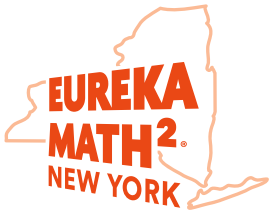


A Story of Ratios® & A Story of Functions®

6–ALGEBRA I

IMPLEMENTATION GUIDE

6 Ratios and Rates

7 Ratios and Proportionality

8 Ratios and Linearity

A1 Modeling with Functions

Contents

What's Included 3

Inside *Teach*

Module-Level Components 7

Topic-Level Components 9

Lesson Overview 10

Lesson Structure 11

Visual Design 13

Resources 15

Inside *Learn*

Cover Art 19

Topic Opener 19

Components 20

Student Resources 22

Inside the Digital Platform

Teach 24

Pacing

Year at a Glance 33

Pacing Your Instruction 35

Lesson Facilitation

Effective Delivery 39

Sample Dialogue 40

Classroom Culture 41

Instructional Routines 41

Universal Design for Learning 44

Multilingual Learner Support 44

Readability 45

Assessment

Core Assessment Components 47

Premium Assessment Components 49

Achievement Descriptors 51

Scoring 54

Grading 58

Plan to Teach

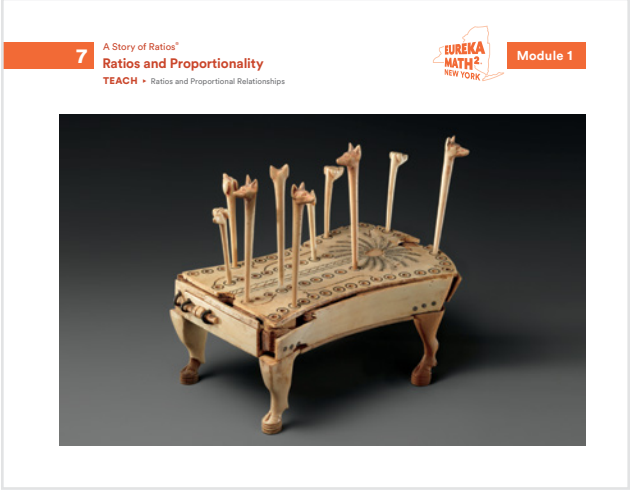
Study a Module 61

Study a Topic 63

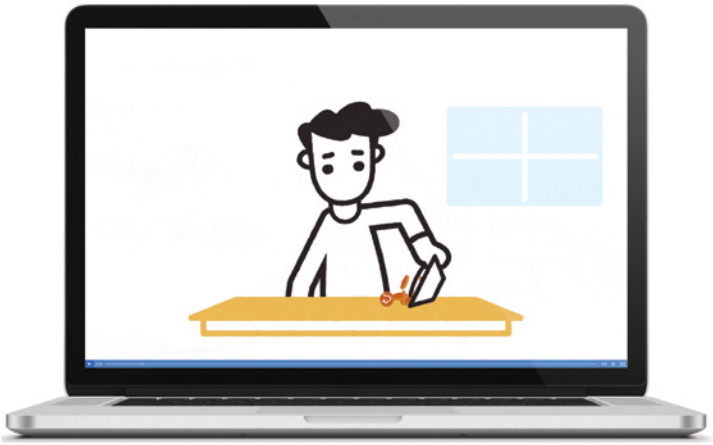
Study a Lesson 64

What's Included

Teach book



Great Minds® Digital Platform



Learn book

Eureka Math²® New York Next Gen is a comprehensive math program built on the foundational idea that math is best understood as an unfolding story where students learn by connecting new learning to prior knowledge. Consistent math models, content that engages students in productive struggle, and coherence across lessons, modules, and grades provide entry points for all learners to access grade-level mathematics.

Eureka Math² New York Next Gen is designed with access and engagement in mind. Peer discussion helps students solidify their understanding of math concepts, so every lesson includes opportunities for rich student discourse. The *Eureka Math² New York Next Gen* digital experience further supports discourse, giving all students opportunities to access learning and share their mathematical thinking while also providing teachers with windows into students' thinking. *Eureka Math² New York Next Gen* encourages students to think like mathematicians as they tackle tough problems and answer their own questions. In *Eureka Math² New York Next Gen* classrooms, students regularly share their mathematical knowledge through discussion and reasoning.

In addition, lessons follow Universal Design for Learning principles to accommodate various learning differences and increase access for multilingual learners and emergent readers. We've also increased our focus on student ownership of learning and belonging in the mathematics classroom. These elements are woven into our instructional design and instructional routines, and lesson-specific strategies help teachers address learner variance.

Eureka Math² New York Next Gen was also designed with teachability in mind. Every classroom is unique, and we've designed the curriculum with that understanding. For example, we've intentionally built flexibility into the year-long pacing and created options for you to choose from within modules and lessons. This way you can spend your time where it's needed most—delivering instruction that meets the needs of your specific students.

So what should you expect from this guide? Think of it as a user's manual for the curriculum. This guide orients you to the structure and design of *Eureka Math*^{2} *New York Next Gen*, and to what is available in the digital experience and in print. You'll find answers to questions both big and small:

- How does *Eureka Math*^{2} *New York Next Gen* enrich my content and pedagogical knowledge?
- What is the lesson structure?
- What is included in my *Teach* book? What about the digital platform?
- How do students engage with the digital platform?
- What is included in the *Learn* and *Apply* books?
- What assessments are available?

We are so excited to launch this curriculum together with you. We hope this Implementation Guide is an empowering resource as you begin to teach *Eureka Math*^{2} *New York Next Gen*. At Great Minds® we believe that every child is capable of greatness. We are confident that, as your students notice and wonder, as you foster their interest in the mathematics, and as their minds are opened to new connections, greatness will be brought to life in your classroom each day.

Inside *Teach*

Each of your six *Teach* books includes one module. Within a module, small groups of related lessons are organized into topics.

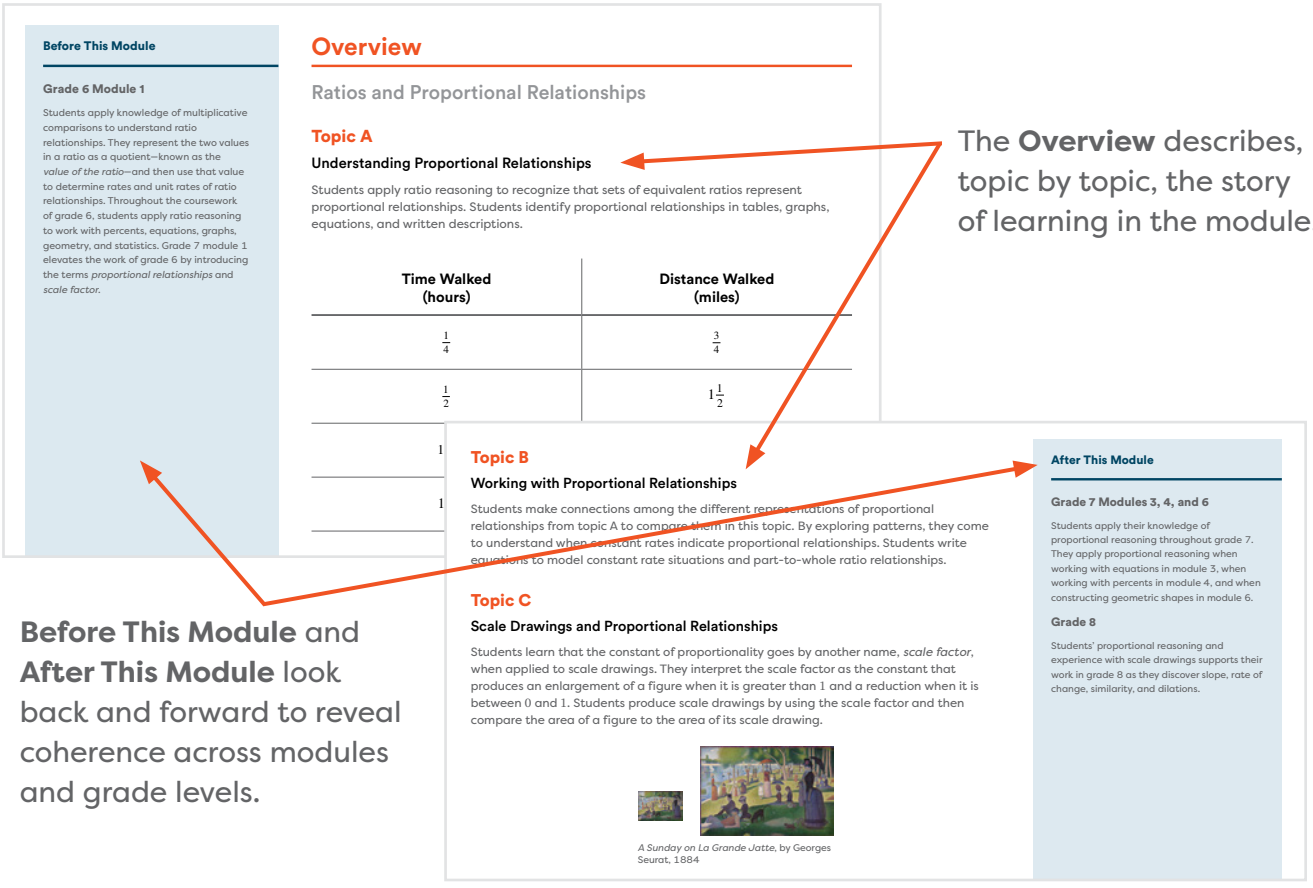
Module-Level Components

Cover Art

Each *Teach* book opens with a stunning work of fine art that has a connection to the math learned within the module. The cover art is discussed or analyzed in specific lessons within the module.

Overview

Your *Teach* book begins with the Overview, a topic-by-topic summary that shows the development of learning throughout the module. It also provides connections to work done before and after the module, helping you understand the module's place in the overall development of learning in and across the grade levels.



Before This Module

Grade 6 Module 1

Students apply knowledge of multiplicative comparisons to understand ratio relationships. They represent the two values in a ratio as a quotient—known as the *value of the ratio*—and then use that value to determine rates and unit rates of ratio relationships. Throughout the coursework of grade 6, students apply ratio reasoning to work with percents, equations, graphs, geometry, and statistics. Grade 7 module 1 elevates the work of grade 6 by introducing the terms *proportional relationships* and *scale factor*.

Overview

Ratios and Proportional Relationships

Topic A

Understanding Proportional Relationships

Students apply ratio reasoning to recognize that sets of equivalent ratios represent proportional relationships. Students identify proportional relationships in tables, graphs, equations, and written descriptions.

Time Walked (hours)	Distance Walked (miles)
$\frac{1}{4}$	$\frac{3}{4}$
$\frac{1}{2}$	$1\frac{1}{2}$
1	
1	

Topic B

Working with Proportional Relationships

Students make connections among the different representations of proportional relationships from topic A to compare them in this topic. By exploring patterns, they come to understand when constant rates indicate proportional relationships. Students write equations to model constant rate situations and part-to-whole ratio relationships.

Topic C

Scale Drawings and Proportional Relationships

Students learn that the constant of proportionality goes by another name, *scale factor*, when applied to scale drawings. They interpret the scale factor as the constant that produces an enlargement of a figure when it is greater than 1 and a reduction when it is between 0 and 1. Students produce scale drawings by using the scale factor and then compare the area of a figure to the area of its scale drawing.

A Sunday on La Grande Jatte, by Georges Seurat, 1884

After This Module

Grade 7 Modules 3, 4, and 6

Students apply their knowledge of proportional reasoning throughout grade 7. They apply proportional reasoning when working with equations in module 3, when working with percents in module 4, and when constructing geometric shapes in module 6.

Grade 8

Students' proportional reasoning and experience with scale drawings supports their work in grade 8 as they discover slope, rate of change, similarity, and dilations.

The **Overview** describes, topic by topic, the story of learning in the module.

Before This Module and **After This Module** look back and forward to reveal coherence across modules and grade levels.

Contents

Lesson titles and objectives reveal the story of each topic at a glance.

Contents

Ratios and Proportional Relationships

Why . . . 6

Achievement Descriptors: Overview . . . 8

Topic A . . . 10

Understanding Proportional Relationships

Lesson 1 . . . 12
An Experiment with Ratios and Rates
- Compare different relationships in situations by using ratio and rate reasoning.

Lesson 2 . . . 22
Exploring Tables of Proportional Relationships
- Identify proportional relationships represented in tables by calculating constant unit rates.

Lesson 3 . . . 40
Identifying Proportional Relationships in Tables
- Analyze tables to identify proportional relationships.
- Determine the unit rate associated with a ratio of fractions by evaluating a complex fraction.

Lesson 4 . . . 58
Exploring Graphs of Proportional Relationships
- Identify proportional relationships represented as graphs.
- Interpret and make sense of the point $(0, 0)$ in context.

Lesson 5 . . . 80
Analyzing Graphs of Proportional Relationships
- Analyze graphs or sets of ratios to determine whether they represent proportional relationships.
- Identify the point on a graph that best shows the constant of proportionality k and explain the meaning of the point in context.

Lesson 6 . . . 106
Identifying Proportional Relationships in Written Descriptions
- Determine whether a written description represents a proportional relationship.

Topic B . . . 124

Working with Proportional Relationships

Lesson 7 . . . 126
Handstand Sprint
- Model a situation by using a proportional relationship to solve a problem.

Lesson 8 . . . 136
Relating Representations of Proportional Relationships
- Relate information among tables, graphs, equations, and situations to display a proportional relationship.
- Identify the constant of proportionality in different representations of a proportional relationship.

Lesson 9 . . . 154
Comparing Proportional Relationships
- Explain how to use the point $(1, r)$ to find the unit rate of a proportional relationship.
- Relate the unit rate to the steepness of the line representing the proportional relationship by using the unit rate triangle with vertices $(0, 0)$, $(1, 0)$, and $(1, r)$.

Lesson 10 . . . 164
Applying Proportional Reasoning
- Represent proportional relationships as equations.
- Solve problems by applying proportional reasoning.

Lesson 11 . . . 182
Constant Rates
- Represent rate problems as proportional relationships with equations.
- Solve rate problems.

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

Why

Ratios and Proportional Relationships

I was expecting to see percent work in this module. Where is it addressed?

The curriculum reserves the application of proportional reasoning to percent problems until module 4, after work with equations is completed. The major emphasis of grade 7's math standards is ratio and proportional reasoning. Because students apply proportional reasoning throughout their careers, strong foundational knowledge is essential. Module 1 focuses on conceptual understanding of proportional relationships. Students are introduced to the equation $y = kx$, where k is the constant of proportionality, as a representation of a proportional relationship in this module; work with equations is extended in module 3.

I notice students do not set up a proportion in this module. Is this intentional?

The traditional method of setting up a proportion obscures understanding of why the procedure works, and it often leads to misuse of the procedure, resulting in common errors in calculation. The connection between the values in the proportional relationship and the order in which quantities are placed in the traditional proportion is not usually made clear to students.

1. In this module, students extend work with unit rates and equations from grade 6 to represent proportional relationships with the equation $y = kx$. This representation allows students to determine the constant of proportionality and compare proportional relationships efficiently.
2. After ample practice representing proportional relationships with the equation $y = kx$ in modules 1 and 3, students are introduced to the traditional proportion in module 3. In module 4, students consider the efficiency of the traditional proportion when working with percent problems. Students understand the connection between a visual model and the equation of the relationship, and they relate the placement of the values in that relationship to the placement of values in the traditional proportion.

