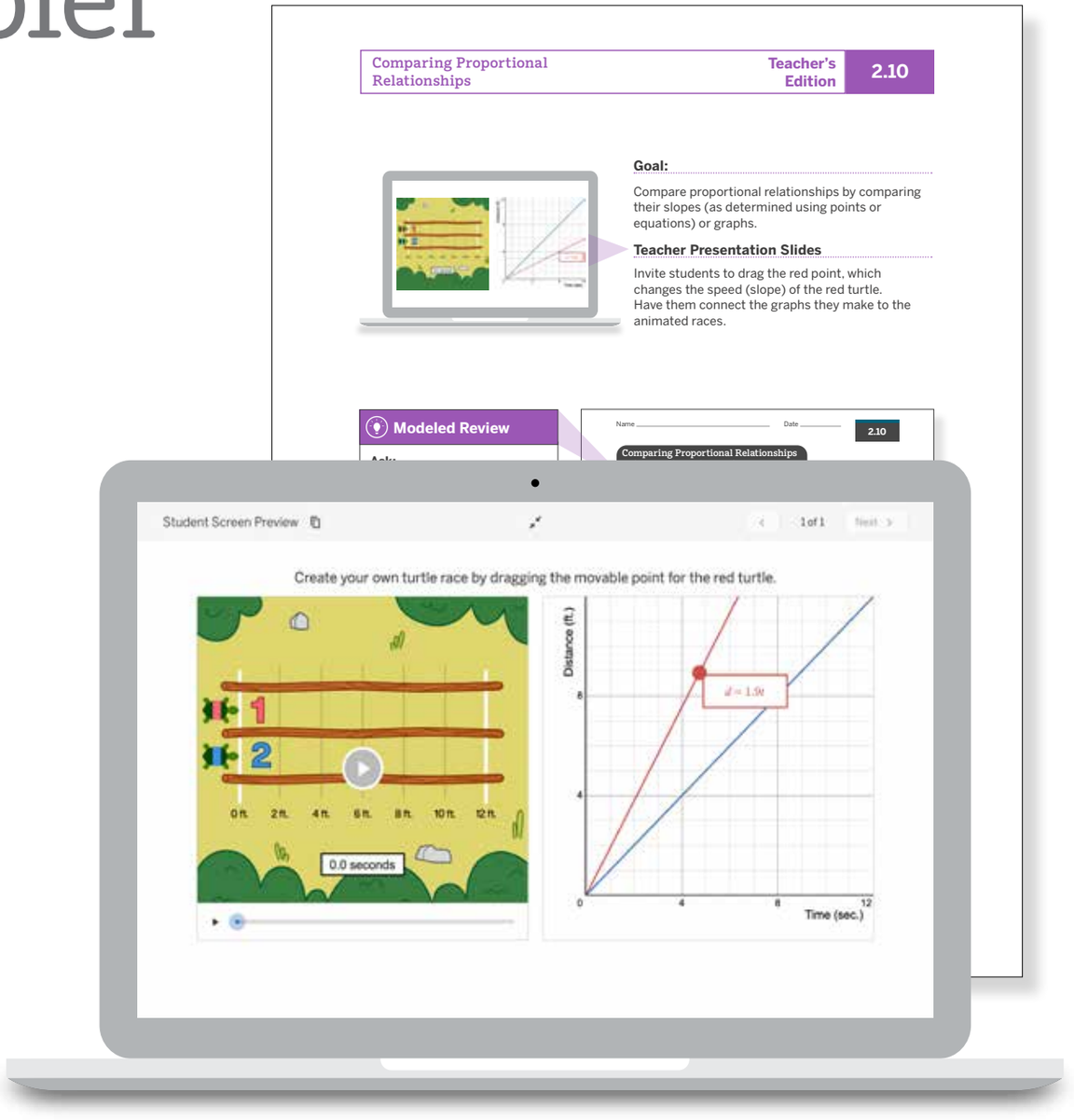
Amplify Desmos Math

Grades 6–8

Mini-lesson sampler

Inside you'll find:

- Mini-lesson overview
- Sample mini-lessons



About mini-lessons

Targeted intervention aligned to core instruction.

Amplify Desmos Math mini-lessons are 15-minute lessons aligned to the most critical topics throughout a unit. Teacher-led mini-lessons are used to provide targeted intervention to small groups of students who need additional support or to re-engage students with content that they may need more time on.

