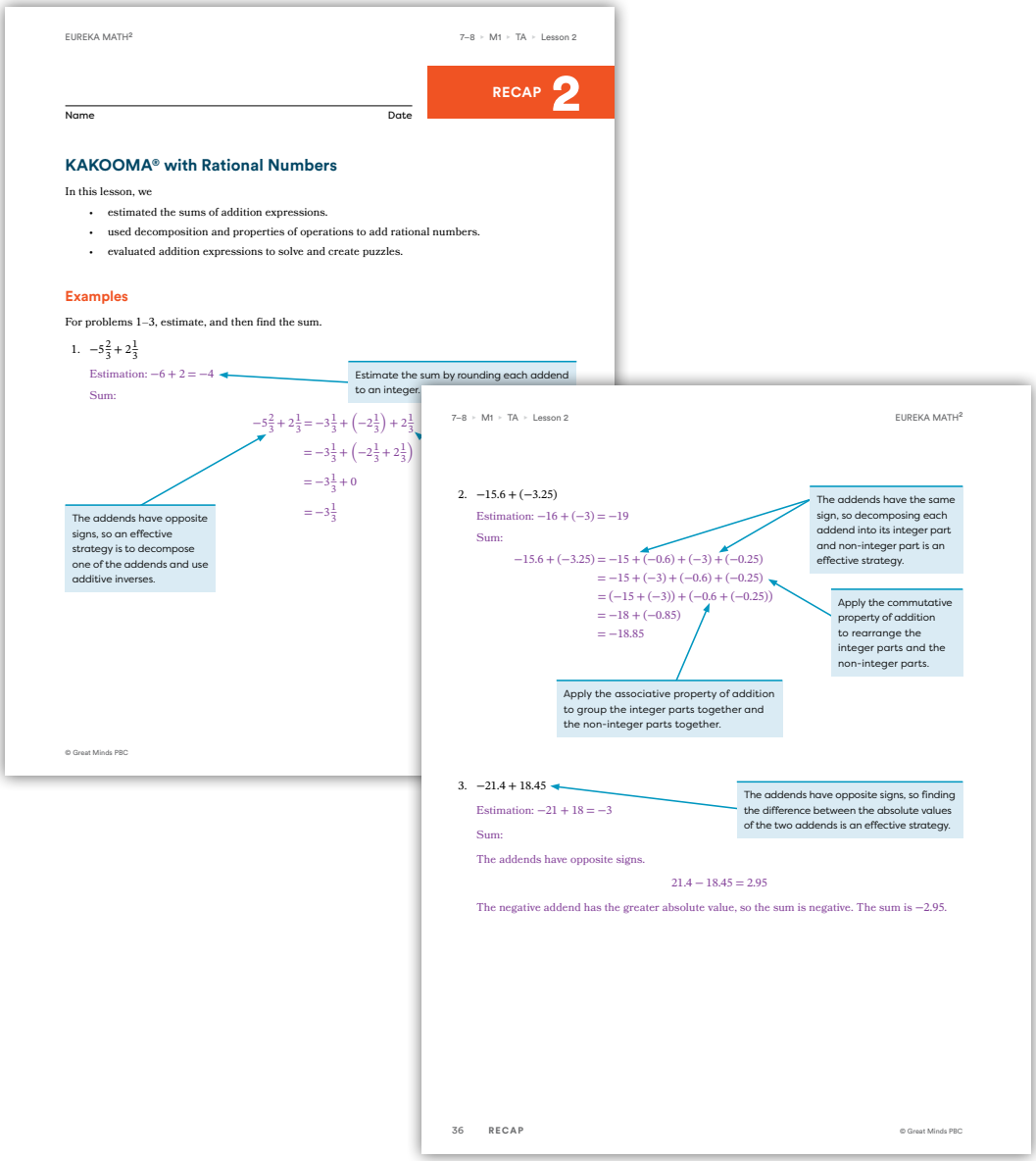
After students explore rational number addition by solving and creating KAKOOMA® puzzles, the class comes back together for the Land portion of the lesson. For Lesson 2, this section begins on page 62 of the *Teach* book. In this portion of the lesson, the teacher facilitates a discussion by using suggested questions about the lesson's objectives and guides students to synthesize the day's learning. Following the discussion, students complete the Exit Ticket on page 33 of their *Learn* book. This gives teachers a sense of what students understand so they can help make instructional decisions for the next lesson.

Continued Practice *at Home*

Included at the end of each lesson in the *Learn* book is a lesson Recap and more Practice problems with the concepts learned in class.