Achievement Descriptors: Overview

The Achievement Descriptors: Overview section is a helpful guide that describes what Achievement Descriptors (ADs) are and briefly explains how to use them. It identifies specific ADs for the module, with more guidance provided in the Achievement Descriptors: Proficiency Indicators resource at the end of each *Teach* book.

Topic-Level Components

Topic Overview

Each topic begins with a Topic Overview that is a summary of the development of learning in that topic. It typically includes information about how learning connects to previous or upcoming content.

Progression of Lessons

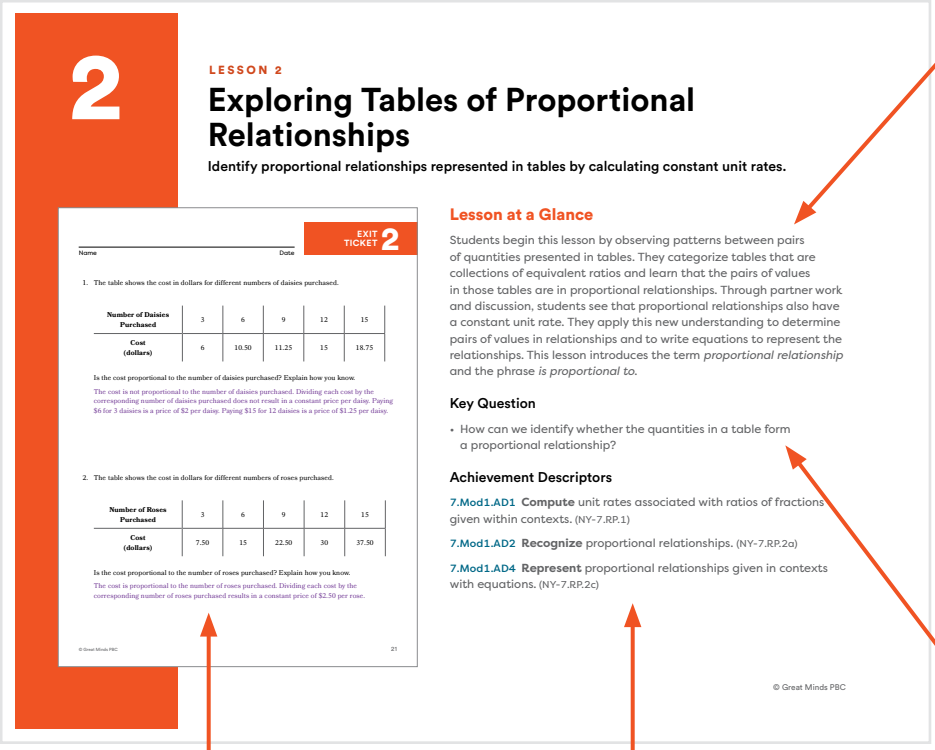
The Progression of Lessons provides a quick overview of lessons in the topic.

Progression of Lessons

Lesson 1 An Experiment with Ratios and Rates
Lesson 2 Exploring Tables of Proportional Relationships
Lesson 3 Identifying Proportional Relationships in Tables
Lesson 4 Exploring Graphs of Proportional Relationships
Lesson 5 Analyzing Graphs of Proportional Relationships
Lesson 6 Identifying Proportional Relationships in Written Descriptions

Lesson Overview

Each lesson begins with two pages of information to help you prepare to teach the lesson.



2

LESSON 2

Exploring Tables of Proportional Relationships

Identify proportional relationships represented in tables by calculating constant unit rates.

EXIT TICKET 2

Name Date

1. The table shows the cost in dollars for different numbers of daisies purchased.

Number of Daisies Purchased	3	6	9	12	15
Cost (dollars)	6	10.50	11.25	15	18.75

Is the cost proportional to the number of daisies purchased? Explain how you know.

The cost is not proportional to the number of daisies purchased. Dividing each cost by the corresponding number of daisies purchased does not result in a constant price per daisy. Paying $6 for 3 daisies is a price of $2 per daisy. Paying $15 for 12 daisies is a price of $1.25 per daisy.

2. The table shows the cost in dollars for different numbers of roses purchased.

Number of Roses Purchased	3	6	9	12	15
Cost (dollars)	7.50	15	22.50	30	37.50

Is the cost proportional to the number of roses purchased? Explain how you know.

The cost is proportional to the number of roses purchased. Dividing each cost by the corresponding number of roses purchased results in a constant price of $2.50 per rose.

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Lesson at a Glance

Students begin this lesson by observing patterns between pairs of quantities presented in tables. They categorize tables that are collections of equivalent ratios and learn that the pairs of values in those tables are in proportional relationships. Through partner work and discussion, students see that proportional relationships also have a constant unit rate. They apply this new understanding to determine pairs of values in relationships and to write equations to represent the relationships. This lesson introduces the term *proportional relationship* and the phrase *is proportional to*.

Key Question

- How can we identify whether the quantities in a table form a proportional relationship?

Achievement Descriptors

7.Mod1.AD1 **Compute** unit rates associated with ratios of fractions given within contexts. (NY-7.RP.1)

7.Mod1.AD2 **Recognize** proportional relationships. (NY-7.RP.2a)

7.Mod1.AD4 **Represent** proportional relationships given in contexts with equations. (NY-7.RP.2c)

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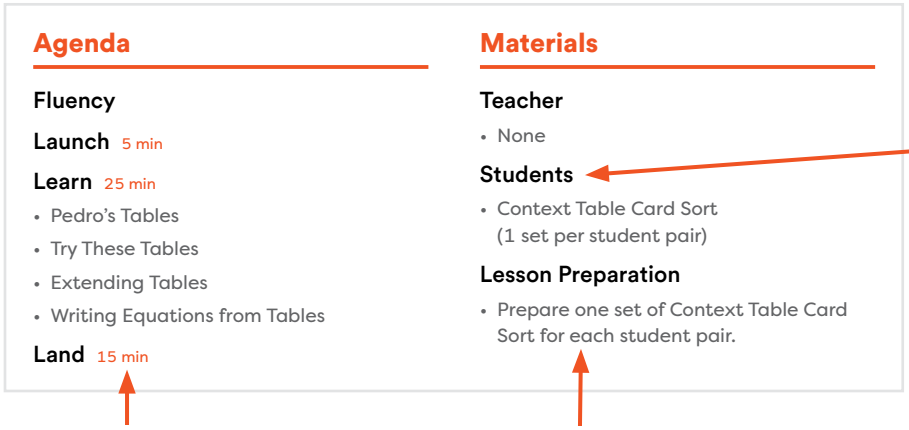
The **Lesson at a Glance** is a snapshot of the lesson framed through what students should know, understand, and do while engaging with the lesson. It includes information about the tools, representations, and terminology used in the lesson. The Lesson at a Glance will also mention if the lesson is delivered digitally.

Key Questions help focus your instruction and classroom discourse. They encapsulate the key learning of the lesson and may help develop coherence and connections to other concepts or a deeper understanding of a strategy or model. Students discuss these questions as part of the Debrief to synthesize learning during the Land section of the lesson.

The **Exit Ticket** is a formative assessment that is given at the end of the lesson. Use it to monitor student progress toward proficiency on the Achievement Descriptors and to make instructional choices for upcoming lessons.

Achievement Descriptors (ADs) are standards-aligned descriptions that detail what students should know and be able to do based on instruction. The number of ADs addressed in each lesson varies depending on the content. Turn to the Resources section at the end of the *Teach* book to see the proficiency indicators for each AD. Proficiency indicators help you assess your students' level of proficiency.



Materials lists the items that you and your students need for the lesson. If not otherwise indicated, each student needs one of each listed material.

The **Agenda** shows the sequence and recommended time length of the sections of the lesson. A (D) indicates that the segment includes a digital component.

Lesson Preparation provides guidance about materials that need to be created, assembled, or placed in advance.

Lesson Structure

Each lesson is structured in four sections: Fluency, Launch, Learn, and Land. Lessons are designed for one 45-minute instructional period.

Fluency

Fluency provides distributed practice with previously learned material. It is designed to prepare students for new learning by activating prior knowledge and bridging small learning gaps. Fluency activities are included with each lesson, but they are not accounted for in the overall lesson time. Use them as bell ringers, or, in a class period longer than 45 minutes, consider using the facilitation suggestions in the Resources to teach the activities as part of the lesson.

Launch

Launch creates an accessible entry point to the day's learning through activities that build context and often create productive struggle that leads to a need for the learning that follows. Every Launch ends with a transition statement that sets the goal for the day's learning.

Learn

Learn presents new learning related to the lesson objective, usually through a series of instructional segments. This lesson component takes most of the instructional time. Suggested facilitation styles vary and may include direct instruction, guided instruction, group work, partner activities, interactive video, and digital elements.

Land

Land helps you facilitate a brief discussion to close the lesson and provides students with an opportunity to complete the Exit Ticket. In the Debrief portion of Land, suggested questions, including key questions related to the objective, help students synthesize the day's learning. The Exit Ticket provides a window into what students understand so that you can make instructional decisions.

Margin Notes

There are six types of instructional guidance that appear in the margins. These notes provide information about facilitation, differentiation, and coherence.

Teacher Notes communicate information that helps with implementing the lesson. Teacher Notes may enhance mathematical understanding, explain pedagogical choices, give background information, or help you identify common misconceptions.

Universal Design for Learning (UDL) suggestions offer strategies and scaffolds that address learner variance. These suggestions promote flexibility with engagement, representation, and action and expression, the three UDL principles described by CAST. These strategies and scaffolds are additional suggestions to complement the curriculum's overall alignment with the UDL Guidelines.

Language Support provides ideas to support students with receiving (reading and listening) and producing (speaking and writing) English in mathematical contexts. Suggestions may include ways to promote student-to-student discourse, support new and familiar content-specific terminology or academic language, or support students with multiple-meaning words.

Differentiation suggestions provide targeted ways to help meet the needs of specific learners based on your observations or other assessments. There are two types of suggestions: support and challenge. Use these to support students in the moment or to advance learning for students who are ready for more of a challenge.

Promoting the Standards for Mathematical Practice highlights places in the lesson where students are engaging in or building experience with the Standards for Mathematical Practice (MPs). Although most lessons offer opportunities for students to engage with more than one Standard for Mathematical Practice, this guidance identifies a focus MP within each lesson. The notes also provide lesson-specific information, ideas, and questions that you can use to deepen students' engagement with the focus MP. Often, the suggested questions for a particular MP repeat. This intentional repetition supports students in understanding the MPs in different contexts.

Math Past provides guidance about how to use the module's Math Past resource in the lesson. (See Resources in this document.)

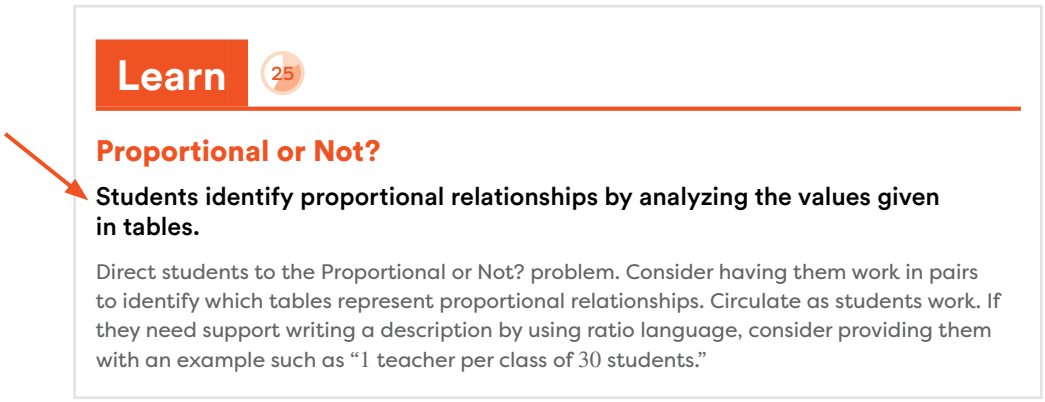
Lesson-Level Sample Solutions

Sample Solutions are examples of solutions to problems students engage with during the lesson, including those in Practice. Although specific solution paths are provided in the sample solutions, they are only samples. Accept accurate responses, reasonable explanations, and equivalent answers for student work even if they differ from the sample.

Visual Design

In the *Teach* book, color coding and other types of text formatting are used to highlight facilitation recommendations and possible statements, questions, and student responses. These are always suggestions and not a script.

- Each section includes a bold line of text that gives the purpose for that section. These purpose statements, taken together, support the overall objective of the lesson.



- Dark blue text shows suggested language for questions and statements that are essential to the lesson. Light blue text shows sample student responses.

Ask one or two students to share with the class their strategies for identifying and creating equivalent ratios. Then introduce the term *proportional relationship*.

Each pair of quantities in Pedro's Tables is in a proportional relationship. Measures of two quantities are in a proportional relationship if there is a constant unit rate between pairs of corresponding values.

We can use the phrase *is proportional to* when describing the relationship between the quantities. In the first table, the number of cups of sugar is proportional to the number of cups of flour.

Encourage students to practice using the new terminology *proportional relationship* and the phrase *is proportional to* throughout the remainder of this lesson and topic.

How can you use the phrase *is proportional to* when describing the other three relationships?

The volume of a sample in cubic centimeters is proportional to the mass of that sample in grams. The height of a prism in inches is proportional to the volume of the prism in cubic inches. The time in minutes is proportional to the volume of water in gallons.

- Bulleted lists provide suggested advancing and assessing questions to guide learning as needed.

Have students work in pairs to complete the Nora's Summer Job problem. Encourage students to discuss an approach to this problem with their partner before solving. As needed, guide them through the problem by asking the following questions or similar ones:

- To write an equation, we must first determine the unit rate of the ratios in the table. How can we rewrite a ratio from the table as division to determine how much Nora earns per hour?
- Since we know this situation is a proportional relationship, what does that mean about the unit rate for all pairs of values?
- How can we use the unit rate to write an equation that represents the amount of money Nora earns per hour?

- Text in purple shows possible student responses. These responses appear only in *Teach*.

1. Create a table, a graph, or an equation to represent your assigned type of relationship.

   Proportional relationship:

   Sample (table):

Number of Flowers	Total Cost (dollars)
1	1.25
2	2.50
3	3.75
4	5.00

   Sample (equation):

   Let x represent the number of hours worked.

   Let y represent the amount of money earned in dollars.

   $y = 10.25x$

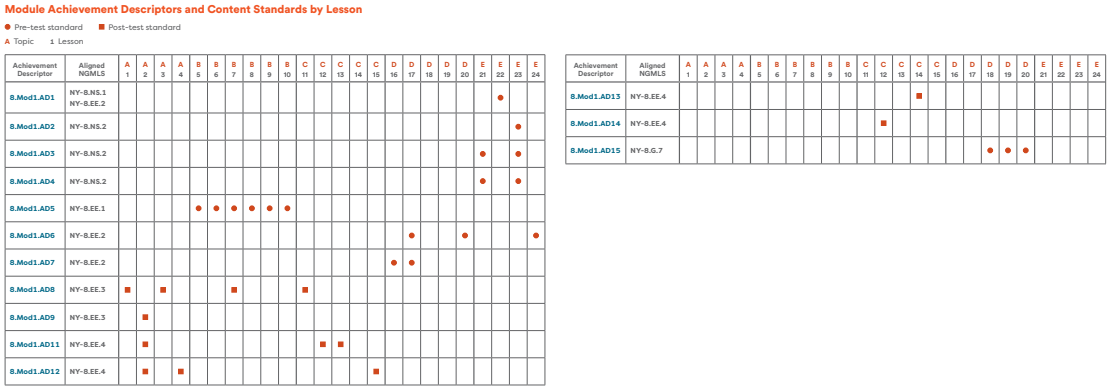
Resources

Near the end of your *Teach* book, you will find several helpful resources for assessment, lesson planning, and further study.

