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GREAT MINDS™

EUREKA MATH²®

Getting Started Guide

Algebra I Module 1

Getting *Started*

This Getting Started Guide provides contextual information as you review *Eureka Math²®*. 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 Math²*.

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 Math² 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.

Teachability² + Engagement² + Accessibility² = Joy²

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 with one another to make their thinking visible. Students work in pairs and in groups as they engage in a variety of 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 develop a deeper understanding of the topics they learn. These activities are key factors in creating an equitable classroom culture—and in 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.

Each grade level 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* Algebra I Module 2.

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 show an application of the module's math in real-life scenarios are integrated into the curriculum.

In addition to the wordless context videos and animations, Algebra I incorporates dynamic digital lessons with the *Learn* content about once per topic. These lessons allow students to explore further on their own devices by building mathematical models, documenting their thinking, and sharing within the mathematical community. Digital lessons are meant to be semi-synchronous, meaning students can experiment and reflect on their own and with peers before discussing as a class. As students are documenting 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 content tailored to address those gaps so that all students can access grade-level content.

Access the Great Minds Digital Platform to review *Eureka Math²* assessments, digital interactives, context videos, and more.

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. Algebra I features the painting *A Sunday on La Grande Jatte* by Georges Seurat, 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 Algebra I Module 2, the Overview begins on page 2. The Overview notes any previous knowledge students use and build upon in the module, summarizes the student learning taking place in each topic in the module, and shows where in the curriculum students will next access the module's learning to build new layers of understanding and more complex knowledge.

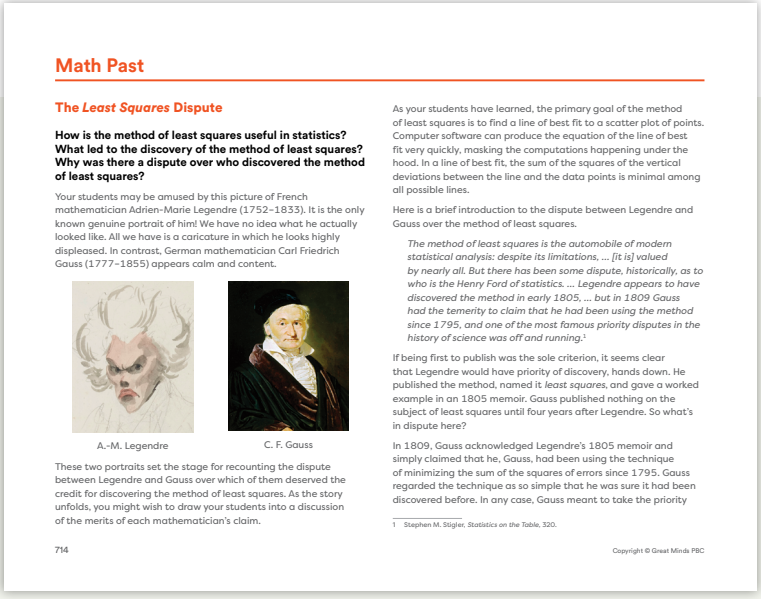
Following the Overview is the Why section. The Why section gives insight into the decisions made during the writing of the module, helping you understand the underlying structure of the module, the flow of the content, and the coherence of the different parts of the curriculum.

What Does Understanding *Look Like?*

Beginning on page 8, 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 with interpreting student work in the module. The Proficiency Indicators begin on page 686 in the Algebra I Module 2 *Teach* book.

History *of the Math*

Math Past is another way that *Eureka Math²* 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 how to engage students in the history of mathematics. The Math Past summary for Algebra I Module 2 begins on page 714 of the *Teach* book.



Math Past

The *Least Squares* Dispute

How is the method of least squares useful in statistics? What led to the discovery of the method of least squares? Why was there a dispute over who discovered the method of least squares?

Your students may be amused by this picture of French mathematician Adrien-Marie Legendre (1752–1833). It is the only known genuine portrait of him! We have no idea what he actually looked like. All we have is a caricature in which he looks highly displeased. In contrast, German mathematician Carl Friedrich Gauss (1777–1855) appears calm and content.