- **Recaps** summarize the main learning in the lesson. Definitions of any terms introduced in the lesson are included. Each Recap also shows problems like those completed in class and examples of the thinking that helps students solve the problems. Recaps are useful for anyone supporting the student's learning outside of the classroom.
- **Practice** problems provide an additional set of problems organized from simple to complex. These problems interleave and distribute practice, providing students with opportunities to discern and recall which knowledge, concepts, and strategies are appropriate for solving different problems. Practice problems can be completed in the classroom or assigned outside of the classroom.



EUREKA MATH²

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RECAP 2

Name Date

KAKOOMA® with Rational Numbers

In this lesson, we

- estimated the sums of addition expressions.
- used decomposition and properties of operations to add rational numbers.
- evaluated addition expressions to solve and create puzzles.

Examples

For problems 1–3, estimate, and then find the sum.

1. $-5\frac{2}{3} + 2\frac{1}{3}$

Estimation: $-6 + 2 = -4$

Estimate the sum by rounding each addend to an integer.

Sum:

$$-5\tfrac{2}{3} + 2\tfrac{1}{3} = -3\tfrac{1}{3} + \left(-2\tfrac{1}{3}\right) + 2\tfrac{1}{3}$$
$$= -3\tfrac{1}{3} + \left(-2\tfrac{1}{3} + 2\tfrac{1}{3}\right)$$
$$= -3\tfrac{1}{3} + 0$$
$$= -3\tfrac{1}{3}$$

The addends have opposite signs, so an effective strategy is to decompose one of the addends and use additive inverses.

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2. $-15.6 + (-3.25)$

Estimation: $-16 + (-3) = -19$

Sum:

$$-15.6 + (-3.25) = -15 + (-0.6) + (-3) + (-0.25)$$
$$= -15 + (-3) + (-0.6) + (-0.25)$$
$$= (-15 + (-3)) + (-0.6 + (-0.25))$$
$$= -18 + (-0.85)$$
$$= -18.85$$

The addends have the same sign, so decomposing each addend into its integer part and non-integer part is an effective strategy.

Apply the commutative property of addition to rearrange the integer parts and the non-integer parts.

Apply the associative property of addition to group the integer parts together and the non-integer parts together.

3. $-21.4 + 18.45$

Estimation: $-21 + 18 = -3$

The addends have opposite signs, so finding the difference between the absolute values of the two addends is an effective strategy.

Sum:

The addends have opposite signs.

$$21.4 - 18.45 = 2.95$$

The negative addend has the greater absolute value, so the sum is -2.95.

36 RECAP

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Assessment with *Eureka Math²*

The assessment system for Grade Levels 6–Algebra I/Mathematics I helps teachers understand student learning by generating data from many perspectives. The system includes three components.

- **Exit Tickets** are formative assessment opportunities that use at least one problem or question to assess whether a student has learned the basic skills and concepts needed for success in upcoming lessons. Items reflect the minimum that students must demonstrate to meet the lesson objective.

  Students complete Exit Tickets independently on paper, with directions or problems read aloud as necessary, and they are not graded. Most students with a basic understanding of the math can finish within 3–5 minutes. Generally, teachers should strictly observe this time frame because a student's inability to finish within 5 minutes can be valuable proficiency information.

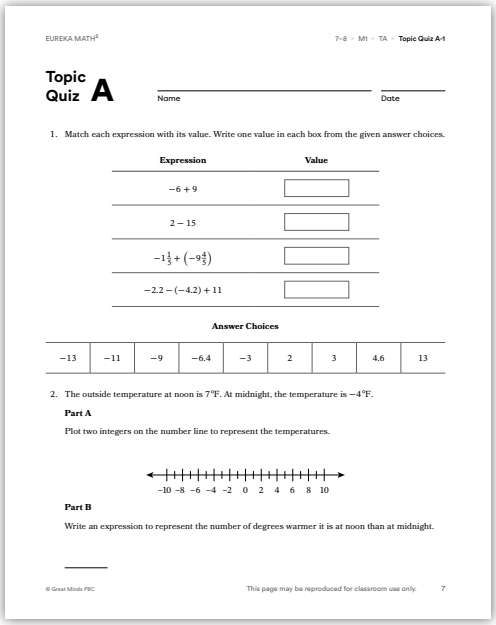
- **Topic Quizzes** are short sets of items that assess proficiency with the major concepts and skills from the topic. These include Depth of Knowledge (DOK) 1 and 2 items. Topic Quizzes are intended for digital administration, with a paper-based option.

  There are three analogous versions of each Topic Quiz available digitally. Analogous versions target the same material at the same level of cognitive complexity. Use the analogous versions as additional practice or retakes after targeted reteaching.

- **Module Assessments** consist of 6–10 items that assess proficiency in the major concepts, skills, and applications taught in the module. Module Assessments represent the most important content, but they may not assess all the strategies and standards taught in the module.

