# Program Overview

West Virginia Reveal

MATH®

McGraw Hill

Welcome to *West Virginia Reveal Math* 6–8!

Reveal *curiosity* with mathematical exploration and discovery that deepens conceptual understanding.

Reveal *understanding* with insightful instructional resources to more effectively differentiate and promote a positive student mindset.

Reveal *possibilities* with purposeful technology that creates an active classroom experience.
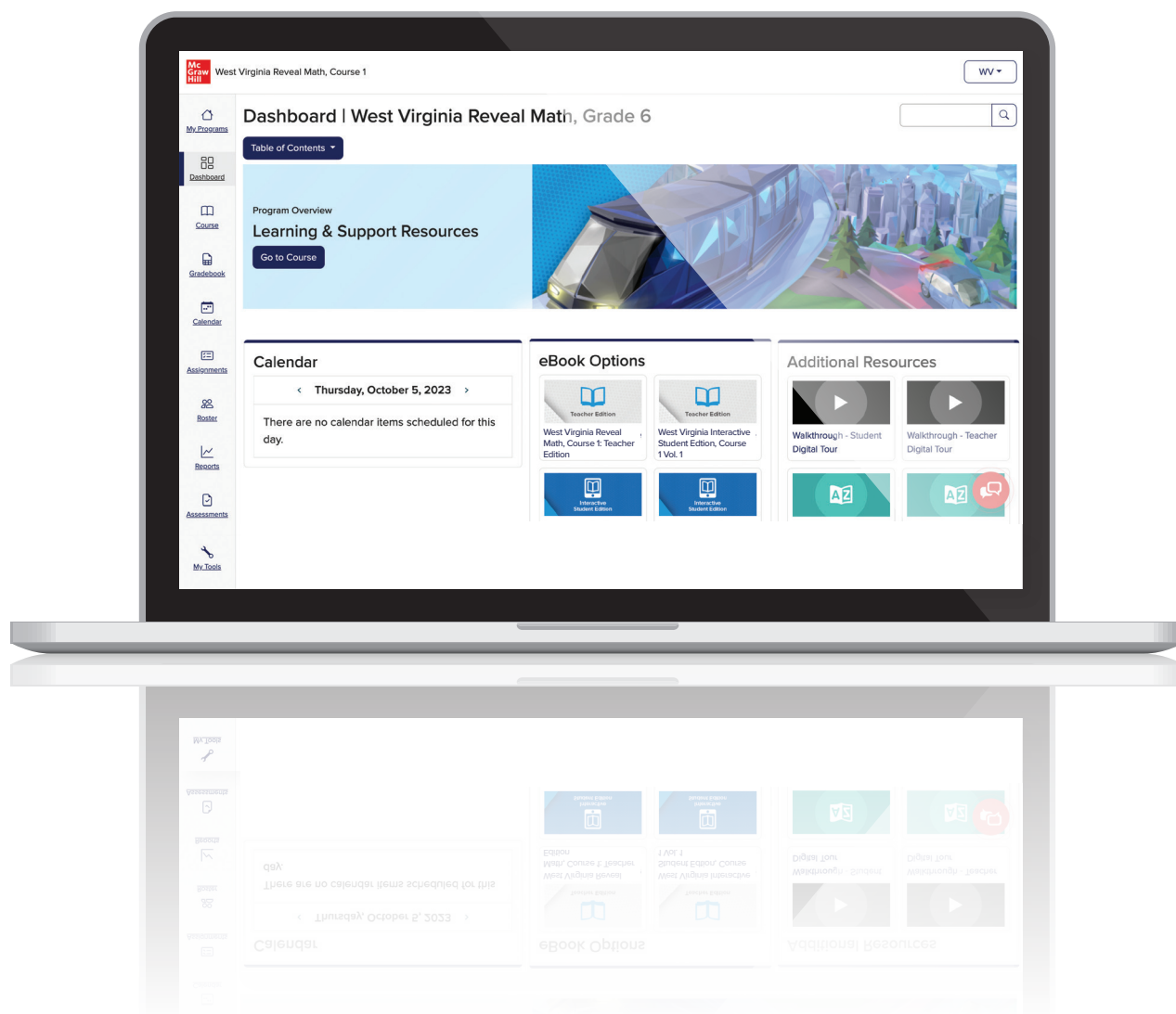
Reveal the Full Potential in Every Student

West Virginia Reveal Math helps students develop the positive mindset, confidence, and skills to become problem solvers and mathematical thinkers. The program works by incorporating both inquiry-focused and teacher-guided instructional strategies within each lesson. Informed by the latest research on how they learn best, *West Virginia Reveal Math* ensures students don't just meet the standards—they master them!
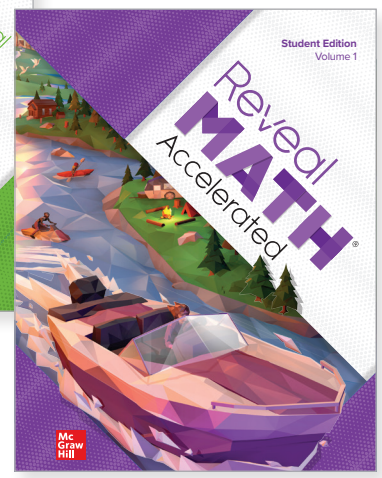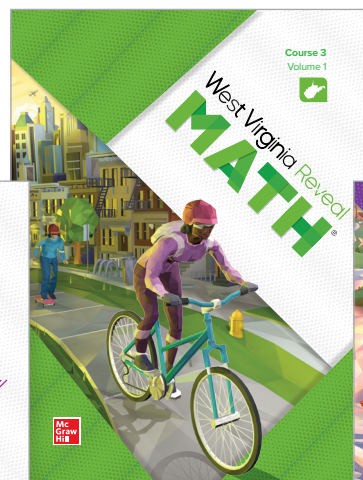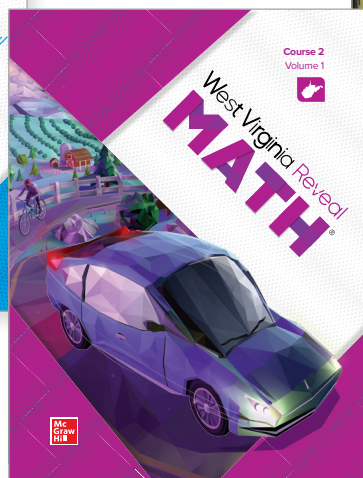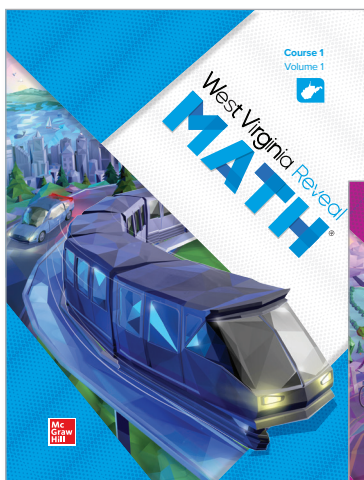
Our Powerful Program:

Champions a positive classroom centered on curiosity, connection, and a mathematical mindset.

Offers a flexible lesson design that provides access to rigorous instruction with robust teacher supports and scaffolds.

Tailors instruction for each student through data-driven insights and purposeful, personalized differentiation.

Built on Standards

Standards Focus

West Virginia Reveal Math breaks down the standards into a coherent scope and sequence that emphasizes each grade level's major content areas to develop a strong foundation as students progress towards algebra.

Standards

Content

👉 **M.7.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units (e.g., if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour).

👉 **M.7.2** Recognize and represent proportional relationships between quantities.

👉 **M.7.2a**

Mathematical Habits of Mind
MHM2 Reason abstractly and quantitatively.

Each Lesson includes the West Virginia CCR Standards for Mathematics and Mathematical Habits of Mind.