A.-M. Legendre

C. F. Gauss

These two portraits set the stage for recounting the dispute between Legendre and Gauss over which of them deserved the credit for discovering the method of least squares. As the story unfolds, you might wish to draw your students into a discussion of the merits of each mathematician's claim.

As your students have learned, the primary goal of the method of least squares is to find a line of best fit to a scatter plot of points. Computer software can produce the equation of the line of best fit very quickly, masking the computations happening under the hood. In a line of best fit, the sum of the squares of the vertical deviations between the line and the data points is minimal among all possible lines.

Here is a brief introduction to the dispute between Legendre and Gauss over the method of least squares.

> *The method of least squares is the automobile of modern statistical analysis: despite its limitations, ... [it is] valued by nearly all. But there has been some dispute, historically, as to who is the Henry Ford of statistics. ... Legendre appears to have discovered the method in early 1805, ... but in 1809 Gauss had the temerity to claim that he had been using the method since 1795, and one of the most famous priority disputes in the history of science was off and running.*[1]

If being first to publish was the sole criterion, it seems clear that Legendre would have priority of discovery, hands down. He published the method, named it *least squares*, and gave a worked example in an 1805 memoir. Gauss published nothing on the subject of least squares until four years after Legendre. So what's in dispute here?

In 1809, Gauss acknowledged Legendre's 1805 memoir and simply claimed that he, Gauss, had been using the technique of minimizing the sum of the squares of errors since 1795. Gauss regarded the technique as so simple that he was sure it had been discovered before. In any case, Gauss meant to take the priority

1 Stephen M. Stigler, *Statistics on the Table*, 320.

Dive into a *Topic*

It's time to dive into a topic to better understand the *Eureka Math²* learning design. On page 12 in Algebra I Module 2, we begin Topic A: Linear Equations and Inequalities in Two Variables. Every topic begins with an overview that summarizes the development expected as students engage with the upcoming content. In the Topic A overview, the teacher can see that students represent linear relationships by using equations and inequalities in two variables. Students determine the solution sets of equations and inequalities in two variables algebraically and graphically in the coordinate plane, and they consider whether solutions make sense within given contexts. There is also a brief Progression of Lessons list on page 14.

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 the upcoming math by piquing curiosity in a humorous context. In Module 2 Topic A, the Topic Opener starts on page 6 of the *Learn* book.

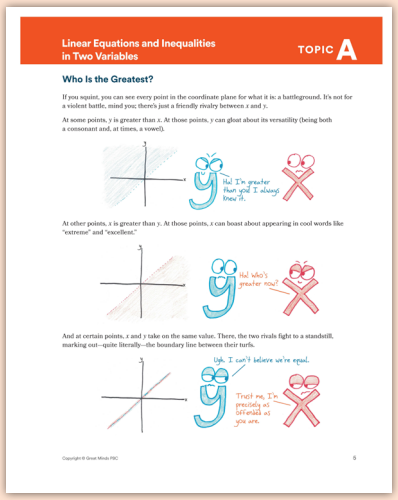
A1 › M2 › TA

The sum of two numbers is less than 5. The sum of two integers is less than 5.

Work in topic A on linear equations and inequalities in two variables prepares students for topic B, which focuses on systems of linear equations and inequalities.

Progression of Lessons

14



Linear Equations and Inequalities in Two Variables TOPIC A

Who Is the Greatest?

If you squint, you can see every point in the coordinate plane for what it is: a battleground. It's not for a violent battle, mind you; there's just a friendly rivalry between x and y.

At some points, y is greater than x. At those points, y can gloat about its versatility (being both a consonant and, at times, a vowel).

At other points, x is greater than y. At those points, x can boast about appearing in cool words like "extreme" and "excellent."

And at certain points, x and y take on the same value. There, the two rivals fight to a standstill, marking out—quite literally—the boundary line between their turfs.