In addition to the assessments above, *Eureka Math² Equip* diagnostic and various benchmark summative assessments are available for print and digital administration.

Click to review the *Eureka Math²* assessments on the Great Minds Digital Platform.



EUREKA MATH² 7–8 • M1 • TA • Topic Quiz A-1

Topic Quiz A Name _____ Date _____

1. Match each expression with its value. Write one value in each box from the given answer choices.

Expression	Value
$-6+9$	
$2-15$	
$-1\frac{1}{3}+\left(-9\frac{4}{3}\right)$	
$-2.2-(-4.2)+11$	

Answer Choices

−13	−11	−9	−6.4	−3	2	3	4.6	13

2. The outside temperature at noon is 7°F. At midnight, the temperature is −4°F.

Part A

Plot two integers on the number line to represent the temperatures.

−10 −8 −6 −4 −2 0 2 4 6 8 10

Part B

Write an expression to represent the number of degrees warmer it is at noon than at midnight.

_____

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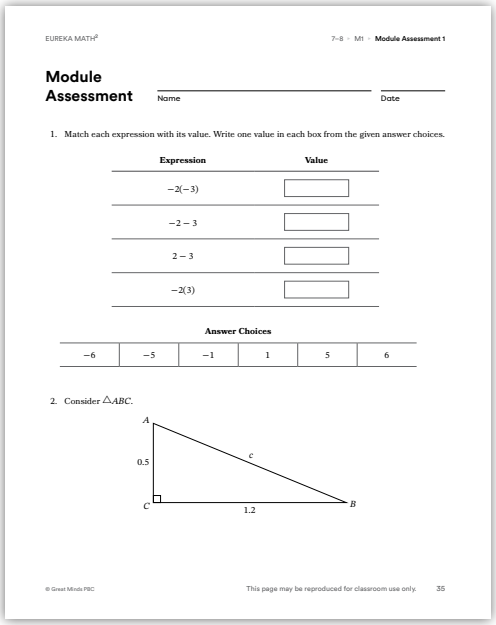

EUREKA MATH² 7–8 • M1 • Module Assessment 1

Module Assessment Name _____ Date _____

1. Match each expression with its value. Write one value in each box from the given answer choices.

Expression	Value
$-2(-3)$	
$-2-3$	
$2-3$	
$-2(3)$	

Answer Choices

−6	−5	−1	1	5	6

2. Consider $\triangle ABC$.

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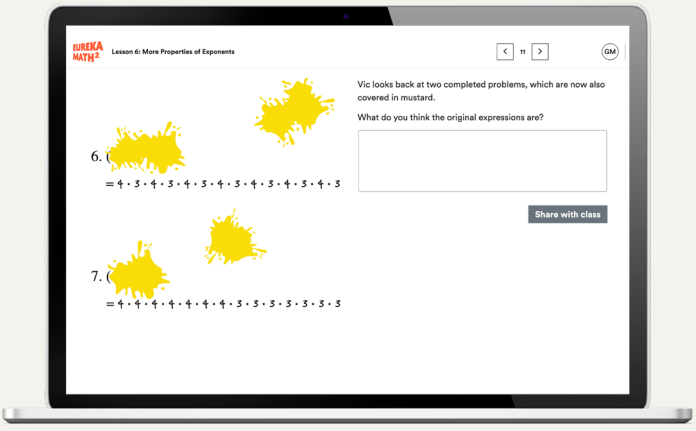
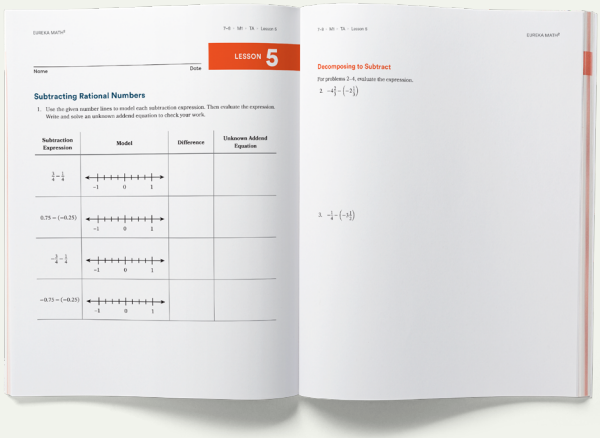
Raising the Bar to the *Second Power*

In the world of math curricula, *Eureka Math²* stands alone. Our curriculum invites student discourse, provides accessibility, and advances equity. Its combination of digital and print resources helps all students build a strong foundation of mathematical knowledge that they will build upon, module after module and year after year.





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