Amplify Desmos Math mini-lessons are the perfect complement to our problem-based approach because they provide more explicit instruction opportunities and leverage a consistent instructional routine (Modeled Review, Guided Practice, Check for Understanding).

A minds-on experience to extend your students' curiosity and thinking beyond the core lesson

Amplify Desmos Math mini-lessons are far more than solo drill worksheets. They tie directly to critical topics to keep students thinking and exploring the grade-level math they need more time with.

Differentiation where and when it matters most to help all students catch up while keeping up with grade-level math

Amplify Desmos Math mini-lessons are used to address critical prerequisite skills for upcoming lessons or to engage students in grade-level math immediately after a core lesson, when they need more time to think about a concept or skill. Mini-lessons reinforce the same topics and content students see in core instruction.

Our philosophy

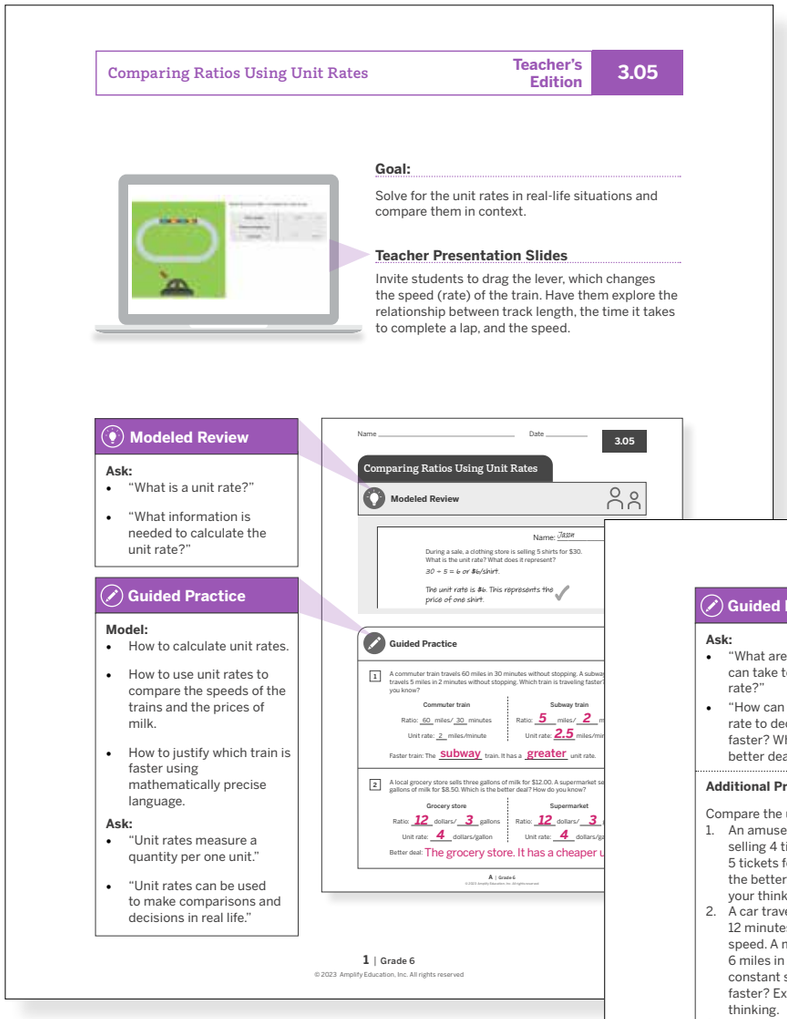
The design of Amplify Desmos Math mini-lessons is informed by the extensive research around worked examples, in particular faded worked examples. Because novice learners benefit more from worked examples than more experienced learners (Kalyuga, Ayres, Chandler, & Sweller, 2003), one pedagogical approach involves scaffolding, or fading away, the support given in the worked examples as practice goes on and students become more proficient (Atkinson et al., 2003; van Merrienboer, Kirschner, & Kester, 2003).