6

Lesson Structure *and Support*

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

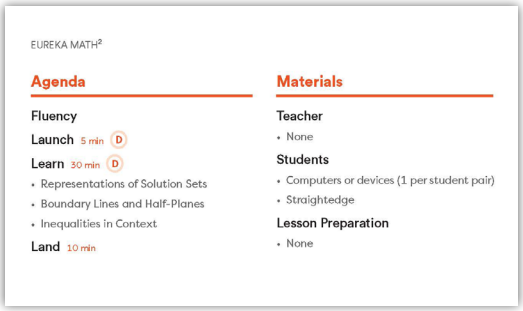
- **Fluency** opens each lesson and provides distributed practice with previously learned material. This practice prepares students for new learning by activating prior knowledge and bridging small learning gaps.
- **Launch** creates an accessible entry point to the day's learning with activities that 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.

Throughout the lesson, 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 104 helps teachers prepare to teach Algebra I Module 2 Lesson 4.

- 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 (D)

Learn 30 min (D)

- Representations of Solution Sets
- Boundary Lines and Half-Planes
- Inequalities in Context

Land 10 min

Materials

Teacher

- None

Students

- Computers or devices (1 per student pair)
- Straightedge

Lesson Preparation

- None

Page 105 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 4 Fluency exercise on page 106, students graph solution sets of inequalities in one variable to prepare for graphing solution sets of linear inequalities in two variables.

In Launch, students notice and wonder about pointillist art by watching a video. Each video in our *Eureka Math²* digital experience has been crafted with special care to ensure representation of students from different backgrounds and with different abilities. These videos do not include spoken words because we want to make them accessible to multilingual learners and striving readers and keep the focus on the math story instead of the dialogue.

Through the Great Minds Digital Platform, students explore a two-variable linear inequality in context and use the aggregate of their classmates' responses to visualize the solution set. Students visually inspect a graph to make sense of the boundary line on the graph. Drawing connections to pointillism, students recognize that the most efficient way to represent the infinite solutions contained in a half-plane is with a shaded region.

Students explore solution sets for linear inequalities. Before students begin this work, teachers should note the teacher margin notes provided on pages 109 and 113 that offer terminology support surrounding the concepts. Other margin notes offer problem customization and support strategies for students who need additional language or content support, and students who would benefit from more challenging work.