Teachers can access reports on class performance by West Virginia math standard, including a cumulative score by class and student, as well as the number of questions answered.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1-2	2	3-1	Compute Unit Rates—Complex Fractions	M.7.1
3	3	3-1	Compute Unit Rates—Complex Fractions	M.7.1
4	3	3-2	Proportional Relationships—Tables	M.7.2a
5	2	3-2	Proportional Relationships—Tables	M.7.2a
6-7	1	3-3	Proportional Relationships—Graphs	M.7.2a
8	2	3-2	Constant of Proportionality—Tables	M.7.2b
9	2	3-3	Constant of Proportionality—Graphs	M.7.2b
10	1	3-5	Constant of Proportionality—Descriptions	M.7.2b
11-12	2	3-2	Constant of Proportionality—Tables	M.7.2b
13-14	2	3-5	Proportional Relationships as Equations	M.7.2c
15	3	3-5	Proportional Relationships as Equations	M.7.2c
16	3	3-4	Interpret Proportional Relationships	M.7.2d
17	2	3-6	Solve Multi-Step Ratio Problems	M.7.3
18	2	3-4	Interpret Proportional Relationships	M.7.2d
19-20	2	3-6	Solve Multi-Step Ratio Problems	M.7.3

Standards are included in Item Analysis and the standards report to help track student's understanding as they progress towards the end of each grade level.

Coherent Across Grade Levels

The scope and sequence of *West Virginia Reveal Math* is built on the logical learning progression of mathematical content, connecting concepts across all grades and within each grade.

Coherence

What Students Have Learned

Students

- understood ratios as a comparison of quantities. They applied ratio reasoning to solve problems. (Grade 6)
- understood rates as a kind of ratio that compares quantities that may have different units. (Grade 6)
- understood percents as a kind of ratio with a whole always equal to 100. (Grade 6)

What Students Are Learning

Students

- represent proportional relationships using tables, graphs, and equations.
- determine the constant of proportionality.
- use proportional reasoning to solve single- and multi-step problems.
- recognize graphs of proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope.
- distinguish proportional relationships from other relationships.

What Students Will Learn Next

Students

- use their understanding of ratios, percents, and proportionality to solve a wide variety of percent problems. (Unit 4)
- solve problems about scale drawings. (Unit 6)
- explore concepts of linearity and slope. (Grade 8)

Unit- and lesson-level Coherence guidance helps teachers understand what prior knowledge students need to be able to access the unit content and the math to which the current unit is building a foundation.

Readiness Diagnostic assesses pre-requisite skills and provides connected intervention resources to ensure students have a strong foundation in previously learned topics relevant to the unit content.

Rigorous Instruction

West Virginia College- and Career- Readiness (CCR) Standards for Mathematics

The learning objective for each lesson is influenced by the element or elements of rigor that each standard targets—conceptual understanding, procedural skill and fluency, or application.

Rigor		
Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students recognize and represent proportional relationships between quantities.	• Students use proportional reasoning to determine the unknown term.	• Students compute unit rates related to a real-world problem.

Conceptual Understanding

West Virginia Reveal Math places a large emphasis on sense-making as the foundation for conceptual understanding. Sense-making routines at the beginning of each lesson help build a classroom environment that supports thinking, reasoning, and communicating about math to uncover the "why" behind the math.

? Sense-Making Routines

Notice & Wonder: What do you notice? What do you wonder?

(Lessons 3-1, 3-5) In Lesson 3-1, students explore images that show proportional and non-proportional relationships. In Lesson 3-5, students explore the structure of our solar system.

Notice & Wonder: How are they the same? How are they different?

(Lesson 3-2, 3-4) In Lesson 3-2, students notice similarities and differences between two fun activities. In Lesson 3-4, they compare and contrast orientations of a mobile device.

Which doesn't belong?

(Lessons 3-3) Students explore four different graphs to determine what common attribute three of them have that a fourth does not.

Numberless Word Problem

(Lesson 3-6) Students explore the mathematics in a series of cells of a video.

Procedural Skill and Fluency

Students engage in mathematical discourse and productive struggle as they develop the math for each lesson. This engagement allows students to connect the "why" to the "how" of mathematics. Students are given purposeful practice problems and multiple opportunities to practice throughout the year to help meet each grade level's fluency expectations.

Daily Practice Opportunities:

- Lesson Session Practice
- Additional Practice
- Digital Game Center
- Spiral Review

Unit Practice Opportunities:

- Unit Review
- Performance Task
- Mathematical Modeling Task
- Fluency Practice

Application

Real-world problems are provided throughout each lesson with rich, application-based question types, such as "Error Analysis" or "STEM Connection," which are embedded in daily practice.

Additional application opportunities are provided through the Performance Task and Mathematical Modeling Projects found in each unit.

For exercise 11, answer the question.

11. **Error Analysis** The unit rate for a car's speed is 65 miles per hour. A student determines that after $3\frac{1}{2}$ hours the car will have traveled $162\frac{1}{2}$ miles by finding the difference between $3\frac{1}{2}$ hours and 1 hour and then multiplying by 65. What would your response be to the student?

For exercises 10 and 11, answer the questions.

10. **STEM Connection** An object's potential energy, or energy to potentially move itself downward, is proportional to the height of the object in relationship to the ground. When the person shown is standing with their arms extended down, one barbell has a potential energy of 176.4 joules. Explain how to write an equation to represent the potential energy of the barbell while the person is standing.

Performance Task

For each Part A through C, answer the question and include justifications.
DeShawn works at a company that creates reusable packaging.

Part A
DeShawn sent a survey to 560 companies asking if they would be interested in reusable packaging for their products. 255 companies expressed interest. What percent of the companies surveyed expressed interest in reusable packaging? What factor(s) might prevent a company from using the reusable packaging?

Part B
DeShawn sent surveys to the residents of two different cities to find out their thoughts on reusable packaging. In Johnstown, 88% of 640 people responded that they would like to see companies use reusable packaging. In Springfield, 646 of 760 were in favor of reusable packaging. In which city did residents have a greater interest in reusable packaging? Explain.

Part C
DeShawn's company has a goal of increasing the number of companies using their packaging by 10% over a five-year period. Five years ago, 242 companies used their packaging. If DeShawn's company reached its goal, how many companies would be using their packaging now? Explain.

Unit Reflect
How can you use percents to describe the difference between an estimate and the actual value?

212 Unit 4 • Solve Problems Involving Percentages

Name _____ Date _____ Period _____

Mathematical Modeling

Recycling, It is a Percentage Problem
According to the Environmental Protection Agency (EPA), an average of 5 pounds of trash per person is produced in the United States every day. This means that nearly 300 million tons of garbage is produced per year. Seventy-five percent of this waste is recyclable, but only about 30% of this recyclable-waste is actually recycled.

Choose one of the projects to complete.

Project One
Recycling and recycled products make a positive impact on jobs, wages, and tax generated income. According to the EPA's Recycling Economic Information report, on a national average, there are 1.17 jobs, $65,230 wages, and $9,420 tax revenues attributable, for every 1,000 tons of recyclables collected and recycled.

The mayor of your town has launched a challenge to middle school students to improve recycling in their town. Think of jobs that the mayor could create, and design a robust recycling program. Then make a presentation using the data and information in the previous paragraphs to convince the people in your town to participate in your program.

Unit 4 • Solve Problems Involving Percentages 213

Mathematical Habits of Mind

West Virginia Reveal Math helps students build proficiency with these important thinking habits and problem-solving skills through the **Math is... prompts**. These prompts model the kinds of questions students can ask themselves to become proficient problem solvers and doers of math.

Support the Development of Mathematical Habits and Problem-Solving

In the **Math is... Unit**, students are first introduced (or re-introduced) to the Math is... prompts. Teachers can model applying Mathematical Habits of Mind skills within the problem-solving process. With *West Virginia Reveal Math,* developing these habits of mind becomes a daily expectation within the math classroom.

Self-Monitoring Throughout the Year

Math Is...prompts are embedded into the Teacher Edition for easy integration into a daily learning routine. Prompts in student-friendly language in the Student Edition remind students to employ mathematical thinking habits throughout the year.

Explore – Session 1 20 min

Launch | Explore | Assess | Practice

CHOOSE YOUR OPTION

Activity-Based Exploration

Proportional Reasoning

Implement Tasks That Promote Reasoning and Problem Solving
Students explore ratios, proportions, and rates. The goal is to have students understand that a proportion can be used to determine unknown values.

Materials
Digital: *Activity Exploration Journal*, pp. AEJ31–32, 1 per student
Hands-On: *Dog Breed Cards and Diagnosis and Medication Cards* Teaching Resource, 1 p...

Math is... Making Connections

- How is this problem like something you have done before?

MHM Invite volunteers to describe the aspects of the problem that are familiar. Students may recognize notation, terminology, or structure. Helping students make connections to previous work will allow them to draw from their earlier experiences.