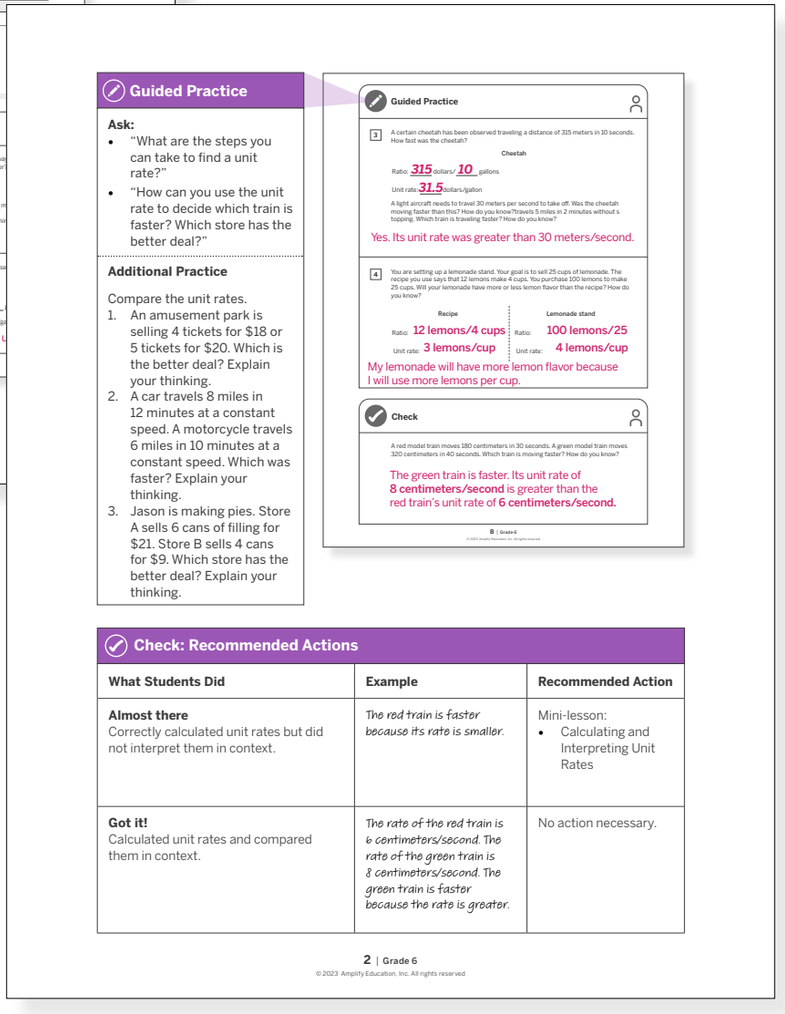
In essence, the worked examples get less "worked-out" over time. Studies on the use of faded worked examples have found benefits for problem solving, both in terms of better performance on difficult problems (Atkinson et al., 2003) and less time taken to achieve the same level of performance (Flores & Inan, 2014). Students working with faded worked examples have also been shown to have fewer unproductive moments during their practice sessions (Renkl et al., 2004).[1]

[1]Booth, J. L., McGinn, K. M., Young, L. K., & Barbieri, C. (2015). Simple Practice Doesn't Always Make Perfect: Evidence From the Worked Example Effect. Policy Insights from the Behavioral and Brain Sciences, 2(1), 24–32. https://doi.org/10.1177/2372732215601691

Structure of a mini-lesson

As easy as 1, 2, 3.





1

Modeled review

Teachers work through an example with students.

2

Guided practice

Teachers guide students through faded examples, where scaffolds are heavier early on and are gradually removed.

3

Check for Understanding

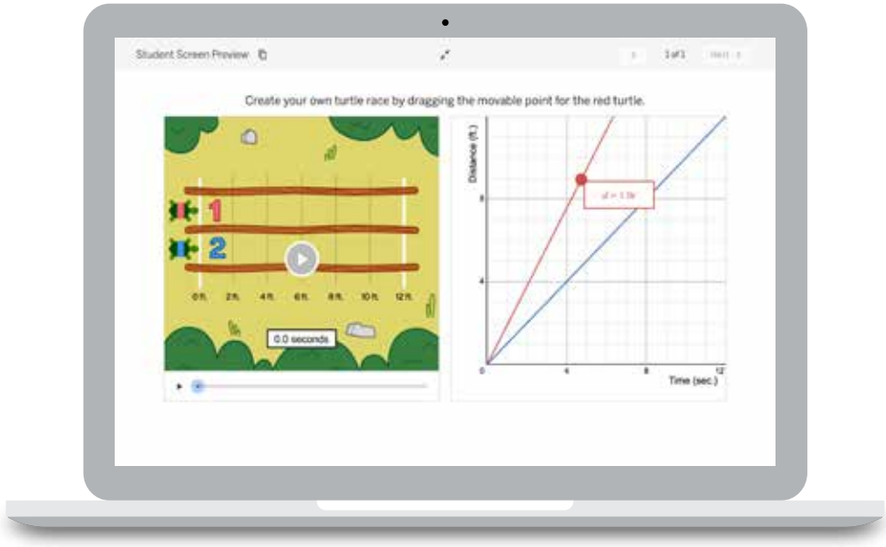
An opportunity for students to show what they have learned.