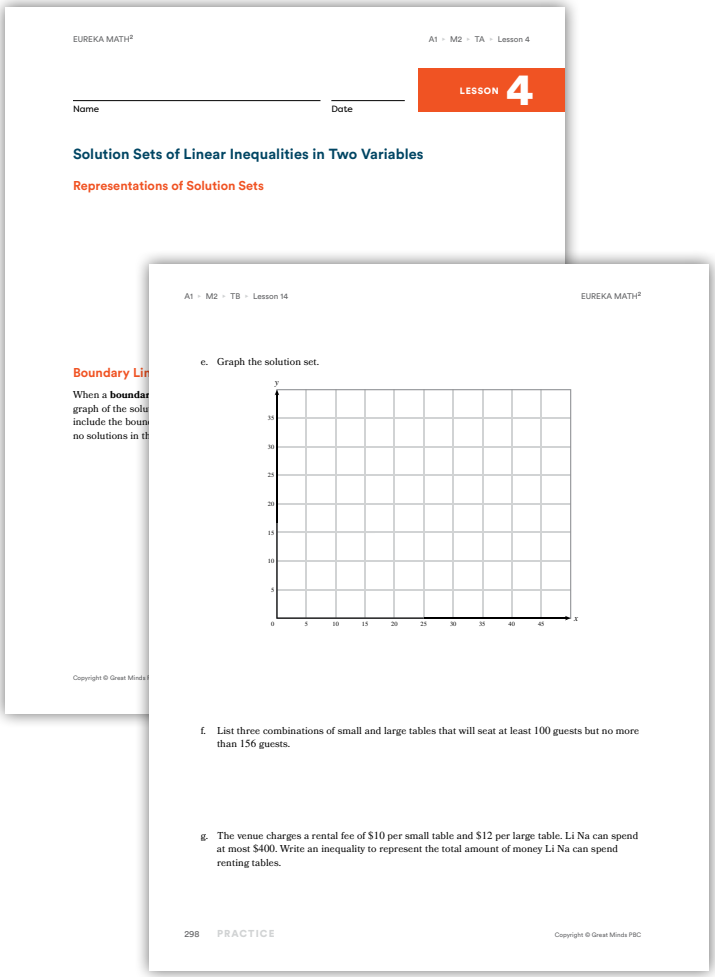
Teacher Note

Eureka Math² has chosen to refer to the shaded half-planes as those that contain a point with coordinates that are a solution, rather than using the phrase *above/below the boundary line*. The latter description is used commonly, but the former description more clearly identifies the referenced half-plane. This is especially true for the case where the boundary line is vertical. For instance, when graphing the solution set of the inequality $x < 4$, it does not make sense to refer to the half-plane above or below the boundary line. In addition, using the above/below the boundary line criteria is not always reliable. For instance, students might mistakenly assume that they should shade above the boundary line to represent the solution set of the inequality $2x - y > 6$.

The Student Experience: *Learn*

On page 79 of the *Learn* book, students begin the Launch portion of the lesson. Notice the Lesson 4 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.



EUREKA MATH²

A1 • M2 • TA • Lesson 4

Name

Date

LESSON 4

Solution Sets of Linear Inequalities in Two Variables

Representations of Solution Sets

A1 • M2 • TB • Lesson 14

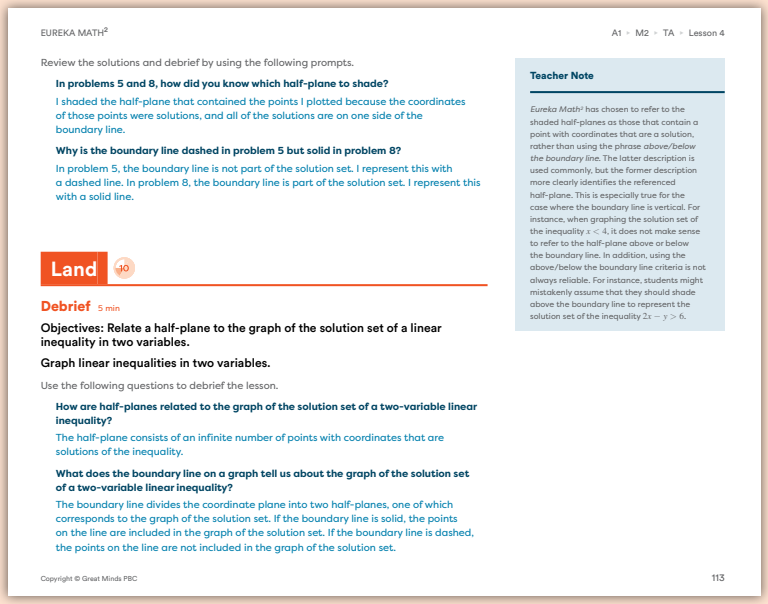
EUREKA MATH²

e. Graph the solution set.

f. List three combinations of small and large tables that will seat at least 100 guests but no more than 156 guests.

g. The venue charges a rental fee of $10 per small table and $12 per large table. Li Na can spend at most $400. Write an inequality to represent the total amount of money Li Na can spend renting tables.

298 PRACTICE



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A1 • M2 • TA • Lesson 4

Review the solutions and debrief by using the following prompts.

In problems 5 and 8, how did you know which half-plane to shade?

I shaded the half-plane that contained the points I plotted because the coordinates of those points were solutions, and all of the solutions are on one side of the boundary line.

Why is the boundary line dashed in problem 5 but solid in problem 8?

In problem 5, the boundary line is not part of the solution set. I represent this with a dashed line. In problem 8, the boundary line is part of the solution set. I represent this with a solid line.

Land 10

Debrief 5 min

Objectives: Relate a half-plane to the graph of the solution set of a linear inequality in two variables.

Graph linear inequalities in two variables.

Use the following questions to debrief the lesson.

How are half-planes related to the graph of the solution set of a two-variable linear inequality?

The half-plane consists of an infinite number of points with coordinates that are solutions of the inequality.

What does the boundary line on a graph tell us about the graph of the solution set of a two-variable linear inequality?

The boundary line divides the coordinate plane into two half-planes, one of which corresponds to the graph of the solution set. If the boundary line is solid, the points on the line are included in the graph of the solution set. If the boundary line is dashed, the points on the line are not included in the graph of the solution set.