...comparing the amount of medicine to bodyweight. The ratios are given in decimals, fractions, and mixed numbers. Students will need to determine how much medication the vet will need for their dog. Time permitting, students may want to draw another set of cards.

Support Productive Struggle
As student pairs explore the activity, check that all groups understand the task and are completing their Activity Exploration Journal pages. If students need guidance or support, ask:
- How can you find equivalent ratios?
- How can you use equivalent ratios to solve for unknown quantities?
- How can you use equivalent ratios to find a unit rate?

Math is... Making Connections
- How is this problem like something you have done before?

MHM As students complete the activity, encourage them to think about aspects of the real-world problem that are familiar. Students who make connections to previous work will be able to draw from their earlier experiences.

Have students complete the **Concluding Questions** in their Activity Exploration Journal.
How can you find a unit rate for a rate that contains fractions, mixed numbers, or decimals?
How can you use a proportion to solve for an unknown value?

MLL Multilingual Learner Scaffolds
Entering/Emerging Preteach any unfamiliar words, such as *determine*. Explain that words such as *record* and *rate* (which as a verb is synonymous with *evaluate*) have more than one meaning. Provide a chart in which students can draw pictures illustrating scenarios for these different meanings.
Developing/Expanding Review that words such as *rate*, and *record* (a false cognate of the Spanish *recordar*, "to remember") have multiple meanings. Have students brainstorm for such high-frequency words, including *press*, *turn*, and *seconds*, and work with their partners to define them.
Bridging/Reaching Challenge students to use the multiple-meaning word *record* in sentences reflecting its meanings. Draw attention to the shift in the stressed syllable. Explain that such words often change parts of speech. Have students identify these parts of speech in the sentences they devised.

Guided Exploration

Salt-Water Aquarium
Students explore the concepts of *equivalent ratios* and *proportions* in a problem about constructing a salt-water aquarium.

Materials
none

Introduce the problem situation on Student Edition p. 122.

...words and phrases for the students to reference throughout the lesson. Update the collection with other relevant terms and new understanding as the lesson progresses.

Math is... Making Connections
- How is this problem like something you have done before?

MHM Invite volunteers to describe the aspects of the problem that are familiar. Students may recognize notation, terminology, or structure. Helping students make connections to previous work will allow them to draw from their earlier experiences.

Let's Explore More
Students work with partners or in small groups to complete the questions.
Check that students understand that two equivalent ratios written as an equation is a proportion. Students should also understand that the amount of salt will be different, but that the ratio of salt to water is the same.

MLL Multilingual Learner Scaffolds
Entering/Emerging Preteach content-area vocabulary, such as *salinity*, and other unfamiliar words, such as *elapsed*. Explain that words such as *table* and *record* have more than one meaning. Provide a chart in which students can draw pictures illustrating the different meanings.
Developing/Expanding Remind students that words sometimes have more than one meaning, and have them identify these as they arise during the lesson. Ask students to use the different meanings of those words verbally in different sentences.

254 Unit 3 • Proportional Relationships

255

Salt-Water Aquarium
Jacob is setting up a salt-water aquarium. The aquarium needs to have a salinity level of 35 grams of salt per kilogram of water (1,000 cm³ = 1 kg).

How much salt will Jacob need to add to the water for the salinity level to be correct?

Use ratio reasoning to solve the problem.

One Way Use a table of equivalent ratios.

The ratio of salt to water is $\frac{35\ g}{1\ kg}$.

Another way Use an equation.
Write an equation using two equivalent ratios.
$$\frac{35}{1} = \frac{x}{75}$$
Two equivalent ratios written as an equation is a proportion.
Use multiplication to determine the unknown term.
$$\frac{35}{1} = \frac{2,625}{75}$$
×75

Jacob needs to add 2,625 grams of salt to the water.

Math is... Making Connections
How is this problem like something you have done before?

Let's Explore More
a. How is finding an unknown in a proportion similar to determining equivalent ratios?
b. Ayana is setting up a salt-water aquarium that holds 120 kilograms of water. How much salt will she need if she maintains the same salinity level?

Student Edition, p. 122

Math is... Making Connections
How is this problem like something you have done before?

122 Unit 3 • Proportional Relationships

Sense-Making

Be Curious launches every lesson and is designed to encourage curiosity and ideas. Students apply previously learned problem-solving strategies or knowledge to make sense of and wonder about a situation, problem, or phenomenon.

Lesson 3-1
Connect Ratios, Rates, and Proportions

? Be Curious

What do you notice?
What do you wonder?

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Math is... ◀ **Mindset**

What classroom rules might help prevent problems from arising in math class?

Lesson 3-1 • Connect Ratios, Rat...

? Be Curious

What do you notice?

What do you wonder?

GO ONLINE

The focus of **Be Curious** is to

- Engage the classroom community.

- Allow students to make sense of the problem.

- Encourage mathematical curiosity.

Every Lesson launches with a Be Curious sense-making routine. These routines present students with a low-floor, high ceiling activity and also helps them develop the habit of making sense of a situation, a foundational part of problem-solving.

West Virginia Reveal Math sense-making routines follow one of four formats:
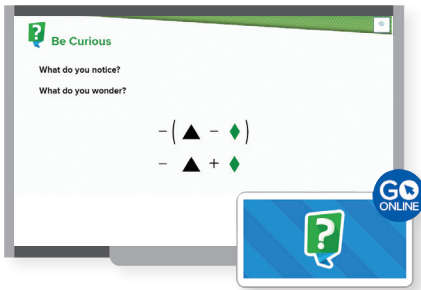
Notice and Wonder focuses students on making sense of the story, the quantities, and the real-world relationships of the mathematical concept.
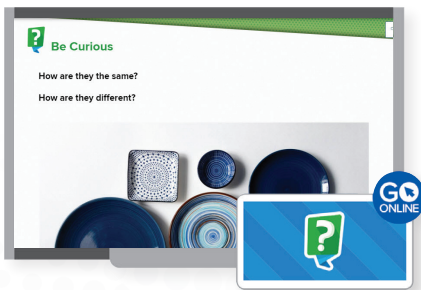
Same/Different presents students with images or situations that require thought about the relationship among the objects in the image.

Which Doesn't Belong? presents a series of images, quantities, or numbers. Students compare and contrast the images or use reasoning to help identify which item "doesn't belong." The problem has multiple solutions depending on the reasoning students use.
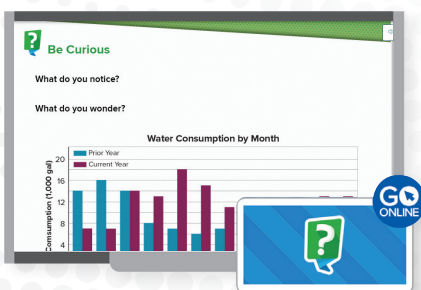
Numberless Word Problems provide scaffolding that allows students the opportunity to develop a better understanding of the underlying structure of the problem itself.

Building Student Fluency with Number Routines

West Virginia Reveal Math Number Routines are a daily opportunity to focus on student development and strengthening of number sense.

Number Routines 🕐 3–5 min

About, Between, or Exact

Build Fluency Students build fluency with estimation and operations strategies as they decide whether to determine an estimate, a range, or the exact solution to the given expression.

These prompts encourage students to talk about their estimates:

- What was it easiest to find about the value of the expressions—an estimate, a range, or the exact number?
- Why might it be easiest to find a range?
- How were you able to think of an exact answer?
- What rounded numbers were you thinking about?
- How does ____'s approach compare to your approach?

Or You Could...

Build Fluency Students build fluency with flexibility with operations as they look for different ways to evaluate or compare expressions.

These prompts encourage students to talk about their estimates:

- What was your strategy for comparing?
- What numbers did you use? Did you use rounded numbers or the exact numbers?
- How does your strategy compare to ____?

The Teacher Edition includes two Number Routines for the launch. Choose to use a Number Routine for both Lesson Session 1 and Lesson Session 2 or choose between the two for a single Session.

Number Routines are found in the Teacher Digital Center for Presentation to the class.

This or That?

This or That? is a take on the classic conversation or party game "Would You Rather." In this routine, students compare two different values or expressions with a given context. They are then asked to determine which of the choices they would prefer by comparing the values.

GO ONLINE

Number Routine

Student Engagement through Number Routines

Students revisit Number Routines across grades using the same structure, but with more complex numbers or quantities.