Standards

Standards lists the content standards addressed in the module. This resource also lists the Standards for Mathematical Practice.

Module Achievement Descriptors and Content Standards by Lesson



Module Achievement Descriptors and Content Standards by Lesson

● Pre-test standard ■ Post-test standard

A Topic 1 Lesson

Achievement Descriptor	Aligned NGMLS	A 1	A 2	A 3	A 4	B 5	B 6	B 7	B 8	B 9	B 10	C 11	C 12	C 13	C 14	C 15	D 16	D 17	D 18	D 19	D 20	E 21	E 22	E 23	E 24
8.Mod1.AD1	NY-8.NS.1 NY-8.EE.2																						●		
8.Mod1.AD2	NY-8.NS.2																							●	
8.Mod1.AD3	NY-8.NS.2																					●		●	
8.Mod1.AD4	NY-8.NS.2																					●		●	
8.Mod1.AD5	NY-8.EE.1					●	●	●	●	●	●														
8.Mod1.AD6	NY-8.EE.2																	●			●				●
8.Mod1.AD7	NY-8.EE.2																●	●							
8.Mod1.AD8	NY-8.EE.3	■		■				■				■													
8.Mod1.AD9	NY-8.EE.3		■																						
8.Mod1.AD11	NY-8.EE.4		■											■	■										
8.Mod1.AD12	NY-8.EE.4		■		■											■									

Achievement Descriptor	Aligned NGMLS	A 1	A 2	A 3	A 4	B 5	B 6	B 7	B 8	B 9	B 10	C 11	C 12	C 13	C 14	C 15	D 16	D 17	D 18	D 19	D 20	E 21	E 22	E 23	E 24
8.Mod1.AD13	NY-8.EE.4														■										
8.Mod1.AD14	NY-8.EE.4												■												
8.Mod1.AD15	NY-8.G.7																		●	●	●				

These charts highlight the location and frequency of the Achievement Descriptors (ADs) and standards for each lesson in a module. Each standard is also identified as a pre-test or post-test standard. Guidance is included to give insight about why an identified post-test standard is taught pre-test.

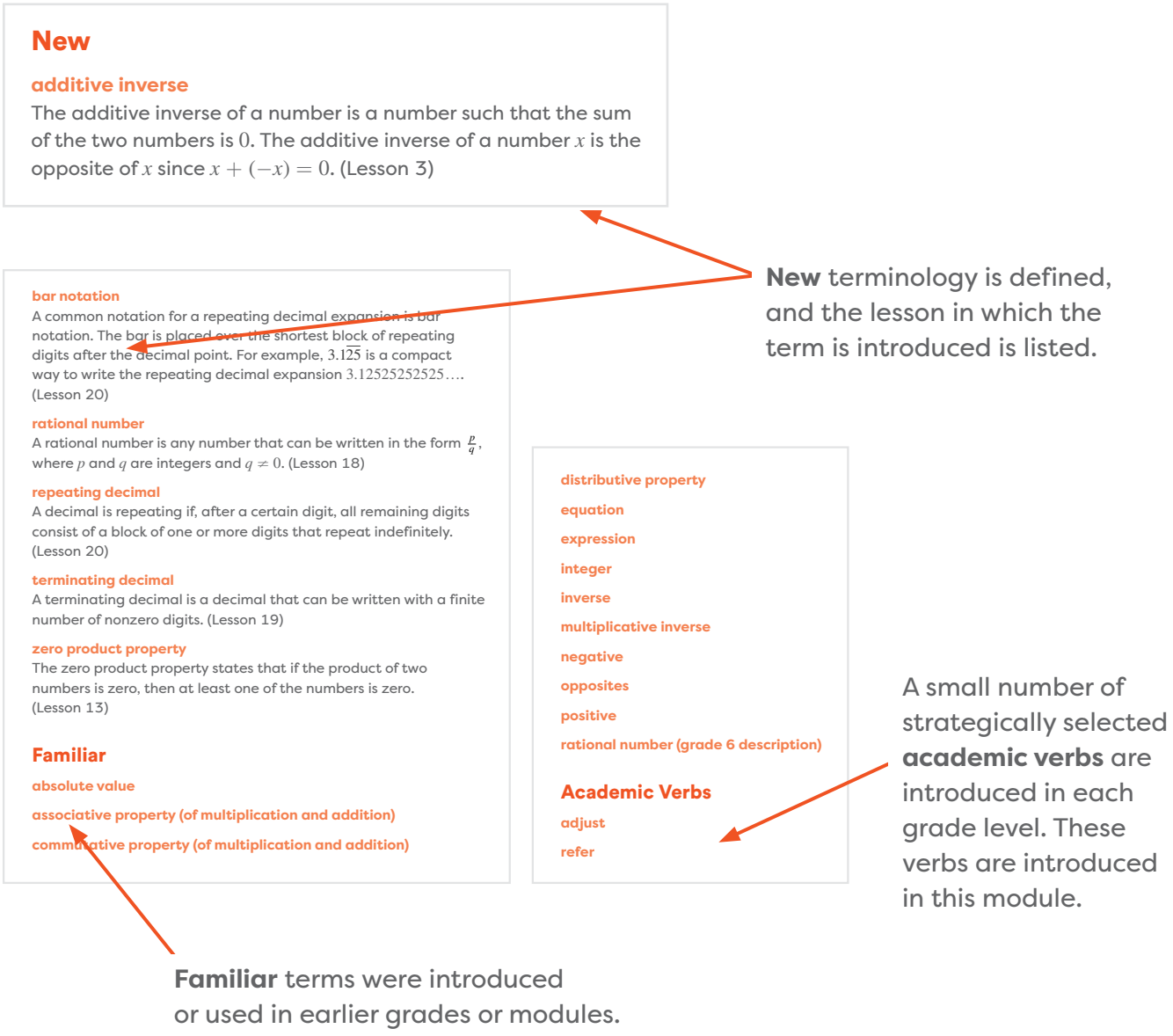
Achievement Descriptors: Proficiency Indicators

Achievement Descriptors (ADs) are standards-aligned descriptions that detail what students should know and be able to do based on instruction they receive. The number of ADs addressed in each lesson varies depending on the content.

This resource includes proficiency indicators for each AD. Proficiency indicators are descriptions of work that is partially proficient, proficient, or highly proficient. Proficiency indicators help you assess your students' level of proficiency.

Terminology

Terminology is a list of new and familiar terms used in the module. New terminology includes definitions as they appear within the module.



Math Past

Math Past tells the history of some big ideas that shape the mathematics in the module. It 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 information to inform your teaching and lesson-specific ideas about how to engage students in the history of mathematics.

Math Past

Per Centum: Romans and Taxes

When was the concept of percent invented?
Why does *percent* mean "hundredths"?
Who introduced the symbol % to represent percent?

About 2,000 years ago, the word *Roman* did not just mean someone who lived in the Italian city of Rome. The Romans were citizens of a vast territory, initially called the Roman Republic (509–27 BCE) and later renamed the Roman Empire (27 BCE–476 CE).

The map shows the extent of the Roman Empire in the year 14 CE. The empire's territory was divided into provinces. The map shows the provinces in several colors, based on when the provinces were brought into the Roman Empire.

A Roman province was similar to a US state; it had its own borders and its own governor. The provinces formed a ring around the Mediterranean Sea and stretched 2,500 miles from present-day Spain in the west to present-day Syria in the east.

Where did the Roman Empire get the money it needed to perform the functions of government, for example, to hire soldiers for the army? Your students might have a good guess—taxes! Indeed, just like the state and the federal governments in the United States, the Roman Empire levied taxes on their citizens.

The city of Rome was the center of the Roman Empire. Travel—and with it, communication and shipping—between Rome and the more distant parts of the empire took weeks by ship and by land. Collecting taxes and sending them back to Rome would have been very difficult.

Starting in about 167 BCE, independent contractors called tax farmers (*publicani*) collected the property taxes from the Roman provinces on behalf of the central government in Rome. The tax farmers competed for the right to collect taxes in provinces. They prepaid the anticipated tax due and pocketed any profits from over-collecting.

Roman leader Augustus Caesar (63 BCE–14 CE) combined the treasuries in the provinces and the central treasury in Rome, abolished tax farming, and instituted a fairer system of direct taxation.

The new system included a tax on land (*tributum soli*) and a poll tax (i.e., voting tax) on each adult (*tributum capitis*). The amount of the Roman land tax was about one part out of a hundred. The Latin words *per centum* mean "per one hundred." Today, we abbreviate this as the single word *percent*.

Materials

The Materials resource lists items that you and your students need for the module.

Fluency

The Fluency resource gives facilitation guidance for the recommended Fluency activities within the lessons, and it shows Sprints annotated with solutions.

Sample Solutions

The Sample Solutions resource shows Mixed Practice problems annotated with solutions.

Works Cited

A robust knowledge base underpins the structure and content framework of *Eureka Math² New York Next Gen*. A listing of the key research appears in the Works Cited for each module.

Inside *Learn*

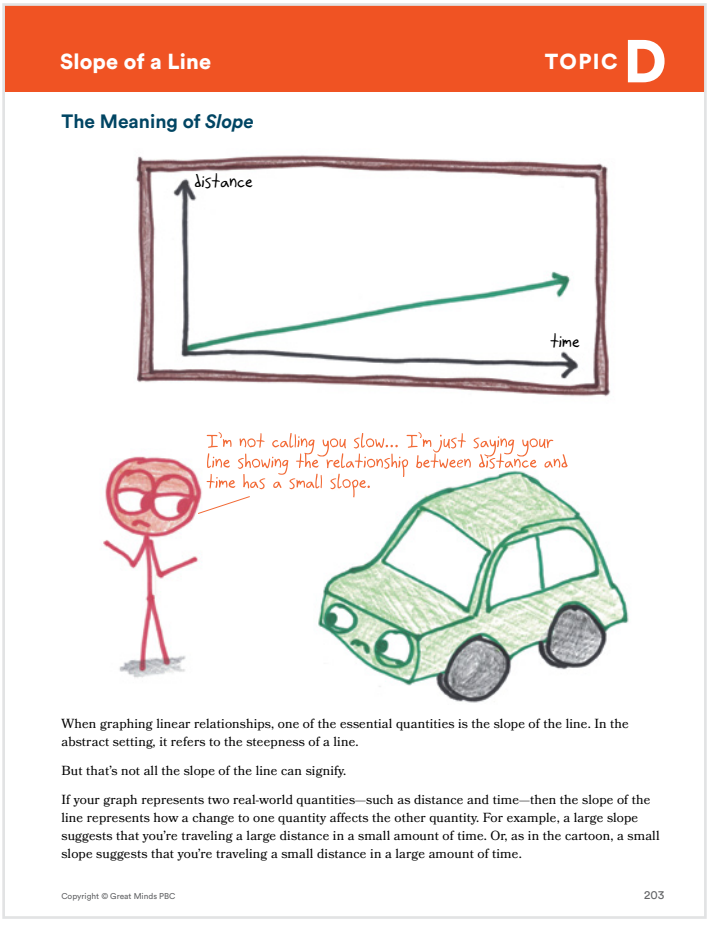
Learn is students' companion text to the instruction in *Teach*. It contains all the pages your students need as you implement each lesson.

Cover Art

Each *Learn* book includes the same work of fine art included on the cover of the *Teach* book. The art has a connection to the math learned within the grade.

Topic Opener

The Topic Opener is an illustration created in collaboration with Math with Bad Drawings. The Topic Opener helps students relate to the concepts they learn in the topic. It is designed to build anticipation—and even enthusiasm!—for math by piquing curiosity in a humorous context.



Slope of a Line TOPIC D

The Meaning of *Slope*

When graphing linear relationships, one of the essential quantities is the slope of the line. In the abstract setting, it refers to the steepness of a line.

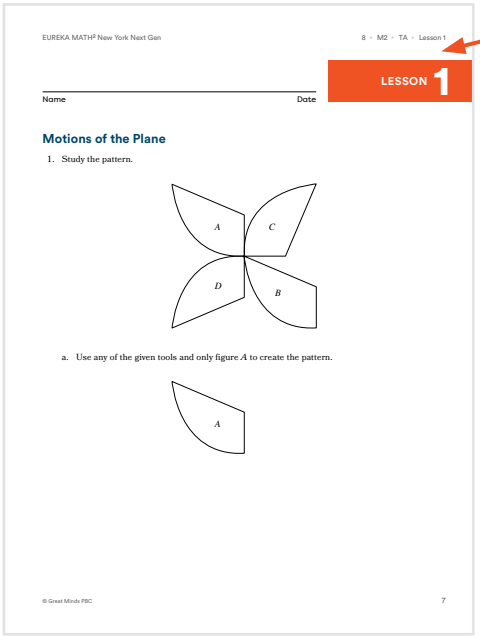
But that's not all the slope of the line can signify.

If your graph represents two real-world quantities—such as distance and time—then the slope of the line represents how a change to one quantity affects the other quantity. For example, a large slope suggests that you're traveling a large distance in a small amount of time. Or, as in the cartoon, a small slope suggests that you're traveling a small distance in a large amount of time.

 203

Components

Student pages are labeled to align with lesson components.


EUREKA MATH² New York Next Gen 8 ▸ M2 ▸ TA ▸ Lesson 1

LESSON 1

Name Date

Motions of the Plane

1. Study the pattern.

a. Use any of the given tools and only figure *A* to create the pattern.

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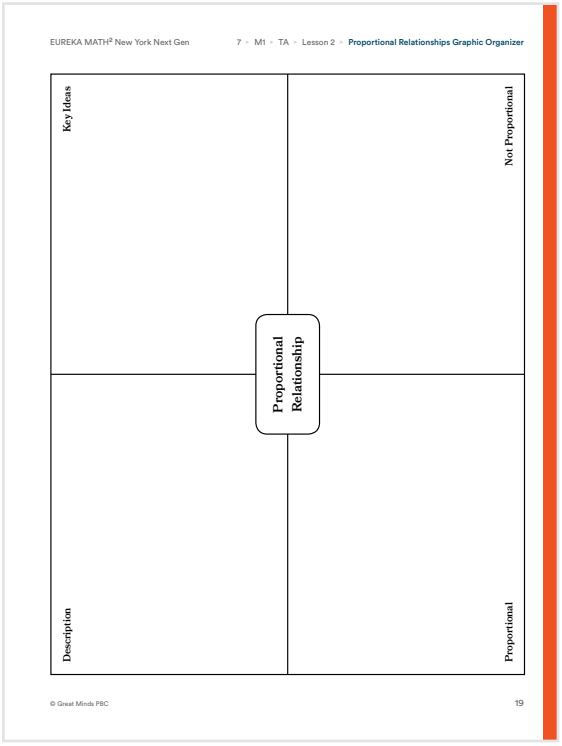
LESSON — **Lesson pages** are completed by students during the lesson. The pages are organized in the order they are used in the lesson, starting with Launch, and are labeled with the segment titles in the lesson.