Teacher Note

Eureka Math² has chosen to refer to the shaded half-planes as those that contain a point with coordinates that are a solution, rather than using the phrase *above/below the boundary line*. The latter description is used commonly, but the former description more clearly identifies the referenced half-plane. This is especially true for the case where the boundary line is vertical. For instance, when graphing the solution set of the inequality $x < 4$, it does not make sense to refer to the half-plane above or below the boundary line. In addition, using the above/below the boundary line criteria is not always reliable. For instance, students might mistakenly assume that they should shade above the boundary line to represent the solution set of the inequality $2x - y > 6$.

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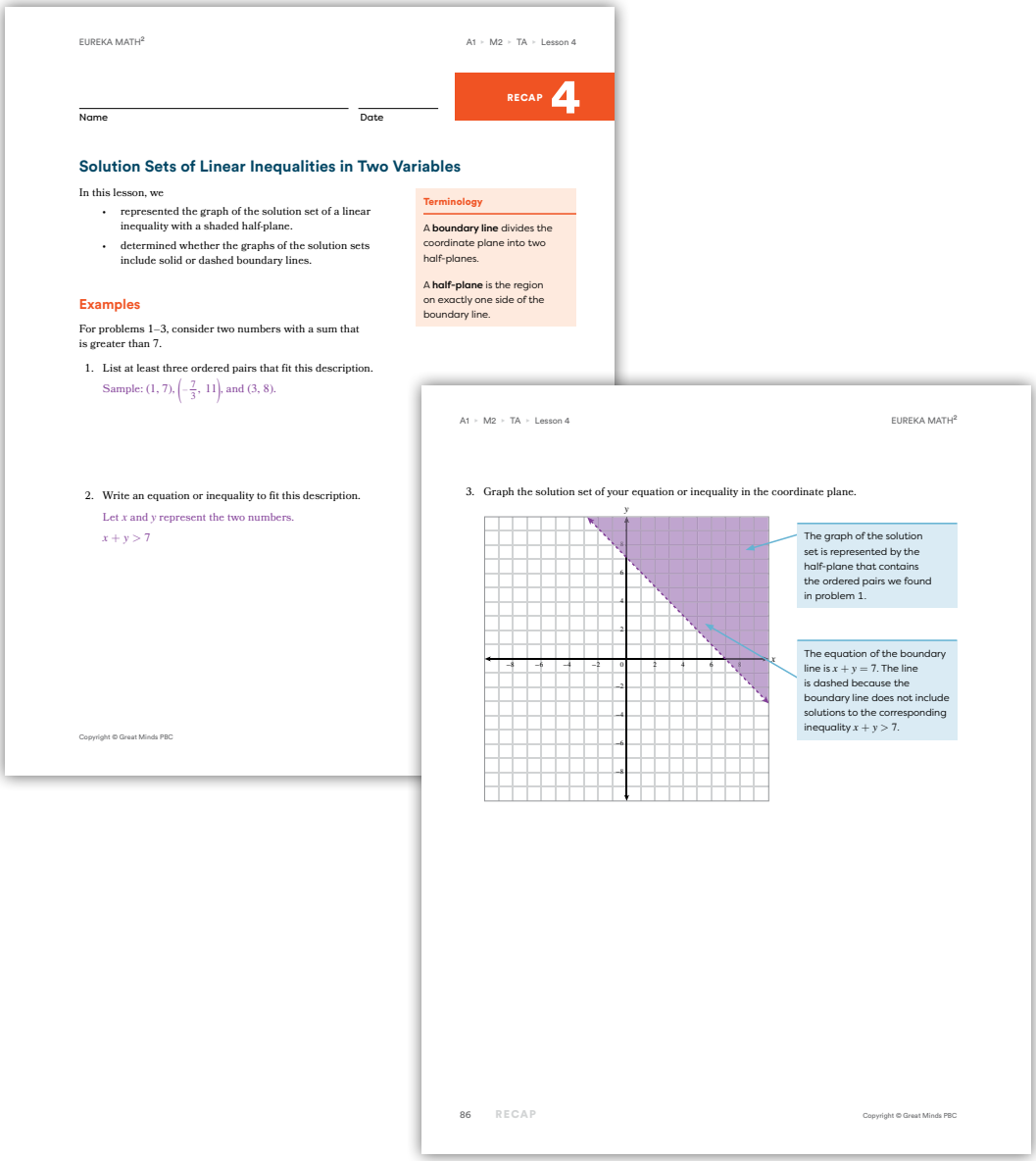
113