About How Many?

This routine is an opportunity for students to practice mathematical reasoning in the real world. Pictures are posed and students estimate quantity, determine probability, and much more. Students share their insights and justify their thinking.

About, Between, or Exact

In this routine, students estimate the result by using friendly numbers (finding the about) or a range (finding the between). Students could also choose to determine the exact result. Students decide which strategy to use and share out.

Five Breaks

Five Breaks provides opportunity for students to hone their skills with number decomposition and flexible thinking about numbers. A number is given, and students identify five different ways to break it apart. Then small groups of students compare their decompositions and share with the other groups.

Give Me 5

Students are given five numbers and a target number. Students then use all the numbers in any order with any operation to arrive at the target number. Extensions of this routine include giving students three numbers and a target number and students determine which two missing numbers in addition to the three get them to the target number.

If I Know This...

This routine is similar to the Number String Matrix routine. Students are given a single fact and four or five equations that are related in some way. Students explain how they used the given fact to determine the solutions to the equations.

In My Head?

In My Head? empowers students to think flexibly about computing and evaluating on paper or in their head. Students determine which of the given expressions they could do mentally and share how they would do so. Students also talk about why certain problems are better done on paper or even with a calculator.

Is It Reasonable?

Students are presented with three or four statements like $6.76 \div 6$ is 1.21. They then discuss whether the statement is reasonable. They do not look to determine whether the statement is accurate but simply whether it is reasonable. Students work with a collection of different numbers and operations.

It's About

This is a routine for estimating with fractions or percent. Students are shown a shaded amount, a point on an open number line, or even a progress or status bar, and they have to estimate the value shown. The prompts have no exact amounts. Instead, students have to reason about benchmarks to make estimates.

More or Less Than...

In this routine, students estimate a result using any strategy and then compare their estimate to a given value. The intent is for them to estimate results rather than determine the exact result.

Number String Matrix

A Number String is a list of related equations. Students use the solution strategy for the first equation to solve the subsequent equations. A number string matrix is a set of related problems that are presented in rows and columns. Students pick a row or a column and solve the equations.

Or You Could...

Students are prompted to think about different ways to evaluate or compare expressions. For example, given $2.99 - 7$, a student might say "Or you could do $2.99 - 3$ is -0.01 and $-0.01 - 4$ is -4.01." For 3.9×6, one student might think of it as 4×6 and take away 0.6 whereas another student might think of it as $3 \times 6 + 0.9 \times 6$.

This or That?

This or That? is a take on the classic conversation or party game "Would You Rather." In this routine, students compare two different values or expressions with a given context. They are then asked to determine which of the choices they would prefer by comparing the values.

A full listing of Number Routines is found in the Teacher Edition Appendix.

Supports to Build a Shared Language

West Virginia Reveal Math helps students develop the language of math with Language Routines and comprehensive vocabulary support. These embedded features support teacher facilitation and student acquisition of mathematical language and vocabulary.

Math Language Routines

West Virginia Reveal Math **Math Language Routines** embedded within every lesson provide a framework for teachers to seamlessly promote language development every day.

MLR Collect and Display

As students discuss the questions, listen and write on the board any key words they use. Display the words and phrases for student reference. Use the student-generated expressions to help make connections between student language and math vocabulary. Update the collection with new understandings as the lesson progresses.

- Stronger and Clearer Each Time
- Collect and Display
- Critique, Correct, and Clarify
- Information Gap

- Co-Craft Questions and Problems
- Three Reads
- Compare and Contrast

Math Language Development

Math Language Development offers insights into one of the four areas of language competence—reading, writing, listening, and speaking—and strategies to build students' proficiency.

MLD Math Language Development

Analyzing Word Parts

In this unit, students will read, hear, and say several closely related and important words. Some are math-specific while others represent general academic vocabulary. To expand both receptive and expressive vocabulary, explain that words can be broken down into parts that have shared, or similar, meanings across words. By learning these meanings, students can increase comprehension and be more clear. Tell students that the first word part they should identify is the root or base word. Explain the distinction by saying that the former cannot stand on its own as a word (geology ➔ geo) while the latter can (friendship ➔ friend). Lead the group to brainstorm for common root and/or base words, writing them on the board. Ask:

- What root or base word do you think will produce the greatest number of words?
- How many word can you think of that include that root or base word?

Use these secondary words as a springboard to introduce the concept of prefixes and suffixes. Highlight or circle recurring affixes, encouraging students to deduce their meanings by observing how they consistently alter the meaning of a root or base. Make sure that these include common affixes such as re- or -ity. Show how such affixes can retain the overall meaning of the root or base word but change the part of speech of a word.

Finally, preview related words in the unit, encouraging students to try to define them and their individual parts. These could include rate/ratio, equation/equivalent, proportion/proportional/proportionality.

Language Objectives

Language objectives identify the lesson's linguistic focus for all learners and the math language routines for the lesson.

LANGUAGE OBJECTIVE

Students distinguish between the different uses and definitions of multiple-meaning words.

Multilingual Learner Scaffolds

Multilingual Learner Scaffolds are based on WIDA level and provide teachers with scaffolded instruction to help students understand math vocabulary, ideas, and concepts in context.

MLL **Multilingual Learner Scaffolds**

Entering/Emerging
Allow students struggling with identifying English word parts to analyze words in their home language. Work with them to list words that can be altered with affixes to form others. Point out that the same is true in English.

Developing/Expanding
Have students write sentences using base words, and then add affixes to form new words that they use in new sentences. Challenge students to make the two sentences connect logically to highlight the shift in meaning or part of speech.

Bridging/Reaching
Ask students to write sample sentences that highlight the math domain words shown above. They can look these up in a dictionary or glossary, or preview the text, skimming it to determine how the words are used in context.

Language of Math

Language of Math promotes the development of key vocabulary terms that support how we talk about and think about math in the context of the lesson.

Language Development

Language Development provides graphic organizers, tools, and tips to build students' academic and math vocabulary and support students' precision with their mathematical language.

Building the Language of Mathematics
Complete the graphic organizer as you work through the unit.

Proportional Relationships

Way to Represent	Example	Non-example
Table		

Building the Language of Mathematics

As students work through each lesson, have them complete the graphic organizer to build understanding of and proficiency with key mathematical terms and concepts.

Encourage students to come up with their own definitions and descriptions of terms. When students generate their own definitions or descriptions of terms, they are more likely to remember them long term.

Word Wall

If there is a Math Word Wall in the classroom, ask students to add their words, examples, and counterexamples of proportional relationships to the wall. As they share them, have each student explain their entry.

Effective Teaching Practices

The instructional design with *West Virginia Reveal Math* integrates the **Effective Teaching Practices** from the National Council of Teachers of Mathematics (NCTM). These research-based teaching practices were first presented and described in NCTM's 2014 work "Principles to Action: Ensuring Mathematical Success for All."

In each unit overview, teachers are presented with suggestions on how to successfully implement one of the teaching practices into classroom instruction.

ETP Effective Teaching Practices

Elicit and Use Evidence of Student Thinking

As students progress through the unit, ask them to explain their reasoning. Understanding the reasoning for their answers—whether they are correct or incorrect—allows for targeted instruction to reinforce and expand or enhance their understanding or address misconceptions and misunderstandings in a timely way.

As students learn about proportionality, there are multiple possibilities for errors in execution. Students may have misconceptions about:

- the difference between proportional and nonproportional relationships;
- linear graphs that do not pass through the origin;
- common factors that define equivalent ratios and proportions.

Ask frequent questions, especially those that require reasoning. Use students' responses to inform instruction and determine what kinds of practice and review might be necessary.

For example, if students struggle to determine equivalent ratios or to identify the constant of proportionality, spend some time revisiting multiplication and division of fractions.

In Lessons 3-2, 3-3, and 3-4, students are introduced to proportional relationships. Monitor closely students' responses and thinking in these lessons to ensure they are understanding proportional relationships accurately.

- Establish mathematical goals to focus learning.

- Implement tasks that promote reasoning and problem-solving.

- Use and connect mathematical representations.

- Facilitate meaningful mathematical discourse.

- Pose purposeful questions.

- Build procedural fluency from conceptual understanding.

- Support productive struggle in learning mathematics.

- Elicit and use evidence of student thinking.

Continue with your selected option from Session 1.