EXIT TICKET — **Exit Tickets** are completed during the Land segment of the lesson. The Exit Ticket is a brief, formative assessment of key learning in the lesson.

RECAP — The **Recap** outlines key learning from the lesson and provides examples with supporting notes. (See the More About Lesson Recaps section.)

PRACTICE — **Practice** pages provide a bank of problems organized from simple to complex.


EUREKA MATH² New York Next Gen 7 ▸ M1 ▸ TA ▸ Lesson 2 ▸ Proportional Relationships Graphic Organizer

Key Ideas

Not Proportional

Proportional Relationship

Description

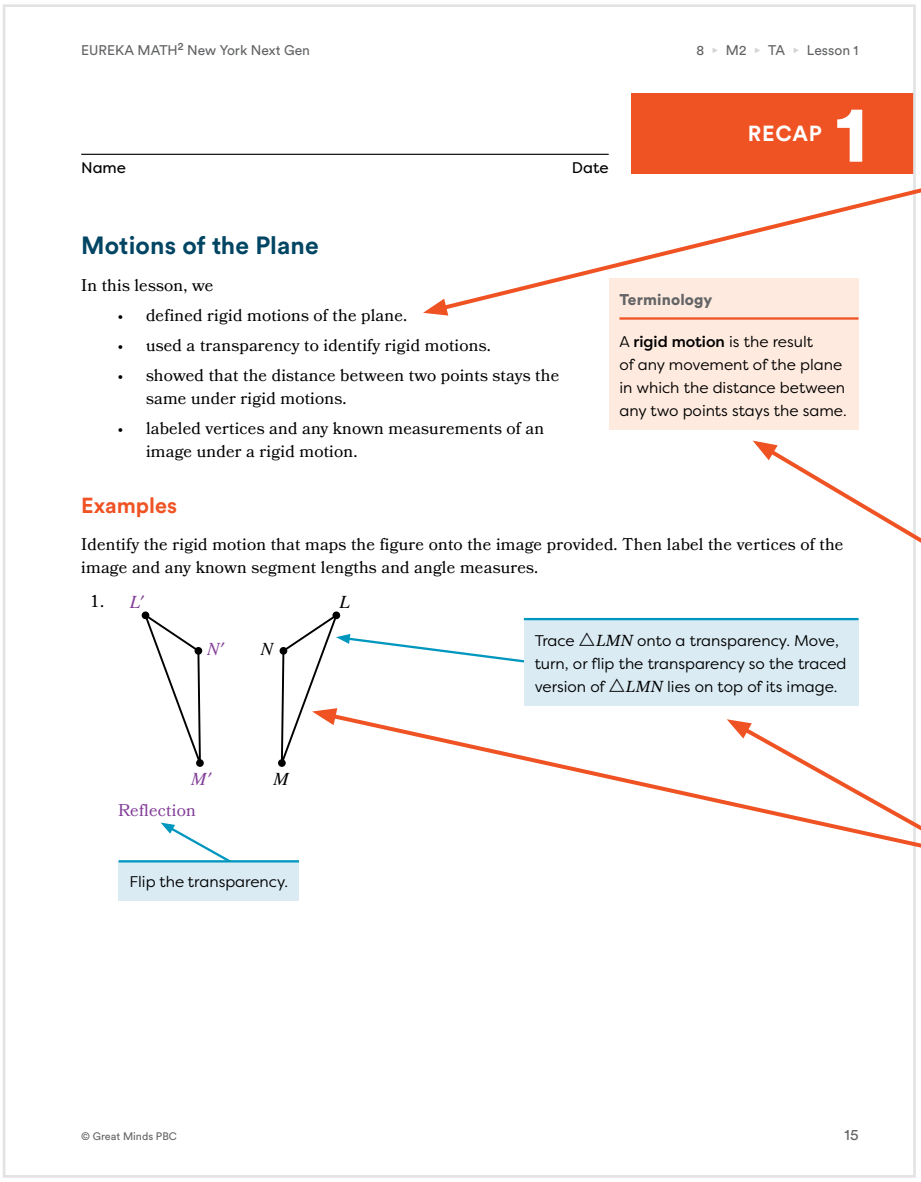
Proportional

© Great Minds PBC 19

An **orange bar** on the side of a page indicates a removable, a student page that should be removed from the *Learn* book. A removable may be used inside a personal whiteboard so students can practice skills several times in different ways, or it may be cut, assembled, or rearranged for an activity during a lesson or across multiple lessons.

More About Lesson Recaps

You may use the Recaps as a guide to support practice outside of class. Recaps are also useful for anyone supporting the student's learning, including family members, tutors, and special educators.



EUREKA MATH² New York Next Gen 8 ▸ M2 ▸ TA ▸ Lesson 1

RECAP 1

Name Date

Motions of the Plane

In this lesson, we

- defined rigid motions of the plane.
- used a transparency to identify rigid motions.
- showed that the distance between two points stays the same under rigid motions.
- labeled vertices and any known measurements of an image under a rigid motion.

Terminology

A **rigid motion** is the result of any movement of the plane in which the distance between any two points stays the same.

Examples

Identify the rigid motion that maps the figure onto the image provided. Then label the vertices of the image and any known segment lengths and angle measures.

1. L' N' M' L N M

Trace $\triangle LMN$ onto a transparency. Move, turn, or flip the transparency so the traced version of $\triangle LMN$ lies on top of its image.

Reflection

Flip the transparency.

© Great Minds PBC 15

The Recap summarizes 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.

Student Resources

Two other resources are available in the *Learn* book.

Talking Tool

The Talking Tool is a scaffold to support students in producing the language to engage in discourse about mathematics with other students. It provides a set of general sentence frames and sentence starters that can be applied to a wide variety of situations.

Language Support margin boxes within the lessons may refer to specific sections of the Talking Tool. Model the use of the sentence frames and sentence starters. This can be done at any time in any lesson but is specifically useful during times of extended student-to-student discourse, such as cooperative activities.

Thinking Tool

The Thinking Tool 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.

Refer to the Thinking Tool as you model self-talk and self-questioning as part of a think-aloud. Invite students to use the Thinking Tool at any time during individual or group work to prompt students to strategically reflect on their own performance.

Inside the Digital Platform

The Great Minds Digital Platform is organized into five key curriculum spaces: Teach, Assign, Assess, Analyze, and Manage. On the digital platform, lessons include the same features as in the *Teach* book, as well as a few more elements that are unique to the digital space. For example, on the digital platform, the side navigation panel previews digital presentation tools, such as slides, that accompany lessons.

Each space within the digital platform supports you to maximize the features that *Eureka Math*^{2} *New York Next Gen* offers.

Teach

Teach contains all the information in the print version, as well as digital curriculum components such as assessments, digital interactives, and slides to project for students. Use this space to access the curriculum components you need for daily instruction.

Assign

Create assignments for your students by using any artifact in the *Eureka Math*^{2} *New York Next Gen* resource library in this space, such as Exit Tickets, Module Assessments, Classwork, removables, or problems for practice. You can launch assessments, view and monitor progress on assigned assessments, and score and analyze completed assessments.

Assess

Access the Great Minds Library of digital assessments, where you can duplicate and adjust assessments. You can also assign several assessments at once from this space.

Analyze

Generate reports and view data about students' progress toward proficiency. Assessment reports provide insights, summaries of class performance, and student proficiency by item.

Manage

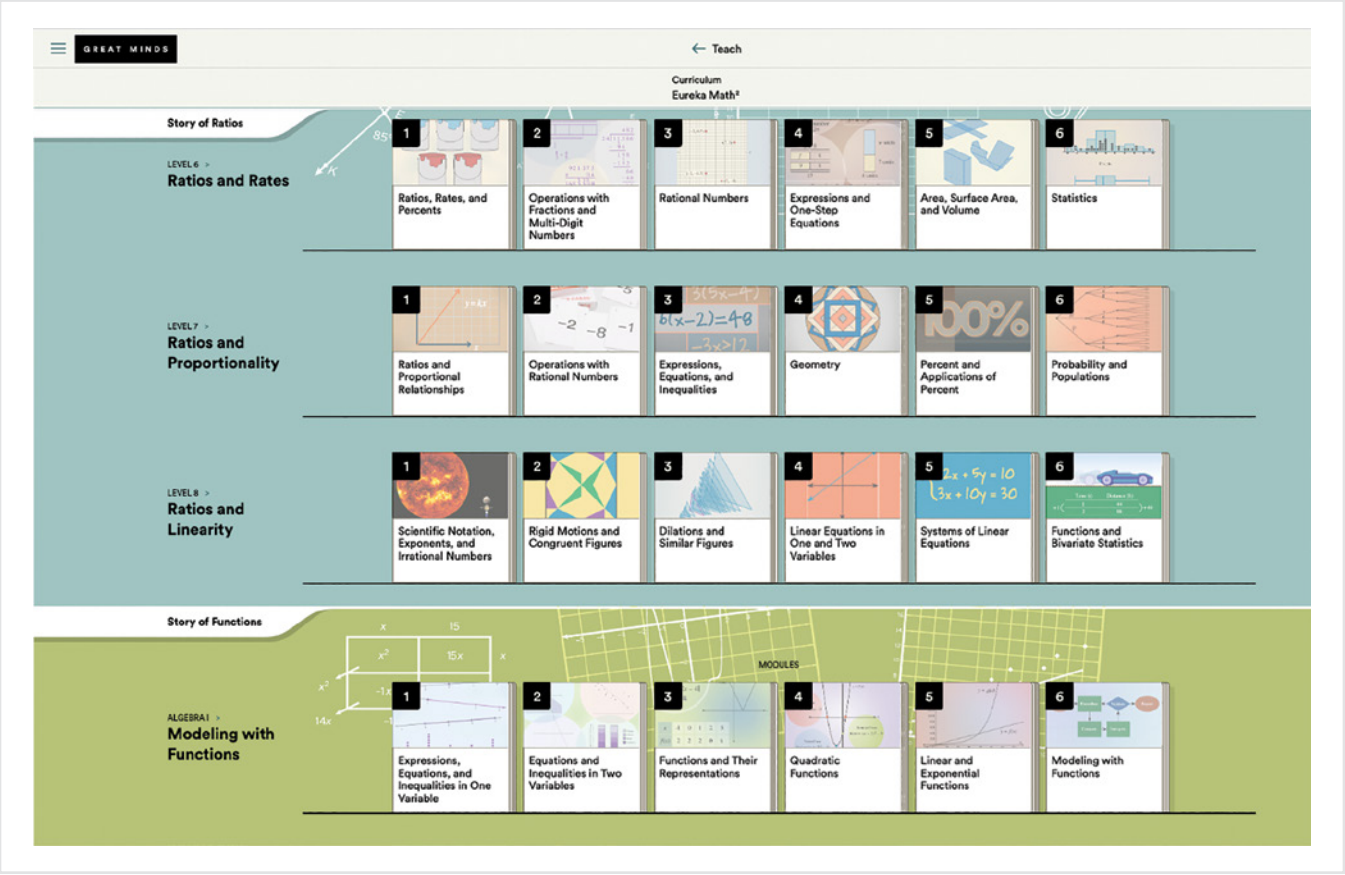
The Manage space allows administrators and teachers to view rostering data for their schools or classes. It is also where you can set or reset a student's password.

This section discusses Teach in detail. Visit the Help Center to read more about Teach as well as Assign, Assess, Analyze, and Manage.

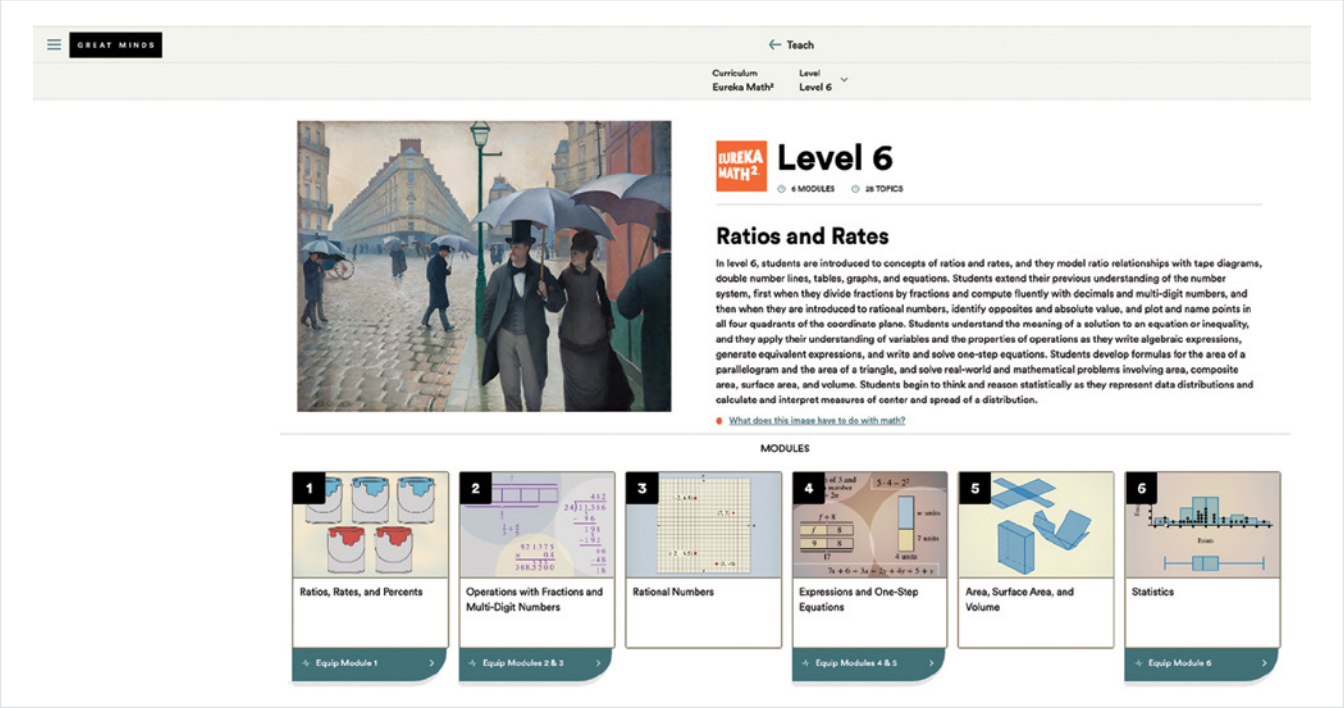
Teach

On the digital platform, use Teach to navigate to the curriculum, level, and module landing pages for easy access to different components.