After students complete the digital lesson and other activities in the *Learn* book, the class comes back together for the Land portion of the lesson. For Lesson 4, this section begins on page 113 of the *Teach* book. In this portion of the lesson, the teacher facilitates a discussion by using suggested questions related to the lesson's objectives and guides students to synthesize the day's learning. Following the discussion, students complete the Exit Ticket on page 83 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.



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A1 • M2 • TA • Lesson 4

Name _____ Date _____

RECAP 4

Solution Sets of Linear Inequalities in Two Variables

In this lesson, we

- represented the graph of the solution set of a linear inequality with a shaded half-plane.
- determined whether the graphs of the solution sets include solid or dashed boundary lines.

Terminology

A **boundary line** divides the coordinate plane into two half-planes.

A **half-plane** is the region on exactly one side of the boundary line.

Examples

For problems 1–3, consider two numbers with a sum that is greater than 7.

1. List at least three ordered pairs that fit this description.

   Sample: $(1, 7)$, $\left(-\frac{7}{3}, 11\right)$, and $(3, 8)$.

2. Write an equation or inequality to fit this description.

   Let x and y represent the two numbers.

   $x + y > 7$

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A1 • M2 • TA • Lesson 4 EUREKA MATH²

3. Graph the solution set of your equation or inequality in the coordinate plane.

The graph of the solution set is represented by the half-plane that contains the ordered pairs we found in problem 1.

The equation of the boundary line is $x + y = 7$. The line is dashed because the boundary line does not include solutions to the corresponding inequality $x + y > 7$.

86 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.

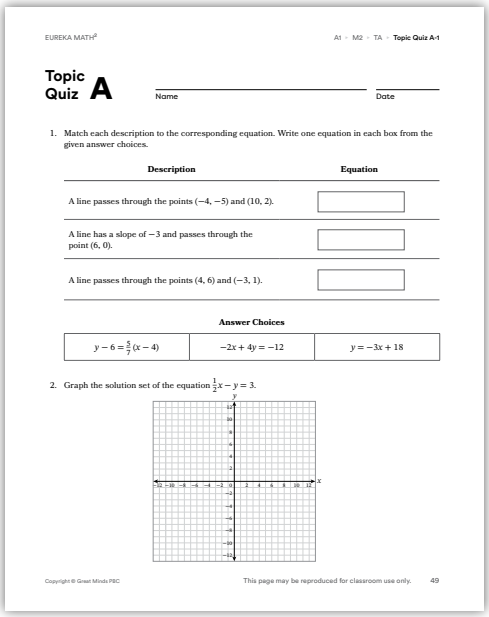
- **Topic Quizzes** are short sets of items that assess proficiency with the major concepts and skills from the topic. These include Depth of Knowledge (DOK) 1 and 2 items. Topic Quizzes are intended for digital administration, with a paper-based option.

  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 assessments are available for print and digital administration.

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



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A1 › M2 › TA › Topic Quiz A-1

Topic Quiz A

Name _____ Date _____

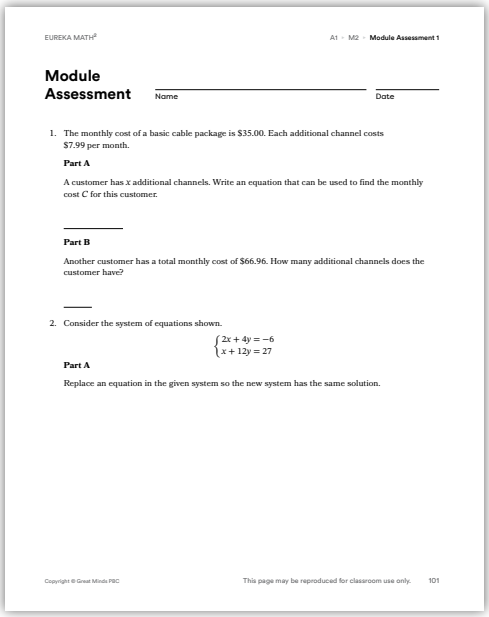
1. Match each description to the corresponding equation. Write one equation in each box from the given answer choices.