Activity-Based Exploration

Activity Debrief

MLR **Discussion Supports: Numbered Heads Together**
1. **Groups:** Each student in the group is assigned a number.
2. **Assign the Task:** Have students review the **Concluding Questions**, including formulating justifications or explanations.
3. **Heads Together:** As students work together to discuss the questions, they make sure that everyone in the group is prepared to provide their answers and explanations to the entire class.
4. **Report:** Choose a student number at random. The students with this number are the reporters for their group. The reporters share their answers and explanations with the entire class. Reporters either agree or provide their own answers and explanations.

ETP **Elicit Evidence of Student Understanding**
As students discuss their approaches, connect their thinking to these new key terms and concepts:
- **proportional relationship:** If the ratios between two quantities in a table have a constant ratio, then the quantities are in a proportional relationship.
- **constant of proportionality:** The constant ratio observed in a proportional relationship is called the constant of proportionality.
- the constant of proportionality has the same value as the unit rate.

ETP **Facilitate Mathematical Discourse**
Facilitate a whole-class discussion of the activities and approaches, reinforcing these key terms: *constant of proportionality* and *proportional*. Ask:
- What does the proportional relationship tell us?
- How can tables help you see patterns in data?
- What other representation can you use?

Math is... ◀ **Making Conjectures**
- What do you think the solution is?

MTM Encourage students to make a habit of predicting answers. In order to make a reasonable prediction, students must understand the problem situation and how the pieces of the problem fit together. Prediction forces students to think about their solution strategy and whether it makes sense.

Have students complete the Concluding Questions in their Activity Exploration Journal.
- What can you learn by analyzing ratios between quantities?
- How can you describe a ratio relationship?

MLL **Multilingual Learner Scaffolds**

Entering/Emerging Help students formulate their justifications or explanations. Create a word bank with non-linguistic representations, including *stayed the same*, *changed*, and *I think*. Provide sentence frames: I think the ratio ... because ....; My group said ... because ... and ....

Developing/Expanding Remind students to include data examples in their justifications and explanations. Tell them to ask clarifying questions during the group discussion, and consider providing an academic word bank for them. Also, encourage them to restate other group members' explanations.

Bridging/Reaching Have students give a

Guided Exploration

Popcorn
Students explore the constant of proportionality in a situation about making popcorn.

Materials
none

Introduce the problem situation on Student Edition p. 129.

ETP **Use and Connect Mathematical Relationships**
- How can you choose numbers in the table to help you solve the problem?
- How can you use a table to show a pattern?

MLR **Discussion Supports**
As students engage in discussing the answers to the questions, have them pay attention to each others' understandings in order to increase their fluency in mathematical discussions about *proportions* and *constant of proportionality*. Restate statements they make as questions to seek clarification and to confirm comprehension, providing validation or correction when necessary. Encourage students to challenge each others' ideas when warranted, as well as to elaborate on their ideas and give examples.

🔄 **Collaborate and Connect**
Students work in small groups to answer the question. Have a member from each group report to the class.
- How could you determine the constant of proportionality?

Math is... ◀ **Making Conjectures**
- What do you think the solution is?

MTM Encourage students to make a habit of predicting answers. In order to make a reasonable prediction, students must understand the problem situation and how the pieces of the problem fit together. Prediction forces students to think about their solution strategy and whether it makes sense.

Let's Explore More
Students work with partners or in small groups to complete the questions. Check that students understand how using a constant of proportionality relates to the importance of following a recipe.

MLL **Multilingual Learner Scaffolds**

Entering/Emerging Preteach unknown vocabulary such as *teaspoon*, explaining that it is abbreviated *tsp* and showing an example if possible. Support student output by focusing on the academic vocabulary word *maintain*, providing its definition, and pointing out its Spanish cognate *mantener*.

Developing/Expanding Focus on the academic vocabulary word *maintain* by reading aloud the three sentences in which it appears. Have volunteers define it and use it correctly in a sentence. Clarify other examples of academic language as needed (e.g., *given information*, *context*).

Bridging/Reaching Have students write

Student Edition, p. 129

ETP **Elicit Evidence of Student Understanding**

As students discuss their approaches, connect their thinking to these new key terms and concepts:
- proportional relationship: If the ratios between two quantities in a table have a constant ratio, then the quantities are in a proportional relationship.
- constant of proportionality: The constant ratio observed in a proportional relationship is called the constant of proportionality.
- the constant of proportionality has the same value as the unit rate.

Throughout the lessons are elements that embody each of the eight teaching practices. Look for the **ETP Icon.**

Equity and Access to High Quality Math for All Learners

West Virginia Reveal Math emphasizes a positive and productive classroom culture where all students have common access to rigorous instruction, make meaningful connections to their culture, and share their ideas freely.

Each *West Virginia Reveal Math* Unit emphasizes one of the six key areas for ensuring equity and access in mathematics.

Go Deep with the Math

What is it, and why does it matter?

Going deep with math ensures that all students develop deep conceptual knowledge[1]. Students need time to learn math so they can make sense of it and explain it to themselves and others. When students have the time to go deep with the math, they increase their confidence and find the wonder and joy in the learning of mathematics.

How does it come about in Reveal?

Every lesson has an Activity-Based Exploration activity where students can go deep with mathematics. These activities give the students opportunities to grapple with and make sense of mathematics. The key is to be sure you allow them the time to engage in those activities and not jump in too soon!

Build Connections

What is it, and why does it matter?

Building connections both to a math community and among math concepts when solving mathematics problems is critical to helping all students achieve success in mathematics. "When students learn to represent, discuss, and make connections among mathematical ideas in multiple forms, they demonstrate deeper mathematical understanding and enhanced problem-solving abilities."[1] Building connections helps to deepen conceptual understanding while making the classroom a more joyful place.

How does it come about in *West Virginia Reveal Math*?

Building connections is an ongoing activity that starts in Unit 1, *Math is...* where students build the classroom community by getting to know one another and establishing classroom norms for the math class. It is important that you continue to foster connections among students to build a strong classroom community. It is also important that when you debrief lessons, you encourage students to share the different ways they solve problems and allow them to talk about the connections between the different strategies.

Descriptor	Actionable Strategies for Teachers	
build authentic and meaningful connections both within and across mathematical concepts.	• Make explicit the connections between topics on reflection days or at the end of a unit. • Have the students complete the Mathematical Modeling tasks that address more than one mathematics concept.	• Students solve complex math problems that cover multiple math concepts.
Build understanding of and honor for different cultural approaches to thinking about and reasoning with mathematics.	• Have students share different approaches to doing math. • Allow students to do math in their home language. • Encourage students to teach their peers math using different approaches.	• Students compare cultural methods. • Students engage in discussions about the math concepts and processes. • Students explain their thinking in a variety of methods.
Promote a classroom culture of respectful discourse, interaction, and risk-taking.	• Co-create and reinforce norms for interaction during discourse. • Have nonverbal signals or use discussion protocols.	• Students hold themselves and peers accountable to co-created expectations.
Create a culture of discourse that elevates all voices and honors risk-taking.	• Co-create and reinforce norms for interaction during discourse. • Model norms of interaction for classroom discourse that include respectful interactions. • Use the Math Language Routines to support student participation in discourse. • Monitor student participation and honor different ways of participating.	• Students expect to be asked to explain, clarify, and elaborate. • Students focus on the process and reasoning, not the correct answer. • Students explain their thinking in a variety of methods.

[1] National Council of Teachers of Mathematics. (2014). *Principles to Actions: Ensuring Mathematical Success for All.* Reston, VA: National Council of Mathematics.

458 Unit 5 • Sampling and Statistics

The wheel diagram: Access and Opportunity for All — Foster Strong Math Identity and Agency, Go Deep with the Math, Use Effective Teaching Practices, Build Connections, Partner with Families and Communities, Set and Maintain High Expectations.

Develop Student Confidence

When students believe that mistakes are learning opportunities, they are willing to try and challenge themselves. This strong identity and agency as doers of math leads to a growth mindset. The Math is... Unit encourages every student to think of their math identity by considering their math and their self-perception as "doers of mathematics."

Encourage Ownership of Learning

The Activity-Based Exploration offers problem-based activities that promote productive struggle and agency as students decide what strategies to use. Daily reflection opportunities drive accountability for both their understanding and behavior.