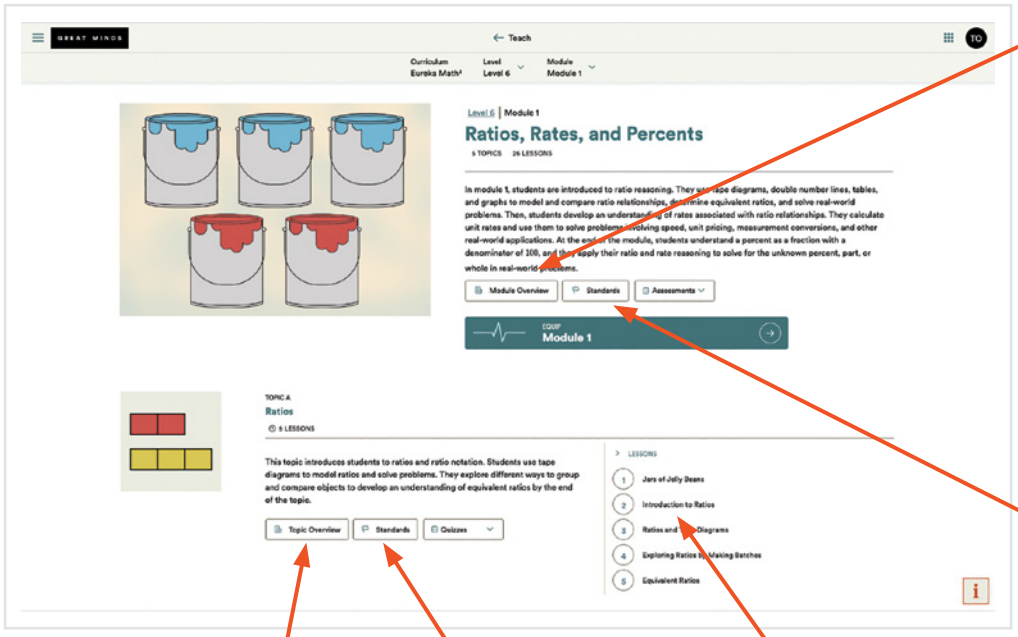
The curriculum landing page, or the bookshelf, gives easy access to the entire curriculum.



The grade-level landing pages provide a brief description of the year-long learning. Use the drop-down arrows in the top navigation panel to view different grade levels.



The module-level landing page houses all the module-, topic-, and lesson-level resources needed to teach each module.



The Module Overview includes resources from the *Teach* book, including Why, Terminology, Math Past, Module Assessments, Scoring Guides, and additional module-level resources.

Access the Achievement Descriptors and standards for the entire module.

Lessons are visible at a glance.

The Topic Overview includes the Progression of Lessons, Topic Quizzes, Scoring Guides, and topic-level resources.

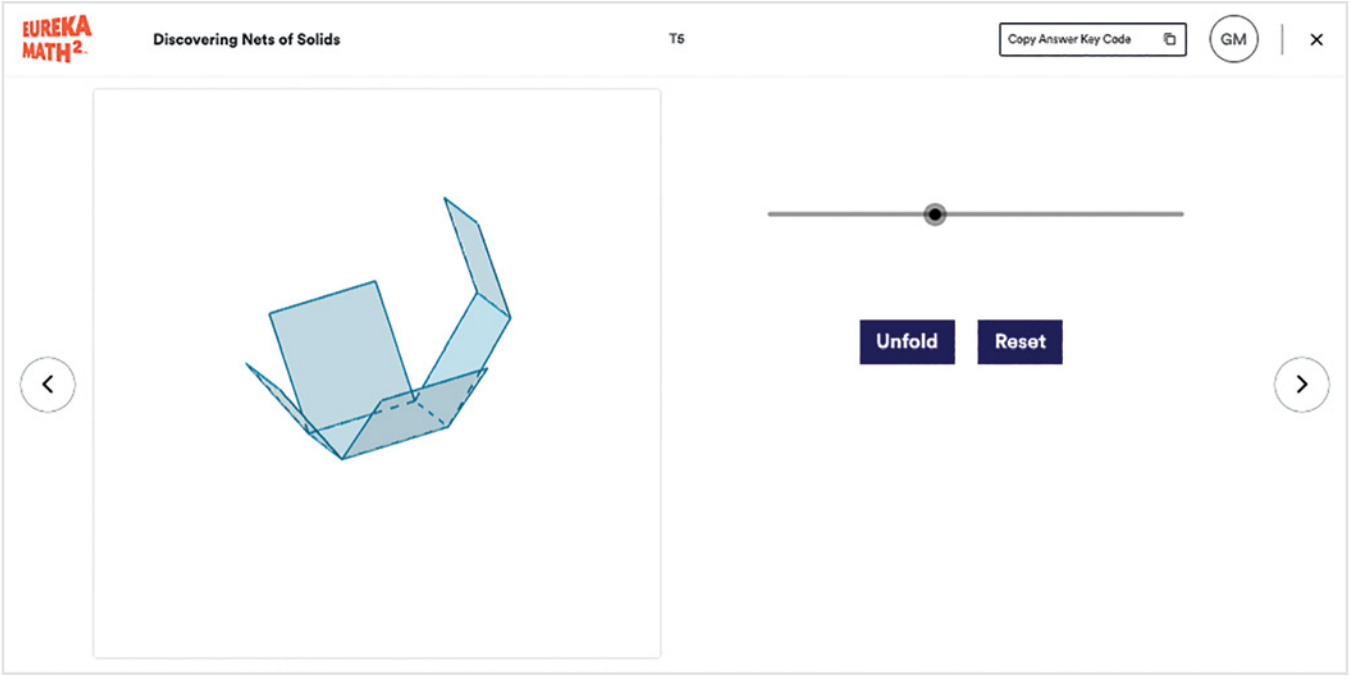
Access the Achievement Descriptors and standards for the topic.

Slides

Each *Eureka Math² New York Next Gen* lesson provides projectable slides that have media and content required to facilitate the lesson, including the following:

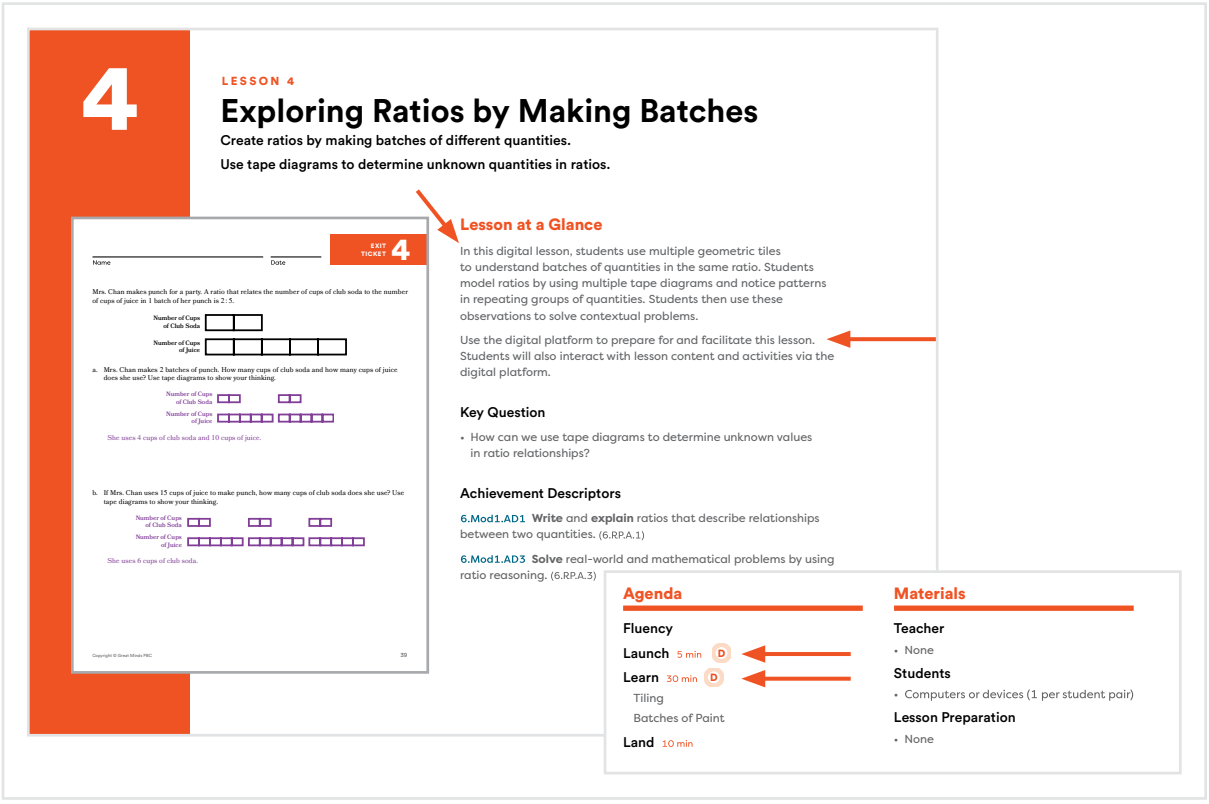
- Fluency activities
- Digital experiences such as videos, teacher-led interactives, and demonstrations
- Images and text from *Teach* or *Learn* cued for display by prompts such as *display*, *show*, *present*, or *draw students' attention to*
- Pages from *Learn* including Classwork, removables, and Exit Tickets

Some slides contain interactive components such as buttons or demonstrations.



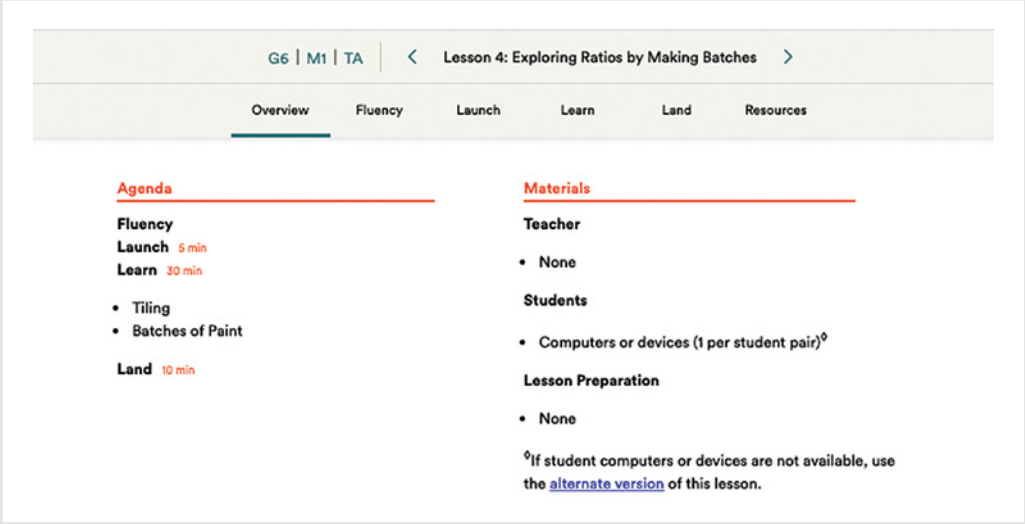
Digital Lessons

Every module contains digital lessons that are accessed on the digital platform. They are part of the module's sequence of lessons and have objectives that advance key learning. Digital lessons provide you with immediate access to every student's response, and they create easy ways to use student work to facilitate discussion. Within the lesson overview, the Lesson at a Glance and icons in the lesson agenda identify digital lessons.



When you launch a digital lesson, students are guided through specific content-based activities. You can control the pacing of the lesson and elevate opportunities for aha moments. *Eureka Math²* digital lessons help students see and experience mathematical concepts interactively.

The *Teach* book provides a summary of the lesson, but the full lesson is in the digital platform. As you prepare at the module and topic levels, use the summaries to understand how the digital lessons fit into the sequence of learning. At the lesson level, use the digital platform to prepare for and facilitate digital lessons.



To encourage student discussion and collaboration, provide one device per student pair. This is indicated in the Materials section.

While digital lessons provide an opportunity to interact with the content of the lesson, if student computers or devices are not available, you can use a nondigital alternate version of the lesson. Access the alternate by using the link in the Materials section of the lesson in the digital platform. Alternate lessons teach the same objective and keep the spirit of the digital lesson they replace.

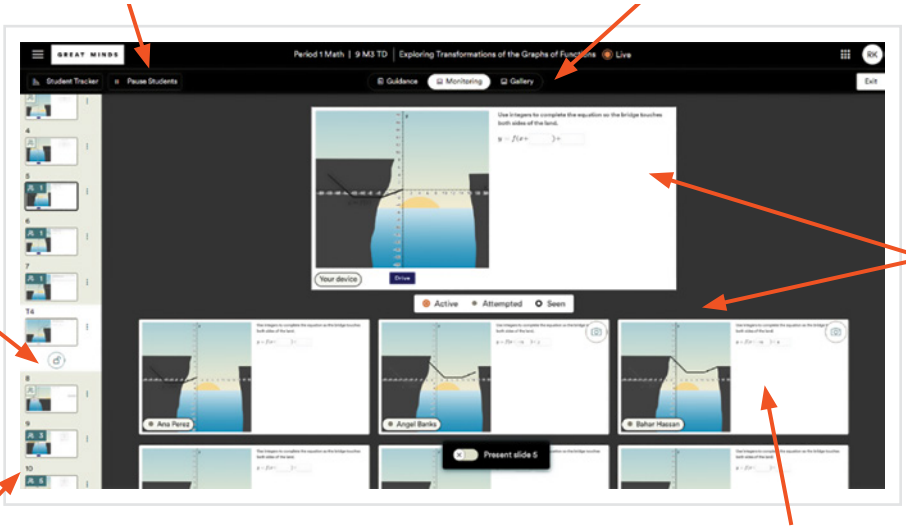
Teacher View

Use Teacher View to present, monitor student progress, and create student discussions. From this view, you can choose to view all students' screens at once or view each student's activity individually.

You can track the pace of the class and pause students as needed.

Toggle among Guidance, Monitoring, and Gallery modes to present, monitor student progress, and create student discussion points.

Pacing gates restrict students from moving to the next slide so that you can facilitate discussion about a concept or discovery.



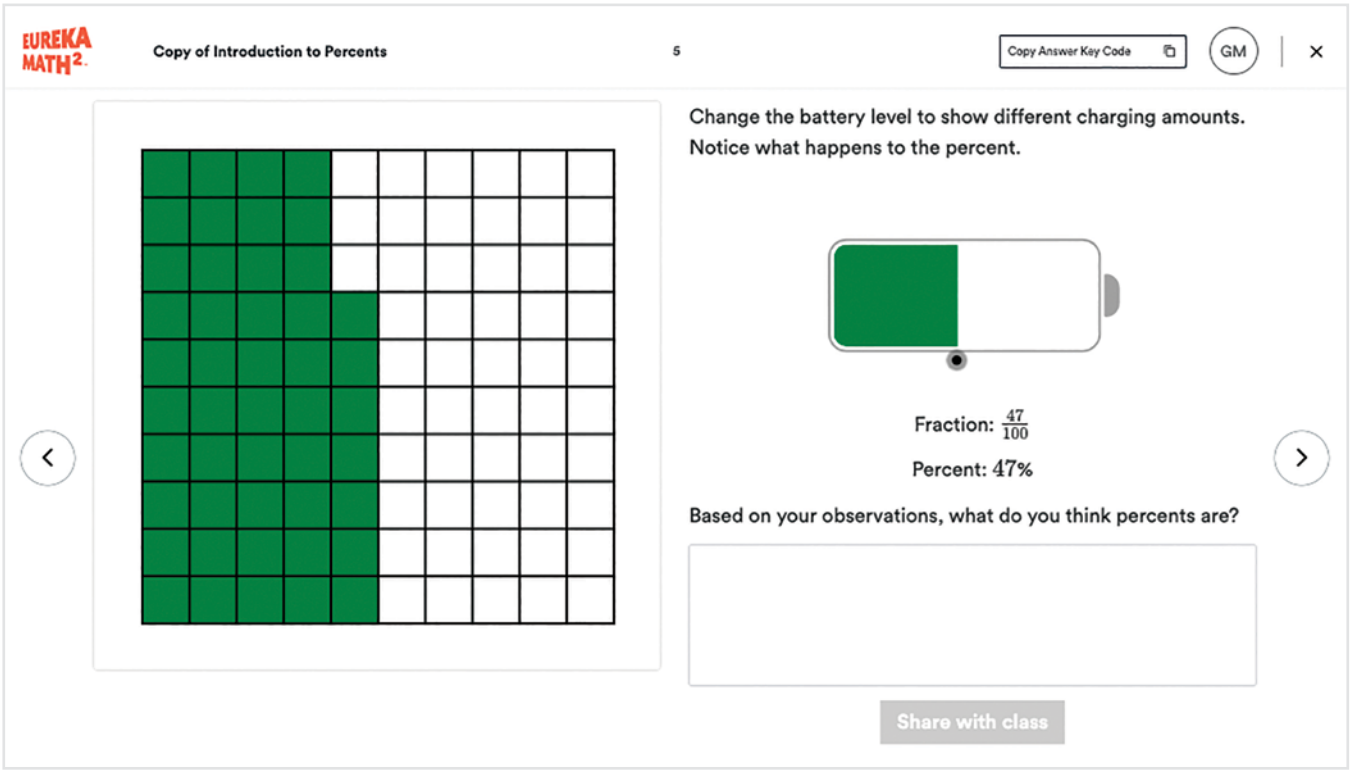
You can see your own display and students' work as they move through the interactive.