Description	Equation
A line passes through the points $(-4, -5)$ and $(10, 2)$.	
A line has a slope of -3 and passes through the point $(6, 0)$.	
A line passes through the points $(4, 6)$ and $(-3, 1)$.	

Answer Choices

$y - 6 = \frac{5}{7}(x - 4)$	$-2x + 4y = -12$	$y = -3x + 18$

2. Graph the solution set of the equation $\frac{1}{2}x - y = 3$.



EUREKA MATH²

A1 › M2 › Module Assessment 1

Module Assessment

Name _____ Date _____

1. The monthly cost of a basic cable package is $35.00. Each additional channel costs $7.99 per month.

Part A

A customer has x additional channels. Write an equation that can be used to find the monthly cost C for this customer.

_____

Part B

Another customer has a total monthly cost of $66.96. How many additional channels does the customer have?

_____

2. Consider the system of equations shown.

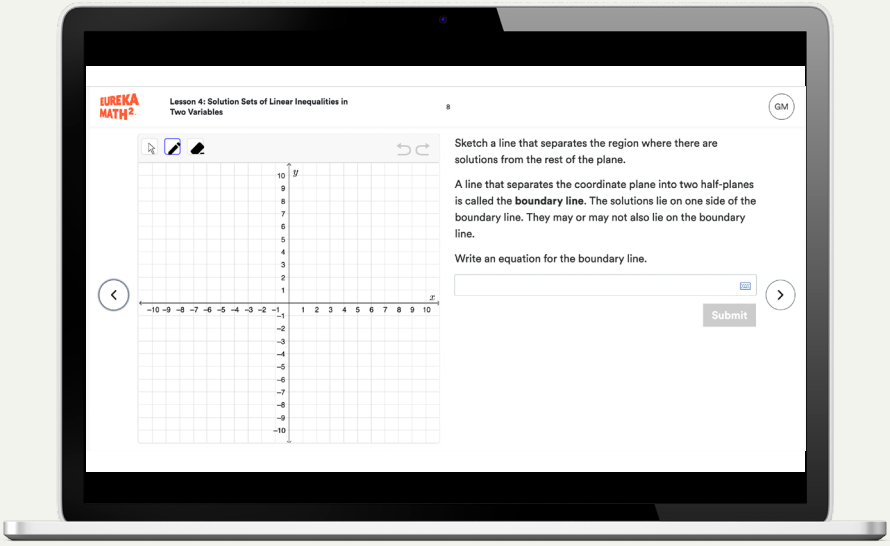
$$\begin{cases} 2x + 4y = -6 \\ x + 12y = 27 \end{cases}$$

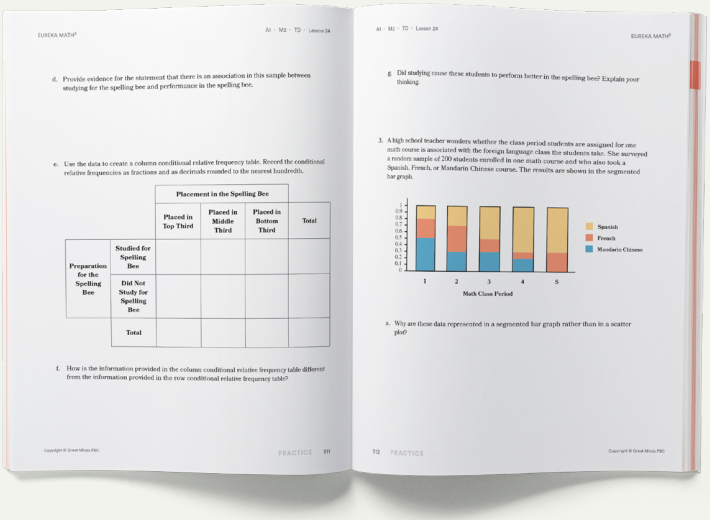
Part A

Replace an equation in the given system so the new system has the same solution.

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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