Make STEM Connections

Each Unit has a STEM focus to engage students, help them make sense of the world, and help make predictions on impacts to the future.

STEM Connections are embedded within student practice problems to help them make a daily connection to math applicability to everyday situations.

Develop Community Skills through Math

A focus on mindset helps establish a positive math classroom community where students are encouraged and motivated to engage in mathematics.

The instructional design of *West Virginia Reveal Math* promotes an active classroom with daily opportunities for collaboration, discourse, creativity, critical thinking, and hands-on learning. In addition to the mathematical objectives for the lesson, each lesson has both a language objective that supports the comprehension and use of mathematical language and a mindset objective that aids in the development of skills needed to be productive participants in the class and beyond.

Focus

Math Objectives
- Students use tables to determine whether two quantities are in a proportional relationship.
- Students identify the constant of proportionality from a table.

Language Objectives
- Students will practice using academic language.
- To optimize output, students will participate in *MLR: Co-Craft Problems* and *MLR: Discussion Supports*.

Math Mindset Objective
- Students identify personal traits that can help them be proficient doers in math.

LESSON 3-2
Use Tables to Determine Proportionality

LESSON 3-1

LESSON 3-2

LESSON 3-3
Use Graphs to Determine Proportionality

Vocabulary

Math Terms
constant of proportionality
proportional

Academic Terms
display
identical

Materials
The materials may be for any part of the lesson.
- *Table Sort* Teaching Resource
- calculators

M.7.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships.

Mathematical Habits of Mind
MHM1 Make sense of problems and persevere in solving them.

Focus

Math Objectives
- Students use tables to determine whether two quantities are in a proportional relationship.
- Students identify the constant of proportionality from a table.

Language Objectives
- Students will practice using academic language.
- To optimize output, students will participate in *MLR: Co-Craft Problems* and *MLR: Discussion Supports*.

Math Mindset Objective
- Students identify personal traits that can help them be proficient doers in math.

Coherence

Previous
- Students used tables to find equivalent ratios.
- Students determined unit rates.

Now
- Students use tables to identify proportional relationships.
- Students calculate the unit rate from a table.

Next
- Students calculate slope from a table.
- Students use tables to analyze functions.

Rigor

Conceptual Understanding
- Students use tables to identify the constant of proportionality.

Procedural Skill & Fluency
- Students use the constant of proportionality to fill in a table.

Application
- Students apply the constant of proportionality to solve a real-world problem.

264 Unit 3 • Proportional Relationships

Math is... Mindset

Students first encounter the Math is...Mindset prompts in Lessons 1 and 6 of Unit 1.

- Lesson 1 prompts help build students' self-awareness and self-management as they think about their attitudes towards and their strengths in math.

- Lesson 6 prompts focus on community participation and relationship skills as students think about and discuss classroom norms for a productive learning environment.

At the close of the year, students will revisit Math Is...in the final unit of the course to reflect on their school year journey, see examples of math in our world, and apply mathematical habits of mind.

Starting in Unit 2, students encounter Math is... Mindset prompts at the beginning and end of each lesson. These prompts focus on the Math Mindset objective for the lesson.

Math is About Doing

What is math?

Math is about solving problems.

➤ When we do math, we solve problems.

When we work together, we collaborate and support each other.
- We make sense of problems.
- We think about what we know and don't know about the problem.
- We look for patterns and relationships among quantities.
- We visualize the problem and choose a useful representation.
- We select and use tools that are appropriate.
- We develop a solution plan.
- We are aware of our progress in solving the problem and shift strategies when needed.

Math is... Mindset
What is your problem-solving process?

➤ When we do math, sometimes we get stuck.

- We think of questions to ask a classmate or the teacher.
- We try to imagine the problem or draw pictures of it.
- We think of problems we have seen like this before.
- We identify what we know about the problem and what we don't understand.

Math is... Mindset
How can you stay productive when you get stuck?

Let's Explore More

a. What part of problem solving is easy for you? What part is challenging?

Before beginning the sense-making routine, have stu[dents] the Math is Mindset prompt.

Math is... Mindset
- What do you want your classmates to know abo[ut] math journey?

MM Understanding Self
Remind students of the discussion from the Math is... unit at the beginning of the school year when students shared their math story/biography. Have them share (as they are willing) parts of their math biography or math journey. Ask them to consider how understanding people's math journeys can help them in their math journey.

Lesson 2-1
Solve Problems Involving Scale Drawings

?

Be Curious

What do you notice?
What do you wonder?

Reflect
How can you explain to a classmate what a scale drawing is?

Math is... Mindset
What did your classmates learn about your math journey?

Math is... Mindset
What do you want your classmates to know about your math journey?

Purposeful Practice

West Virginia Reveal Math provides purposeful practice opportunities in both print and digital formats to help all students build their confidence and prepare for unit, course, and state assessments.

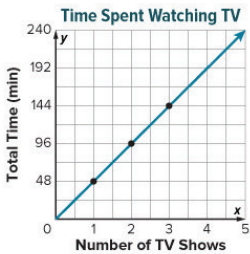| Practice Types and Formats			
Type	**Purpose**	**Print**	**Digital**
Lesson Practice	Daily Practice with exercises that address various depths of knowledge and encourage students to reflect on their learning and the lesson objectives.	Student Edition	✓
Additional Practice	Additional practice aligned to daily lesson content with embedded learning supports.	Printable PDF	✓ Autoscored
Spiral Review	Daily practice on major work of each grade level to help students build fluency and be ready for end-of-year assessment.	Printable PDF	✓ Autoscored
Fluency Practice	Practice at the end of each unit addressing the fluency expectations for each grade level.	Student Edition	✓
Unit Review	End of unit practice to prepare for unit assessment to include vocabulary and content practice items as well as practice task.	Student Edition	✓
ALEKS®	Adaptive practice focused on ready-to-learn topics to fill gaps or accelerate learning.		✓ Autoscored

Digital Practice with Embedded Learning Aids

Autoscored practice items have a variety of helpful tools and learning aids to support students while they practice. Students can also attempt an exercise multiple times. Teachers can customize the number of attempts and the learning aids available to students.

Question 10

The total time you watch television is proportional to the number of shows watched. What do the points (0, 0) and (1, 48) represent?
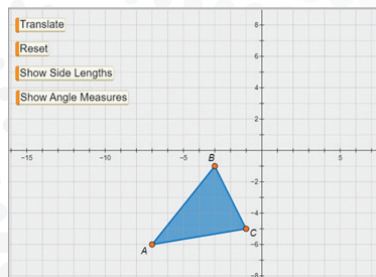
Time Spent Watching TV

The point (0, 0) represents [Select Choice ▾] shows watched in [Select Choice ▾] minutes.

The point (1, 48) represents [Select Choice ▾] show(s) watched in [Select Choice ▾] minutes.

> **Need help with this question?**

Next Question   Check Answer   Done and Review

---

eToolKit

Translate
Reset
Show Side Lengths
Show Angle Measures

Hints

Hint   ✕
                                                                 Close

The title of each axis indicates the meaning of each coordinate. In each ordered pair, the *x*-coordinate is the number of shows. The *y*-coordinate is the number of minutes the shows were watched.

Glossary

Glossary

English ▾   🔍 Search...

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

N

negative integer /NEG-uh-tiv IN-ti-jer/ An integer that is less than zero. It is written with a – sign.

net /net/ A two-dimensional figure that can be used to build a three-dimensional figure.

nonproportional /nohn-pruh-PAWR-shuh-nl/ The relationship between two ratios with a rate or ratio that is not constant.

numerical expression /noo-MER-i-kuhl ik-SPRESH-uhn/ A combination of numbers and operations.