You can see the number of students active on each slide.

Add student work to the Gallery to create specific examples to analyze and critique.

Student View

Digital lessons contain interactives that students access on their devices. Students use the interactives to engage directly with mathematical concepts and receive immediate feedback.



Pacing

Year at a Glance

There are approximately 130 lessons for each grade level or course. Groups of related lessons are organized into topics. Topics are organized into modules. The following table shows modules by title and gives the total number of lessons per year.

Module	6: Ratios and Rates	7: Ratios and Proportionality	8: Ratios and Linearity	Algebra I: Modeling with Functions
1	Ratios, Rates, and Percents	Ratios and Proportional Relationships	Scientific Notation, Exponents, and Irrational Numbers	Expressions, Equations, and Inequalities in One Variable
2	Operations with Fractions and Multi-Digit Numbers	Operations with Rational Numbers	Rigid Motions and Congruent Figures	Equations and Inequalities in Two Variables
3	Rational Numbers	Expressions, Equations, and Inequalities	Dilations and Similar Figures	Functions and Their Representations
4	Expressions and One-Step Equations	Percent and Applications of Percent	Linear Equations in One and Two Variables	Quadratic Functions
5	Area, Surface Area, and Volume	Probability and Populations	Functions and Bivariate Statistics	Linear and Exponential Functions
6	Statistics, Probability, and Populations	Geometry	Systems of Linear Equations	Modeling with Functions
Total	140 lessons	128 lessons	126 lessons	128 lessons

Instructional Days

Plan to teach one lesson per day of instruction. Each lesson is designed for an instructional period that lasts 45 minutes. Grade levels and courses have fewer lessons than the typical number of instructional days in a school year. This provides some flexibility in the schedule for assessment and responsive teaching, and it allows for unexpected circumstances.

Optional Lessons

Some lessons in each grade level or course are optional. Optional lessons are clearly designated in the instructional sequence, and they are included in the total number of lessons per grade level or course. Assessments do not include new learning from optional lessons.

Lessons may be optional for the following reasons:

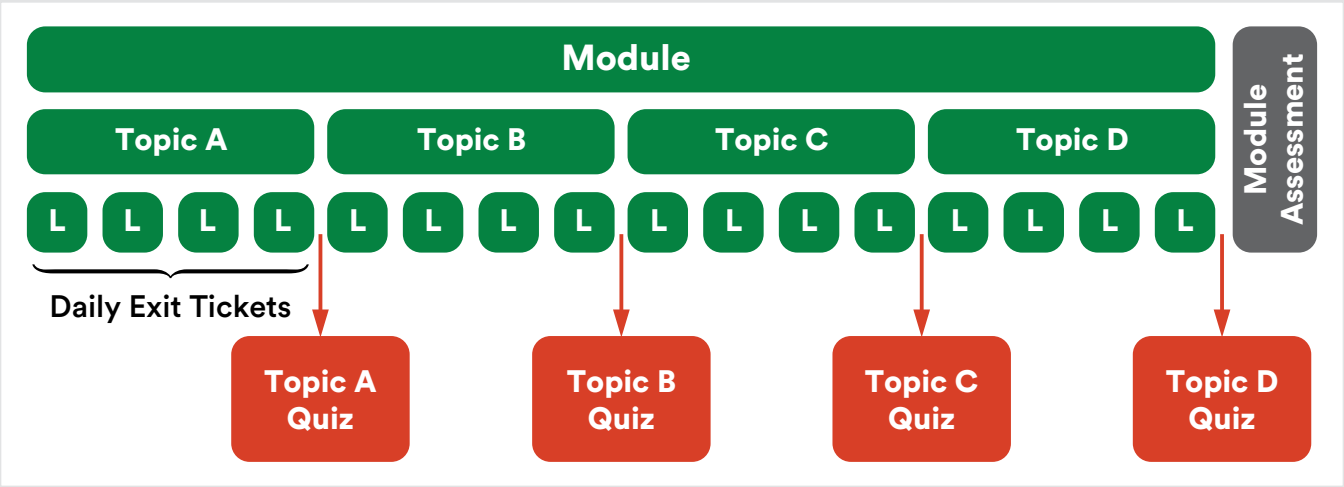
- The lesson is primarily for enrichment.
- The lesson offers more practice with skills, concepts, or applications.
- The lesson bridges gaps between standards.

Assessment Days

In addition to the lessons referenced in the previous table, *Eureka Math²* *New York Next Gen* provides assessments that can be given throughout the year at times you choose. Overall pacing, including assessment delivery, is flexible by design. There are about 30 days overall in the year for assessment and responsive teaching.

The following image shows the various assessments that are included in the *Eureka Math²* *New York Next Gen* core curriculum.[1] As the image suggests, Exit Tickets are designed for use at the end of each lesson. A Topic Quiz is available at the end of each topic. Make intentional choices about when to give Topic Quizzes. You might give them right after teaching the lessons in the topic or wait a day or two as students internalize their recent learning. The Module Assessment is typically given when module instruction is complete. The Module Assessment may be given immediately after finishing the lessons, or several days or even a week after closing the module. Choose when to administer the Module Assessment based on your students' needs and your school's calendar.

[1] See the Assessment section for a complete picture of Core Assessment and Premium Assessment pacing together.



Pacing Your Instruction

The total lesson count at each grade level or course and many of the elements in the lesson structure provide flexibility. As needed, use that flexibility to adjust pacing so that it meets the needs of your students or your school's schedule.

Focus on the major work of the grade.

College- and career-readiness standards are typically organized into the following clusters: major, supporting, and additional. At every grade level or course, the curriculum prioritizes standards in the major cluster by devoting more time to those standards overall and by sequencing modules to teach the major work as close to the start of the school year as possible. Standards in the major cluster appear early and are revisited over the course of the year so that students have ample opportunity to work with them. Whenever possible, the major work of the grade is naturally embedded in lessons, even when the lesson objectives target supporting or additional work.

Use Fluency and Mixed Practice to reinforce skills and concepts as needed.

Fluency and Mixed Practice reinforce skills and concepts through distributed practice. Distributed practice maximizes students' readiness for the grade-level or course-level content in the lessons you teach. The distributed practice embedded in these components will also help you maintain pacing even when your students have unfinished learning. Rather than adding review lessons at the beginning of the school year or reteaching the same lesson to address unfinished learning, allow the distributed practice

to provide natural opportunities to continue teaching. Help students access the current lesson or upcoming lessons by using Fluency activities or problems from Mixed Practice to practice previously taught content.

Use observational assessment data to make decisions.

Use student performance during lessons and on Exit Tickets to make strategic decisions. Look at upcoming content and, based on your observations, choose the pathway that best advances student understanding and allows students to demonstrate what they know. For example, lessons may provide access to a concept by teaching the concept in more than one way, but students may not need to achieve proficiency with every strategy or method taught.

Think flexibly about how and when to use components.

If your class periods are longer than 45 minutes, you may choose to teach the Fluency activities as part of the lesson. If your instructional minutes are limited, use the Fluency suggestions as bell ringer activities that students complete independently as they arrive in class. Read the statement that describes the purpose of the Fluency activity. The purpose statement can help you determine how to best use the Fluency activity with your students.

You can also adjust the Practice that is provided in the *Learn* book. For example, depending on the needs of your students and the length of your class periods, consider allowing class time to complete the problems, or assign the Practice for students to complete later. Consider specifying which problems they should complete.

There may be times when you decide not to administer every available assessment for a module. For example, you may decide not to give the final Topic Quiz if you plan to give the Module Assessment immediately after finishing the module's lessons. You may also find that after administering an assessment you have additional class time. Use this additional time as an opportunity for responsive teaching. The following list offers some suggested resources or activities to use for reteaching, preteaching, extending, or enriching learning.

- Practice problems (e.g., Mixed Practice or unused Remember problems)
- Fluency activities
- Word problems
- Instructional routines, such as Math Chat or Which One Doesn't Belong
- Supporting activities from *Eureka Math^2 Equip™: New York Next Gen* (Premium Assessment)

Expect students to develop proficiency over time.

Students achieve proficiency with the standards over time. Keep moving through lessons even when your students demonstrate only partial proficiency in the moment. Modules and lessons build student knowledge steadily so that students meet grade-level expectations by the end of the school year, and the curriculum's assessments are designed accordingly. Distributed practice of each concept and skill is built into the curriculum to help students achieve and maintain proficiency. Set a goal to have 80% of students demonstrate proficient performance on ongoing assessments. Use small group work or short exercises to support students who need more time or different instruction to understand the concepts.

Lesson Facilitation

Eureka Math^2 *New York Next Gen* lessons are designed to let students drive the learning through sharing their thinking and work. Varied activities and suggested styles of facilitation blend guided discovery with direct instruction. The result allows teachers to systematically develop concepts, skills, models, and discipline-specific language while maximizing student engagement.

Effective Delivery

No matter what style of facilitation lessons suggest, effective delivery prioritizes student engagement; promotes student-to-student discussion; fosters students' ownership of and sense of belonging in the mathematics community; and helps students make connections within mathematics and across disciplines. The following are some of the ways that the curriculum supports these elements of your instruction.

Lessons prioritize **student engagement** by

- maximizing the number of students actively participating at any given time,
- creating space for students to share, discuss, and self-reflect,
- inviting students' curiosity by posing questions or scenarios that spur them to notice and wonder, and
- presenting intriguing artifacts or questions that create a need for new knowledge.

Lessons promote **student-to-student discussion** by

- employing routines that encourage student-to-student dialogue,
- using open-ended questions and scenarios to generate opportunities for authentic class discussion, and
- suggesting when students might use the leveled sentence starters provided in the Talking Tool to participate in discussions.

Lessons foster **student ownership and belonging** by

- including guided discovery so that students generate, test, share, critique, and refine their ideas,
- incorporating the Standards for Mathematical Practice by design so that opportunities to engage with them arise naturally,
- adjusting for age-appropriateness and reading proficiency in student materials to maximize students' independence, and
- providing tools to support students with their processing and verbal expression.

Lessons help **students make connections** by

- building content and language sequentially so that it's easier to relate new learning with prior knowledge,
- incorporating Math Past, a component that contextualizes current learning within the history of mathematics, and
- using artwork to convey broad artistic and mathematical principles.

Sample Dialogue

Lessons include sample dialogue that represents how the teacher and students in a classroom might explore concepts and problems. Sample dialogue gives a sense of how instruction might look and feel. It is not a script and should not be used that way. Instead, use the sample dialogue as if you are observing a class taught by a trusted colleague. For example, the sample dialogue can help you

- identify lines of questioning that advance students toward the objective(s),
- determine when and how to use precise terminology, or
- navigate content that might be new to you or challenging to teach or learn.

Sample dialogue often includes possible student responses or reasoning. However, sometimes the lesson advances without relying on a certain kind of response, or sometimes responses are expected to vary so much that possible student responses are not provided. For example, sample student responses are not usually included with a question that's meant to be used as a simple turn and talk. When they are present, the provided responses serve as examples of the kind of thinking you might expect to hear. As you listen to your own students, consider using the sample responses to help you identify teachable moments.

Classroom Culture

Consider the following ideas to help set norms that support a collaborative culture:

- We value and respect each other's contributions. Everyone has knowledge that is worth listening to and building on.
- We are all expected to explain and discuss our thinking.
- We will solve problems in many different ways.
- We embrace a growth mindset. Making mistakes is part of learning. We will analyze and learn from the mistakes we make.

As the culture of your mathematics classroom becomes established, you may feel the need to shift your instruction. For example, students will begin to share, compare, and critique with confidence. Respond by challenging yourself to maximize student action and conversation over teacher action and speech. Leverage the structures and questions within lessons to increase guided discovery and connection-making so that students generate ideas. Your primary roles then evolve to navigating and developing their emerging mathematical thinking.

Instructional Routines

Eureka Math² New York Next Gen uses instructional routines, or predictable patterns of classroom interaction, to allow students and teachers to focus on mathematical content. Routines intentionally support engagement, discussion, and building content knowledge. Directions for a routine are included in a lesson every time the routine is used. That way, the specific facilitation guidance is immediately available to you as you work through the lesson. Many of the same routines appear across grade levels from kindergarten to Algebra I, using age-appropriate variations.

Fluency

Fluency uses routines that promote engagement, require participation from every student, and develop automaticity with counting and calculating. Students become familiar with fluency routines because the routines are used consistently across modules and grade levels, allowing for efficient teaching and learning. Some of the primary fluency routines are bell ringer, Whiteboard Exchange, choral response, and Sprint.

Launch, Learn, Land

The Launch, Learn, and Land lesson components intentionally include routines that

- promote student engagement in the Standards for Mathematical Practice,
- promote student-to-student dialogue and integrate reading, writing, and listening,
- align to Social Emotional Learning (SEL) core competencies, and
- align to Stanford Language Design Principles.

Although lessons embed many routines, the following routines consistently appear by name within lessons across grade levels. This helps students recognize them and develop ownership over the routines.

Math Chat	Creates open-ended space for sharing mental math strategies and developing number sense, flexibility, efficiency, and accuracy.
Always Sometimes Never	Promotes sense-making and mathematical discussion as students support a claim with examples and nonexamples.
Which One Doesn't Belong?	Promotes metacognition and mathematical discourse as students use precise language to compare different examples.
Co-Construction	Provides structure for contextualizing and decontextualizing problems, which helps students build abstract reasoning.
Critique a Flawed Response	Promotes effective communication techniques for critiquing others' work, correcting errors, and clarifying meaning.
Take a Stand	Supports students in making arguments and critiquing the reasoning of others.
Five Framing Questions	Supports students in analyzing a work sample or solution strategy by guiding them through stages of discovery.
Stronger, Clearer Each Time	Provides a structured, interactive opportunity for students to revise and refine their written language through rehearsal.
Numbered Heads	Helps groups build consensus and holds each student accountable for the material.

Problem Solving Routines

Problem solving routines give students a systematic way to approach a wide range of situations. Many entry points to the routines provide access for students working at different proficiency levels.

Students in grades 6–8 use the Read–Represent–Solve–Summarize (RRSS) process as a way to make sense of problems, choose and apply mathematics, and solve.