O

obtuse angle /uh-b-TOOS ANG-guh-l/ Any angle that measures greater than 90° but less than 180°.

obtuse triangle /uh-b-TOOS TRAHY-ang-guh-l/ A triangle having one obtuse angle.

opposites /OP-uh-zits/ Two integers are opposites if they are represented on the number line by points that are the same
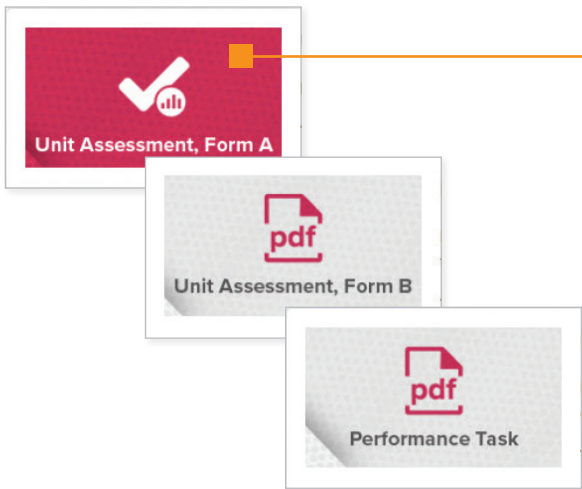
Assessment

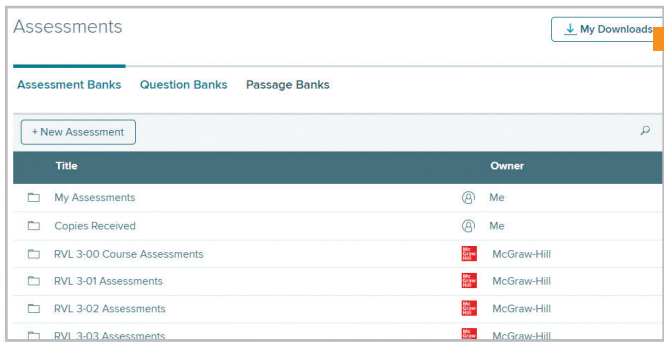## Monitor student understanding throughout the year

West Virginia Reveal Math offers a comprehensive set of assessment resources that include diagnostic, formative, and summative tools.

Type	Assessment	How Often	Description
Diagnostic	Course Diagnostic	Beginning of the school year	Diagnoses students' strengths and weaknesses with prerequisite concepts and skills for the upcoming year.
	Unit Diagnostic	Beginning of each unit	Diagnoses students' strengths and weaknesses with prerequisite concepts and skills for the upcoming unit.
Formative	Exit Ticket	During a lesson	Assesses students' understanding of the concepts and skills following the Explore phase.
	Lesson Quiz	After a Lesson	Assesses students' conceptual understanding with lesson concepts and skills.
	Math Probe	During a unit	Identifies common misconceptions.
Summative	Unit Assessment, Forms A and B	At the end of a unit	Evaluates students' understanding of and fluency with unit concepts and skills.
	Unit Performance Task	At the end of a unit	Evaluates students' ability to apply concepts and skills learned.
	Benchmark Assessments	After multiple units	Evaluates students' understanding of concepts and skills taught in multiple units.
	Summative Assessment	At the end of the school year	Evaluates students' proficiency with concepts and skills taught over the school year.

All assessments are available for either print or digital administration.

Unit Assessment, Form A

Unit Assessment, Form B

Performance Task

All print assessments are available in downloadable PDF printables. Item analysis tables found in the Teacher Edition include recommendations for intervention support.

Assessments   ↓ My Downloads

Assessment Banks   Question Banks   Passage Banks

+ New Assessment

Title	Owner
My Assessments	Me
Copies Received	Me
RVL 3-00 Course Assessments	McGraw-Hill
RVL 3-01 Assessments	McGraw-Hill
RVL 3-02 Assessments	McGraw-Hill
RVL 3-03 Assessments	McGraw-Hill

Digital assessments are customizable as **West Virginia College- and Career-Readiness Standards for Mathematics item banks** to build additional assessments as needed. Many of the digital assessment items are auto-scorable. Teachers can access more digital reporting information in the assessment reports within the Teacher Center.

Name _____ Date _____ Period _____

Unit 3
Unit Assessment: Form A
Answer each question.

1. The table shows the distances and times of some of the world's fastest animals traveling at their top speeds.

Fastest Land Animals

Animal	Distance (mi)	Time (h)
Blue Wildebeest	$33\frac{1}{3}$	$\frac{2}{3}$
Brown Hare	8	$\frac{1}{6}$
Cheetah	7	$\frac{1}{10}$
Elk	18	$\frac{2}{5}$

What are the different animal speeds from least to greatest? Write the animal names with their speeds from least to greatest.

3. Jana ran the first $3\frac{1}{2}$ miles of a 5-mile race in $\frac{1}{3}$ hour. What was her average rate, in miles per hour, for this first part of the race? Explain how you solved the problem.

2. Hector walks 1,000 feet in $2\frac{1}{2}$ minutes. What is his un
   A. 400 ft per min
   B. 500 ft per min
   C. 2,000 ft per min
   D. 2,500 ft per min

Question 1

The table shows the distances and times of some of the fastest animals in the world, along with their maximum speeds.

Fastest land animals

Animal	Distance (mi)	Time (h)
Blue wildebeest	$33\frac{1}{3}$	$\frac{2}{3}$
European Hare	8	$\frac{1}{6}$
Cheetah	7	$\frac{1}{10}$
Elk	18	$\frac{2}{5}$

What are the different animals' speeds from lower to higher? Write the animals' names and their speeds from lower to higher. Enter the answer.

1000 characters remaining

West Virginia Reveal Math assessments include a range of item types that students are likely to encounter on end-of-year state assessments. These include:

- Single Response Multiple Choice

- Multiple Response Multiple Choice

- Fill-in-the-Blank

- Matching

- Constructed Response

- Digital Assessments include technology-enhanced items:
  - Drag and Drop
  - Drop-Down Menu Select
  - Choice Matrix

Student Resources

Print Resources

Student Edition, 2 Volumes

Available in print and interactive formats, the Student Editions are write-in, three-hole-punched, and perforated for easy organization in a binder. Students engage in learning through the use of problem-solving, discourse, and reflection.

Digital Student Center Resources

Students have access to a robust set of engaging digital tools and interactive learning aids, including:

- Interactive Student eBooks

- Daily, interactive practice with embedded learning aids and dynamic (algorithmic) items.

- Dynamic, exploratory activities powered by Web Sketchpad®.

- Anytime access to the eToolkit (Virtual Manipulative Suite).

- Rich, exploratory STEM Adventures.

- Online assessments with interactive item types.

- Math Replay videos to review lesson content.

- Digital games designed for purposeful practice.
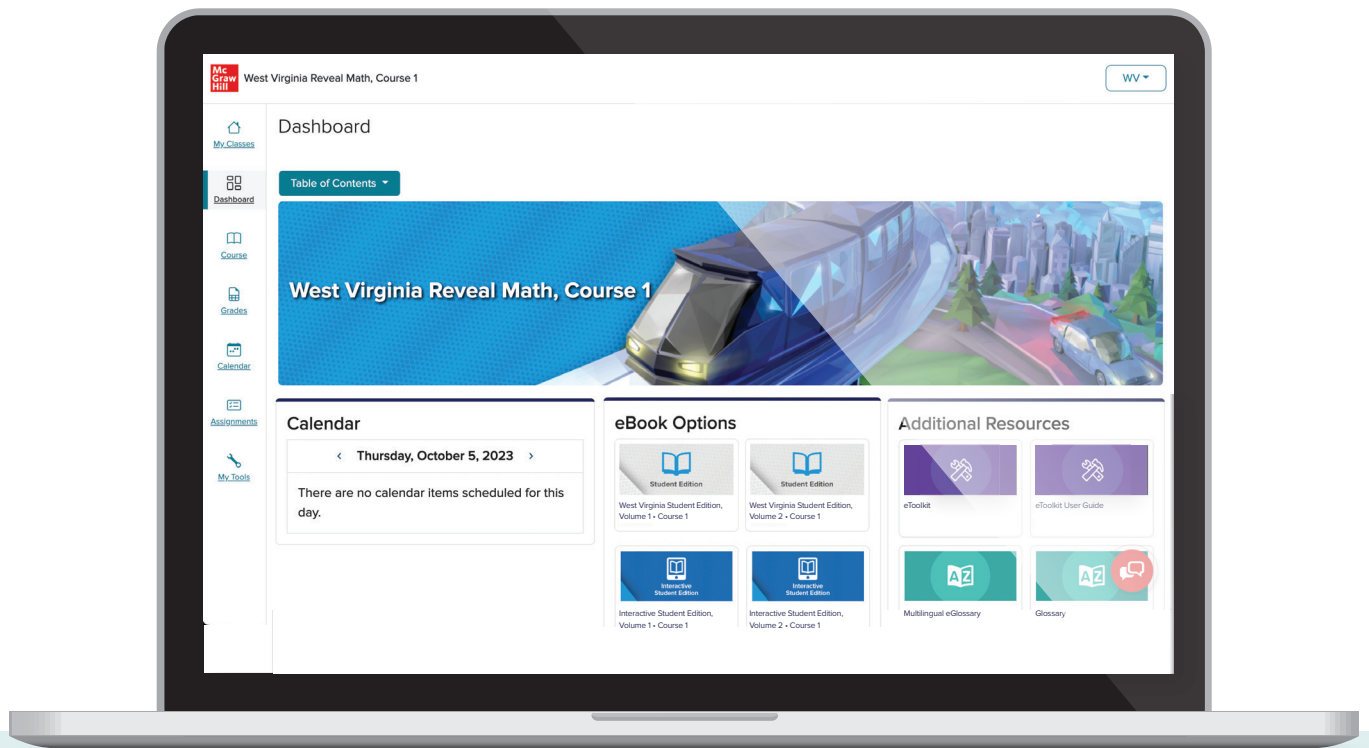
Register for Access to Review the Digital Student Center at **mheonline.com/westvirginia**

Where Technology Meets Math

West Virginia Reveal Math supports both low-tech and high-tech classrooms. The blended print and digital instructional model captures the best of both modalities and brings them together in a seamless experience that makes math meaningful for your students.

Students can access the Interactive Student Edition eBook and assignments from anywhere on a mobile device using the K–12 Portal App.
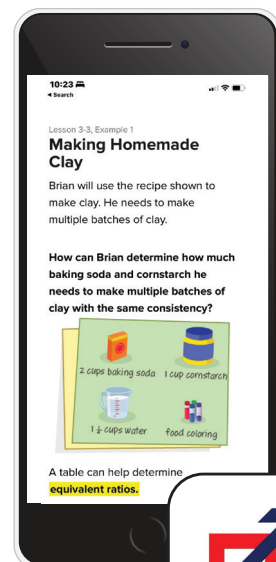
Teacher Resources

## Print Resources
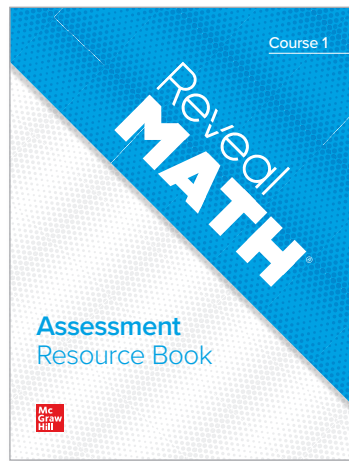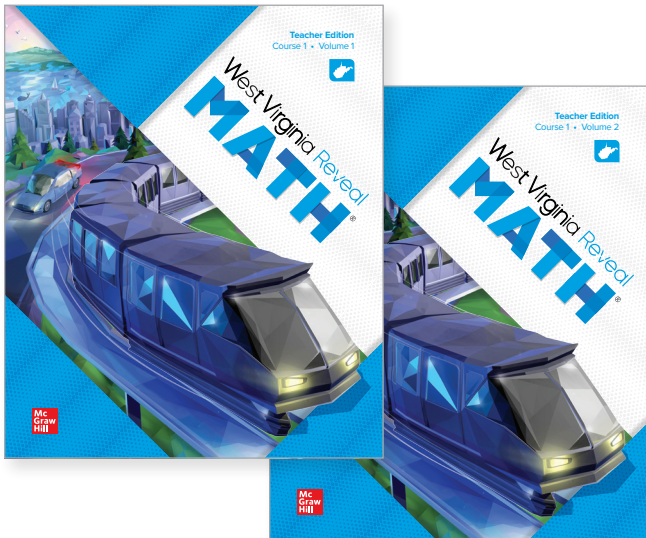
Teacher Edition, 2 Volumes

These spiral-bound Teacher Editions provide the essentials to plan and implement high-quality math instruction. Inside, you will find instructional supports including:

- NCTM's Effective Teaching Practices (ETPs)
- Math Language Routines (MLR)
- Multilingual Learner (ML) Language Scaffolds
- Differentiation Recommendations

Assessment Resource Book

The Assessment Resource Book contains the blackline masters for the following *West Virginia Reveal Math* assessments:

- Lesson Exit Tickets
- Lesson Quizzes
- Unit Readiness Diagnostic
- Unit Assessments
- Unit Performance Tasks
- Course Readiness Diagnostic
- Benchmark Assessments
- End-of-Course Assessment
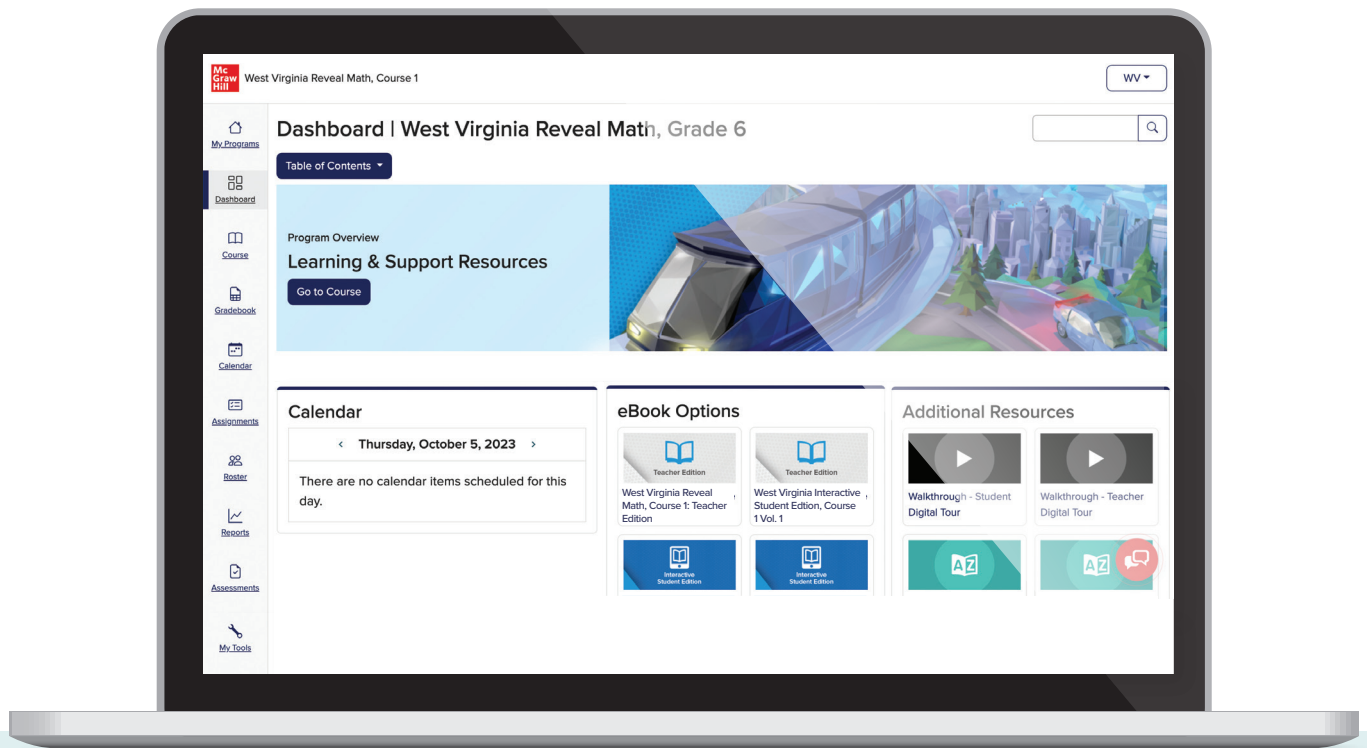
Register for Access to Review the Digital Teacher Center
at **mheonline.com/westvirginia**

Digital Teacher Center Resources

Teachers have access to an intuitive and easy-to-use platform for planning, teaching, and assessment. The teacher digital experience includes:

- Teacher Edition eBooks

- Interactive, customizable lesson presentations

- Expansive Library of Professional Learning Workshops

- Digital Practice and Assessment Banks

- Dynamic Digital Practice

- Digital Exploration Activities Powered by *WebSketchpad*®

- eToolkit (Virtual Manipulative Suite)

- Teacher and Administrator Reporting Suite

- Digital Implementation Guide

- *ALEKS*®*

with West Virginia Reveal Math and ALEKS bundle

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