Read the problem all the way through. Ask yourself, "What is this problem asking me to find?" Then reread a chunk at a time. As you reread, ask yourself, "What do I know?" Model the situation, possibly with tables, graphs, diagrams, or equations.

Represent the problem with your chosen model. Ask yourself, "What labels do I use on the table, graph, or diagram?" and "How should I define the variables?" As you work, ask yourself, "Are the known and the unknown clear in the model?" Add to or revise your model as necessary.

Solve the problem to determine whether your result answers the question(s). Ask yourself, "Does my answer make sense? Does it answer the question?" If not, revise or create another model. Then ask yourself these questions again using your new result.

Summarize your result and be ready to justify your reasoning.

The RRSS process builds students toward the modeling cycle[1] used in courses beginning with Algebra I.

Identify variables in the situation and select those that represent essential features.

Formulate a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables.

Analyze and perform operations on these relationships to draw conclusions.

Interpret the results of the mathematics in terms of the original situation.

Validate the conclusions by comparing them to the situation, and then either improve the model or, if it is acceptable,

Report on the conclusions and the reasoning behind them.

[1] http://www.corestandards.org/Math/Content/HSM/

Students in grades 1–5 build the foundation for RRSS and the modeling cycle by using the following Read–Draw–Write (RDW) process.

Read the problem all the way through. Then reread a chunk at a time. As you reread, ask yourself, "Can I draw something?" Then ask, "What can I draw?"

Draw to represent the problem as you reread. Add to or revise your drawing as you uncover new information or discover what is unknown. As you draw, label what is known and what is unknown. When you finish rereading and drawing, ask yourself, "What does my drawing show me?" Let your drawing help you find a way to solve.

Write number sentences or equations to represent your thinking. Solve. Then use your solution to write a statement that answers the original question.

Universal Design for Learning

Universal Design for Learning (UDL) is a framework based on current research from cognitive neuroscience that recognizes learner variance as the norm rather than the exception. The guiding principles of the UDL framework are based on the three primary networks of the brain. Although the concept of UDL has roots in special education, UDL is for all students. When instruction is designed to meet the needs of the widest range of learners, all students benefit. *Eureka Math²* lessons are designed with these principles in mind. Lessons throughout the curriculum provide additional suggestions for Engagement, Representation, and Action & Expression. Learn more about UDL in *Eureka Math²* here.

Multilingual Learner Support

Multilingual learners, or learners who speak a language other than English at home, require specific learning supports for gaining proficiency with the English needed to access the mathematics. Research suggests that best practices for these learners include opportunities and supports for student discourse and for using precise terminology. In addition to precise domain-specific terminology, high-impact academic terminology that supports learners across learning domains is explicitly introduced and used repeatedly in various contexts to build familiarity and fluency across the grade levels. *Eureka Math²* is designed to promote student discourse through classroom discussions, partner or group talk, and rich questions in every lesson. Learn more about supporting multilingual learners in *Eureka Math²* here.

Readability

A student's relationship with reading should not affect their relationship with math. All students should see themselves as mathematicians and have opportunities to independently engage with math text. Readability and accessibility tools empower students to embrace the mathematics in every problem. Lessons are designed to remove reading barriers for students while maintaining content rigor. Some ways that *Eureka Math²* clears these barriers are by including wordless context videos, providing picture support for specific words, and limiting the use of new, non-content-related vocabulary, multisyllabic words, and unfamiliar phonetic patterns. Learn more about how *Eureka Math²* supports readability here.

Assessment

The assessment system in grade 6 through Algebra I helps you understand student learning by generating data from many perspectives. The system is composed of the following Core Assessment and Premium Assessment components:

- Lesson-embedded Exit Tickets
- Topic Quizzes
- Module Assessments
- Pre-Module Assessments in *Eureka Math²* *Equip*
- Benchmark Assessments

All *Eureka Math²* *New York Next Gen* assessments are considered formative because they are intended to inform instruction. The assessments may also be considered summative when you choose to use the data to produce a grade or report that becomes part of a student, school, or district record.

On its own, a single assessment does not show a complete picture of student progress. For example, a short assessment might use a single question to assess student understanding of part of a standard, thus producing a limited perspective. Use student performance on a combination of assessments and data to get a definitive picture of or to produce a grade for the subject or course.

Core Assessment Components

Exit Tickets

Exit Tickets are short, paper-based assessments that close lessons. These assessments use at least one problem, question, or writing prompt 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 objectives.

In a typical classroom, most students with basic understanding can finish within 3–5 minutes. In some settings, honoring the timeframe is more important than requiring students to finish. For example, a student's inability to finish within 5 minutes may be valuable information. In other settings, you may extend the time to allow all students to finish as appropriate.

Exit Tickets are not graded. They are paper based so that you can quickly review and sort them. Occasionally, an alternative assessment activity may substitute for an Exit Ticket at the end of a lesson.

Topic Quizzes

Typical Topic Quizzes consist of 4–6 items that assess proficiency with the major concepts from the topic. Topic Quizzes

- take 25–30 minutes to complete in a typical setting,
- include Depth of Knowledge (DOK) 1 and 2 items,
- are intended for digital administration, with a paper-based option, and
- are 100% machine scorable when given digitally.

You may find it useful to grade Topic Quizzes. There are three analogous versions of each Topic Quiz available digitally. Analogous versions target the same material at the same level of cognitive complexity. However, typical items on analogous versions are not clones of the original version. Use the analogous versions to give retakes, with reteaching or additional practice between takes, until students score proficient or above.

Module Assessments

Typical Module Assessments consist of 6–10 items that assess proficiency with 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. These assessments use a variety of question types, such as constructed response, multiple select, multiple choice, single answer, and multi-part. Module Assessments

- take up to one class period to complete in a typical setting,
- include DOK 1, 2, and 3 items,
- are intended for digital administration, with a paper-based option, and
- are 50–70% machine scorable when given digitally.

You may find it useful to grade Module Assessments. There are two analogous versions of each Module Assessment available digitally. Analogous versions target the same material at the same level of cognitive complexity. However, typical items on analogous versions are not clones of the original version. Use the analogous versions to give retakes, with reteaching or additional practice between takes, until students score proficient or above.

Reference Sheets

Beginning in grade 5, the curriculum provides a reference sheet that students may use when they take assessments. Reference sheets give information according to the following guidelines:

- When students are expected to apply a formula but are not explicitly expected to know the formula, the reference sheet includes that formula.
- When students are expected to know and apply a formula, the reference sheet does not include the formula.

Reference sheets look similar to those provided with state summative assessments. Periodic experience with reference sheets builds students' confidence with how to use them.

Calculators

Beginning in grade 6, calculators are built into digital assessment items when computation is not the target. Students may use calculators on these same items if you give the assessment in a paper and pencil format.

Premium Assessment Components

Pre-Module Assessments

Eureka Math² Equip empowers teachers to identify and support students' unfinished learning. There are three components of *Eureka Math² Equip*.

- Pre-Module Assessments focus on assessing foundational knowledge essential to the content of upcoming lessons.
- Associated reports make it easy to identify student-specific needs and to create flexible student groups.
- Supporting activities build foundational knowledge when data show that students need it. These activities are short bursts of just-in-time instruction.

All three components work together to reduce obstacles that may prevent students from accessing content so they can engage with the mathematics at their grade level.

Each *Eureka Math² Equip* Pre-Module Assessment targets foundational knowledge for the upcoming modules. Foundational knowledge refers to concepts and skills that come from previous grade levels or, occasionally, from earlier modules within the grade level. These assessments do not

comprehensively assess all related knowledge from previous grade levels. They do assess students' understanding of foundational knowledge that is essential for accessing the material in the upcoming module(s).

Every grade level or course has four Pre-Module Assessments. Modules 1 and 6 each have their own assessment. There is one assessment for modules 2 and 3 and one assessment for modules 4 and 5. Consolidating two modules into a single assessment gives teachers time to implement supporting activities before the foundational knowledge they address is required. Consolidating also paces *Eureka Math² Equip* assessments so that they work well with the recommended schedule for Benchmark Assessment administration. Pre-Module Assessments can be given digitally or as a paper-based assessment.

Pre-Module Assessments are not graded.

Benchmark Assessments

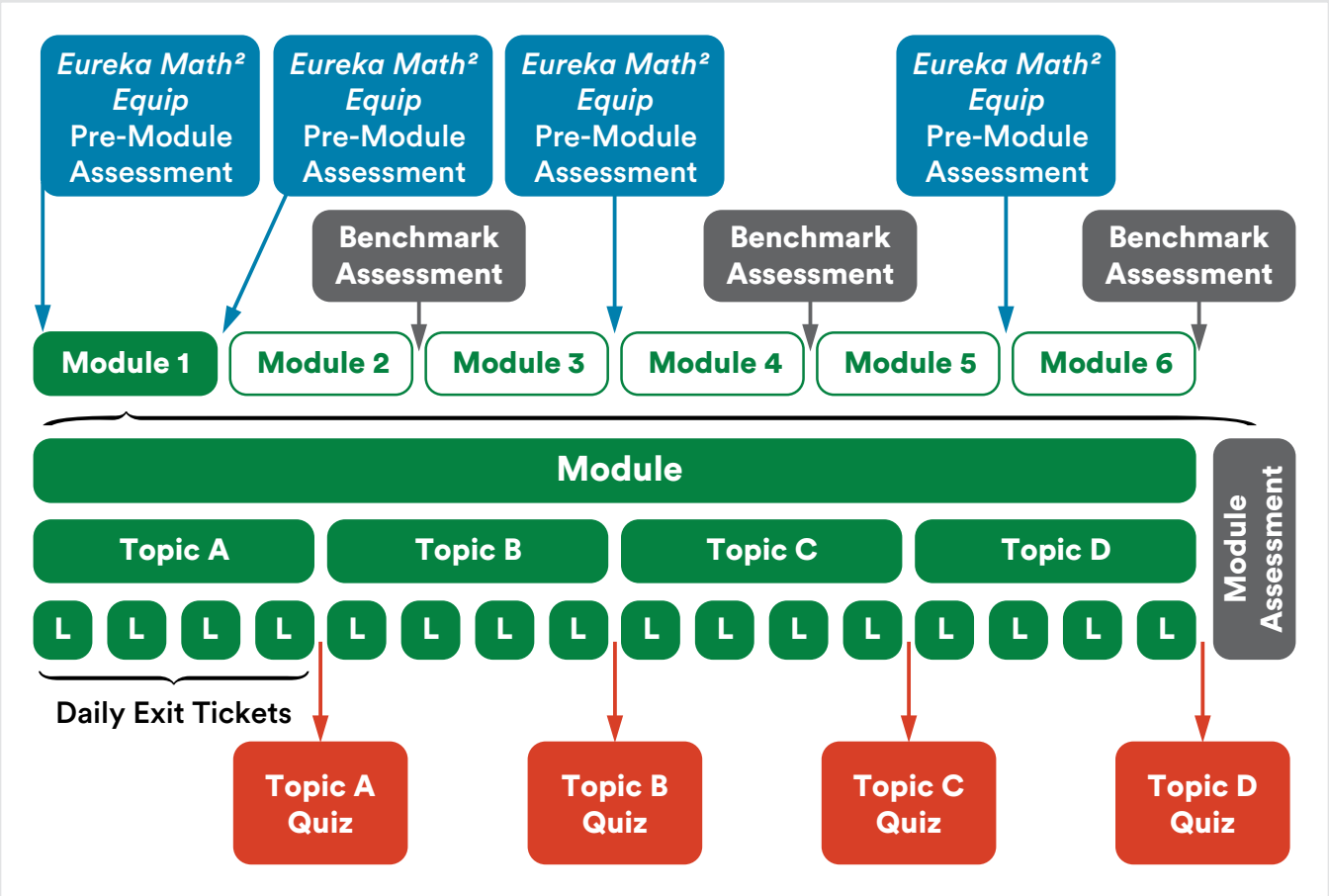
Benchmark Assessments provide a summative measure of the most important content taught in the grade level or course up to the point of administration. There are three Benchmark Assessments throughout the year, administered after modules 2, 4, and 6.

- Benchmark 1 assesses the key learnings from both modules 1 and 2.
- Benchmark 2 focuses on the key learnings from modules 3 and 4, but also reassesses a subset of key learnings from modules 1 and 2 (which are first assessed in Benchmark 1).
- Benchmark 3 primarily assesses key learnings from modules 5 and 6 and a subset of key learnings from modules 1–4.

In grade 6 through Algebra I, Benchmark Assessments consist of two sessions and can be given over more than one day. Session 1 is a noncalculator session, and session 2 is a calculator friendly session, mirroring the format of many state-level summative assessments. Each session typically consists of about 15 items. Benchmark Assessments are digitally administered and machine scored.

You may find it useful to grade Benchmark Assessments and use the data to report on student progress toward year-end expectations.

Eureka Math² Core Assessment and Premium Assessment combine to offer the most complete picture of student learning across the school year. The following image shows how the two elements work together.



Achievement Descriptors

Achievement Descriptors, or ADs, are standards-aligned descriptions of what students should know and be able to do after having completed the lessons in a given module. ADs combine content from different standards to concisely communicate the work of the module. The ADs describe proficiency for the module, and every module has a unique set of ADs.

Proficiency Indicators

Each AD has its own set of proficiency indicators. Proficiency indicators are more detailed than ADs and help you analyze and evaluate what you see or hear in the classroom, as well as what you see in students' written work. Each AD has up to three indicators that align with a category of proficiency: Partially Proficient, Proficient, or Highly Proficient.

Assessment items target specific categories of proficiency according to the following guidelines:

- Items that target a Partially Proficient indicator assess the AD at a lower level of cognitive complexity than what proficiency for the grade or course requires.
- Items that target a Proficient indicator assess the AD at the full grade-level or course-level expectation.
- Items that target a Highly Proficient indicator assess the AD beyond what is explicitly called for in the standards. However, these items do not exceed the limitations of the grade or course.

Proficiency Levels

On each assessment, student performance aligns with one of five categories and letter grades: Not Yet Proficient (F), Partially Proficient (D), Inconsistently Proficient (C), Proficient (B), or Highly Proficient (A). A description for each category follows.

Not Yet Proficient

Performance shows that either the student is not progressing toward proficiency with grade-level or course-level expectations or there is insufficient evidence to determine the level of proficiency. At the module level, the student demonstrates

- little to no use of advanced strategies and limited use of lower-level strategies,
- little to no awareness of appropriate and familiar applications,
- little to no ability to construct viable arguments that support the student's reasoning, and
- little to no recognition and selection of any appropriate method.

Performance indicates that the student likely needs support to fully meet expectations.

Partially Proficient

Performance shows some progress toward proficiency with grade-level or course-level expectations. At the module level, the student demonstrates partial proficiency through

- the limited use of advanced strategies or the occasional use of lower-level strategies,
- an adequate awareness of appropriate and familiar applications,
- an ability to construct partially viable arguments (or a limited ability to construct viable arguments) that minimally support the student's reasoning, and
- a limited recognition and selection of efficient methods, or an occasional recognition and selection of less efficient methods.

Performance indicates that the student may need support to fully meet expectations.

Inconsistently Proficient

Performance shows inconsistent progress toward proficiency with grade-level or course-level expectations. At the module level, the student demonstrates many of the qualities described in Proficient but exhibits these qualities inconsistently.

Performance indicates that the student may need additional practice to achieve consistency and to fully meet expectations.

Proficient

Performance shows progress toward proficiency with grade-level or course-level expectations. At the module level, the student demonstrates proficiency through

- the occasional use of advanced strategies or the regular use of lower-level strategies,
- an awareness of a variety of new applications,
- an ability to construct viable arguments that adequately support the student's reasoning,
- an ability to moderately critique the reasoning of others, and
- an occasional recognition and selection of the most efficient methods or a consistent recognition and selection of less efficient methods.

Highly Proficient

Performance shows advanced progress toward proficiency with the content of the grade-level or course-level expectations. At the module level, the student demonstrates high proficiency through

- the regular use of advanced strategies,
- an awareness of—and ability to work within—a broad variety of new applications,
- an ability to clearly and concisely construct viable arguments that fully support the student's reasoning and to thoroughly critique the reasoning of others, and
- a consistent recognition and selection of the most efficient methods.

Proficiency over Time

Because some standards are not completely covered over the course of a single module, Achievement Descriptors in several different modules may align with the same standard. Do not expect students to achieve full proficiency with the standard until you teach all of the modules that include related ADs.

Also, at some grade levels, students are expected to be fluent by the end of the year, although they may achieve fluency at different points during the year.

Scoring

Scoring Guides

You may find it useful to score Topic Quizzes and Module Assessments. When these assessments are administered digitally, most items are machine scorable. If you give the assessments in a paper and pencil format, score them by hand.

Every assessment has a scoring guide that shows the alignment between each item and an Achievement Descriptor and a proficiency indicator. The scoring guide tells how many points are possible for each item or part of an item. It also tells whether the scoring for an item is dichotomous (i.e., all or nothing) or polytomous (i.e., each embedded correct response earns partial credit). This is the scoring guide for a grade 7 Topic Quiz.

Item Number	Achievement Descriptor	Proficiency Indicator	Raw Points	×	Scale Factor	=	Possible Points	Scoring Type	Notes
1.A	7.Mod1.AD4	P	1	×	2	=	2	Polytomous	Each correct response is worth $\frac{2}{3}$ points.
1.B	7.Mod1.AD4	P	1	×	2	=	2	Dichotomous	All correct responses must be identified to earn 2 points.
1.C	7.Mod1.AD4	P	1	×	2	=	2	Dichotomous	The correct response is worth 2 points.
2	7.Mod1.AD3	P	1	×	2	=	2	Polytomous	Each correct response is worth $\frac{1}{2}$ point.
3	7.Mod1.AD6	P	1	×	2	=	2	Dichotomous	The correct response is worth 2 points.
4.A	7.Mod1.AD3	HP	1	×	1	=	1	Dichotomous	The correct response is worth 1 point.
4.B	7.Mod1.AD5	P	1	×	2	=	2	Polytomous	Each correct response is worth $\frac{1}{2}$ point.

The scoring guide uses a scale factor to weight items differently. Items that target high proficiency carry less weight because it is likely that the least number of students will answer them correctly. Items that target partial proficiency carry more weight because it is likely that the greatest number of students will answer them correctly.

Target Proficiency Indicator	Scale Factor
Highly Proficient	1
Proficient	2
Partially Proficient	3

The following example shows sample students' scores on the grade 7 Topic Quiz referred to earlier. The quiz has a maximum scaled score of 13 points.

Item Number	Student 1	Student 2	Student 3	Student 4	Student 5
1.A	0.67	0.67	2	2	1.33
1.B	0	2	2	2	2
1.C	2	0	0	2	2
2	0	1.5	1.5	1.5	2
3	0	0	2	2	2
4.A	0	0	0	0	1
4.B	0	1.5	2	1	2
Overall	2.67	5.67	9.5	10.5	12.33
Total Possible	13	13	13	13	13

Scoring Notes

On Module Assessments, some items must be hand scored, whether they are given digitally or in a paper and pencil format. Scoring notes for these items are in the Module Assessment's answer key. These scoring notes include a sample student response and tell how many points are possible for the item or for its parts. Scoring notes detail how students earn points, and the notes classify the points in terms of reasoning or computation. The following are the scoring notes from a grade 8 module assessment.

Scoring Notes for Item 11

Points	Description
2	Student response includes the following components: • Reasoning: 1 point The student provides an accurate rationale for why their chosen unit of measurement is more appropriate. • Computation: 1 point The student accurately converts the length of the frog to their chosen unit of measurement. Sample: Inches is a more appropriate unit of measurement. Yards is not an appropriate unit of measurement because 8.75×10^{-3} is a very small number. Using inches makes the length of the frog easier to understand and interpret. The length of the frog is about 0.315 inches, which is about $\frac{3}{10}$ inches.
1	Student response includes 1 of the 2 components.
0	Student response is missing or entirely incorrect.

Scoring Multi-Part Items

- On a hand-scored multi-part item, students earn credit for a correct response to part of the item that is based on an incorrect response to an earlier part of the same item. For example, if part B of an item is answered correctly by using the incorrect response to part A, the response for part B is marked correct.
- On machine-scored multi-part items, correct responses are predefined and cannot be modified. As a result, an incorrect response to one part may result in an incorrect response on another part, and neither response earns points. For example, if a student answers part B of an item correctly by using an incorrect response to part A, the student earns no points on those parts.

Grading

Adjusting raw percentage scores allows for a student's proficiency level to determine their grade, rather than a student's grade determining their proficiency level. In a system in which a grade determines proficiency level, a raw percentage computation might convert a score of 5 points out of 10 into 50%. That 50% would result in a failing grade even though the student may be partially proficient. Raw percentage computations can also allow one very poor performance, such as 20% on one quiz, to result in a failing grade for the marking period. That grade for the marking period may not accurately communicate the student's proficiency. Using adjusted scoring makes it possible for students to recover from a single poor performance and builds scores to show partial proficiency more clearly.

Determine a student's proficiency level and give a letter grade by converting the student's raw percent into an adjusted score. Use the following process to compute an adjusted score:

- Divide a student's total earned points by the total possible points.
- Enter that result into the adjusted score converter on the digital platform.
- Use the value from the adjusted score converter to determine a grade.

Raw Percent Range		Adjusted Score Range		Proficiency Level	Letter Grade
0	35	0	59	Not Yet Proficient (NYP)	F
36	69	60	69	Partially Proficient (PP)	D
70	79	70	79	Inconsistently Proficient (IP)	C
80	92	80	92	Proficient (P)	B
93	100	93	100	Highly Proficient (HP)	A

This is one option for converting a raw percent into an adjusted score and letter grade. This approach is built from raw percent ranges, adjusted score ranges, and a piecewise-defined function. As needed, customize the ranges to meet the needs of your school or district.

The following example shows how the raw percent, adjusted score, letter grade, and proficiency level correlate based on the sample scores from the grade 7 Topic Quiz referred to earlier.

Item Number	Student 1	Student 2	Student 3	Student 4	Student 5
1.A	0.67	0.67	2	2	1.33
1.B	0	2	2	2	2
1.C	2	0	0	2	2
2	0	1.5	1.5	1.5	2
3	0	0	2	2	2
4.A	0	0	0	0	1
4.B	0	1.5	2	1	2
Overall	2.67	5.67	9.5	10.5	12.33
Total Possible	13	13	13	13	13
Raw Percent	21%	44%	73%	81%	95%
Adjusted Score	52%	62%	73%	81%	95%
Proficiency Level	NYP	PP	IP	P	HP
Letter Grade	F	D	C	B	A

Plan to Teach

Study a Module

Begin your planning process by familiarizing yourself with the module's story. Use the following guide to help you review the module as a whole.

Preview the Learning

Module Resource	Guiding Questions
Read the Overview to preview the learning.	• What big ideas does the module teach? • How do the topic titles relate to the module title? What does that tell me about how the concepts are organized? • Which strategies, models, and language will my students use?
Read the Before This Module and After This Module sections in the Overview to understand the coherence between modules.	• What concepts, skills, and language can I expect my students to bring to the new learning? • How does the work of this module support learning in future modules?

Investigate the Development of Learning

Module Resource	Guiding Questions
Review the Contents to see the module's structure.	• How do the lesson objectives relate to the topic titles? What does that tell me about the development of learning across the module? • How many lessons are in the module and in each topic? • How does my school's calendar work with the number of instructional days?
Read the Why section for insight into the module's instructional design and pedagogical choices.	• What does the Why section tell me about the module's design? • In what ways does this information change the way I'm thinking about the content, sequence, models, strategies, and language in this module?

Module Resource	Guiding Questions
Read the Achievement Descriptors: Overview section to get a quick sense of the major learning in the module.	• What are the Achievement Descriptors for this module? • How do the Achievement Descriptors relate to the content standards?
Preview the additional module resources: • Standards • Terminology • Math Past • Materials • Fluency • Mixed Practice	• What standards are addressed in this module? If post-test standards are included, how do they support the learning of this module? • What familiar terminology will I reinforce as I teach the module? What new terminology will I introduce as I teach the module? • How does the Math Past provide human and/or historical context for the learning of this module? • What materials do I need to gather for the lessons in this module? What do I need to prepare in advance? • What Fluency activities are provided for this module? How might I use them to reinforce and strengthen concepts and skills? • What Mixed Practice is provided for this module? How might I use it to maximize student readiness for the work of this module?

Explore the Assessment

Module Resource	Guiding Questions
Read the Achievement Descriptors: Proficiency Indicators section to understand what proficiency looks like in this module.	• What does proficiency with the content of this module look like? • How will I use this information to evaluate student performance?
Complete the Module Assessment to understand how students will be assessed on their learning.	• How does the Module Assessment assess the learning in this module? • How do the models, strategies, and language of the module appear in this assessment? • What variety of strategies might students employ? • How do the assessment items add to my understanding of the mathematics this module develops?
Review the Module Assessment Sample Solutions.	• Do any of the sample solutions surprise me? • What insight can I gain from the rationale provided for multiple choice distractors?
Review the Module Assessment Scoring Guide.	• Which items assess proficiency? Partial proficiency?

Study a Topic

Within a module, small groups of related lessons are organized into topics. Plan by topic. Use the following guide to help you review the whole topic.

Preview the Learning

Topic Resource	Guiding Questions
Read the Topic Overview to understand the scope of the topic.	• What big ideas does the topic teach? • What strategies, models, and language will students use? • Are there any optional lessons? How do these lessons relate to the major learning of the topic or module? • What information is new to me? • In what ways does this information change the way I'm thinking about the content, sequence, models, strategies, and language in this topic?
Read the Topic Opener found in the student *Learn* book.	• How does this drawing foreshadow learning for students?

Investigate the Development of Learning

Topic Resource	Guiding Questions
Review the Progression of Lessons to get a sense of how the learning develops.	• What will students learn in each lesson? • How do the lessons relate to one another? • How do strategies and models evolve through the topic?
Complete the Exit Ticket for each lesson of the topic.	• How does each Exit Ticket assess the learning in its lesson? • How does the sequence of Exit Tickets align with the sequence of the topic?

Explore the Assessment

Topic Resource	Guiding Questions
Complete the Topic Quiz to understand how students will be assessed on their learning.	• How does the Topic Quiz assess the learning in this topic? • How do the models, strategies, and language of the module appear in this assessment? • How does the content on the Exit Tickets relate to content on the Topic Quiz? • What variety of strategies might students employ? • How do the assessment items add to my understanding of the mathematics this topic develops?
Review the Topic Quiz Sample Solutions.	• Do any of the sample solutions surprise me? • What insight can I gain from the rationale provided for multiple choice distractors?
Review the Topic Quiz Scoring Guide.	• Which items assess proficiency? Partial proficiency?

Study a Lesson

Read the lesson, considering the flow of the lesson components and the student experience. Do the math to gain insight into the complexities within a sequence of problems and consider the thought processes and tools that students will have available.

Preview the Learning

Lesson Resource	Guiding Questions
Read the Lesson Overview: • Lesson Objective • Lesson at a Glance • Key Question(s) • Achievement Descriptor(s) • Exit Ticket	• What will students do during the lesson? • What big ideas, understandings, or skills will students have by the end of the lesson? • How is this reflected in the Exit Ticket?

Investigate the Development of Learning

Lesson Resource	Guiding Questions
Read the lesson: Fluency.	• What is the purpose of the Fluency? • Does the Fluency offer distributed practice, or does it build toward the current lesson through language, models, and strategies? • Given my students' strengths and areas of need, what modifications might I make to support different populations? • Will I use the activity as a bell ringer, or will I facilitate the activity by using a routine suggested in the Fluency resource?
Read the lesson: Launch.	• What is the purpose of the Launch? • How will I capitalize on the Launch to activate student thinking, pique student interest, and establish a purpose for today's learning?
Read the lesson: Learn.	• How do the Learn segments build? • What instructional routines or facilitation suggestions support student engagement? • Where are opportunities for students to share their thinking and for me to facilitate various forms of discussion? Where is dedicated time and space for making connections? • Which parts of the lesson might my students find difficult? How will I support students during these parts? • How will I challenge students who demonstrate proficiency? • Where do I anticipate intentionally engaging students in the Standards for Mathematical Practice? • Which questions, phrasing, or terminology will I use from the sample dialogue to support coherence or precision? • Which ideas from the notes in the margin do I expect to use? • Which facilitation suggestions will I customize to meet the needs of my students?

Lesson Resource	Guiding Questions
Read the lesson: Land.	• What takeaways do I plan to make clear during the Debrief? • What terminology do I expect students to use? How will I support them in using it? • How will I support a range of reading abilities in my class? • What misconceptions do I anticipate, and how will I guide students if those misconceptions arise? • How might I assess student learning during the Debrief?
Do the math: Fluency, Classwork, Exit Ticket, Practice.	• What are the ways I anticipate my students might complete the tasks and answer the questions? • What questions assess student thinking? What questions advance student thinking? • Which problems will I ask students to complete? • How much time do I want students to spend practicing outside of class? • Which problems will I assign to provide more practice with the day's lesson? • Which problems will I assign to maintain prior learning? • Does the Lesson Recap provide sufficient support for the task I plan to assign? What other support might be necessary?
Explore: Slides	• What content is included on the slides? • Do the slides have interactive components? If so, how do they function? How will I plan on using them? • Are there any slides I should plan on pushing to student devices? • Do I plan to use all of these slides? Are there any slides I should hide?
Explore: Digital Components	• Is this lesson a digital lesson? If so, preview the slides as a student. • What questions might my students have about the interactives? • What type of sample student work should I look for to share with the class using a discussion slide?

Prepare for Instruction

Successful implementation requires you to stay keenly aware of your students as you honor the strategic guidance offered in the lessons as they are crafted. Difficulty with pacing at the lesson level tends to come about when teachers feel pressured to ask every question and engage with every problem presented in every lesson. Using the curriculum with fidelity means honoring the integrity of its structure and the intent of the guidance within lessons. The following recommendations will help you make strategic decisions as you prepare to teach with your students in mind.

Task	Guiding Questions
Anticipate, prioritize, and customize.	• Considering the suggestions provided in the margin boxes, the language of the lesson, and the needs of my students, how will I customize the lesson? • Considering both my allotted instructional time and the needs of my students, do I need to customize the lesson? • How much time will students spend on the Practice problems? Will students work independently or in pairs?
Prepare the environment.	• What tools or materials will I need for facilitating this lesson? Do I need to prepare sentence frames or an anchor chart in advance? • What tools or materials might my students need? How can I organize them to best facilitate engagement and learning? How will I encourage my students to appropriately select their own tools? • Do I need to make any adjustments to my room arrangement for this lesson either to capitalize on space in the room or to maximize student collaboration?