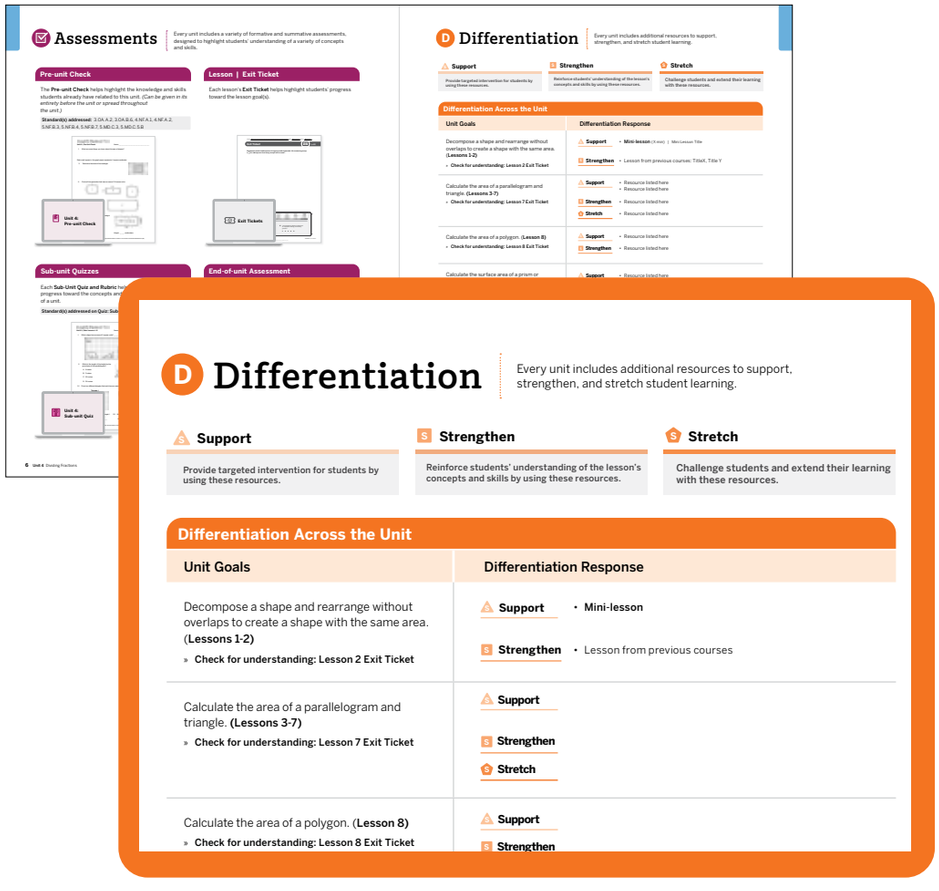
Accessing mini-lessons in Amplify Desmos Math

Amplify Desmos Math mini-lessons are easily accessible at point-of-use for teachers.

In the digital experience

Online, PDF Teacher Edition pages for each mini-lesson, along with the Teacher Presentation Screens, can be accessed within subunit resources.





In the print Teacher Edition

In the Amplify Desmos Math Teacher Edition, mini-lessons will be referenced in the differentiation table at the subunit level.

Learn more about
Amplify Desmos Math at

amplify.com/math

Print sample pages

In the pages that follow, you'll find sample print Teacher Edition and Student Edition pages for three Amplify Desmos Math mini-lessons.

Grade 6: Comparing Ratios Using Unit Rates

(accompanies *Model Trains*, Unit 3, Lesson 4)

Digital Teacher Presentation Screen

Grade 7: Comparing Proportional Relationships

(accompanies *Three Turtles*, Unit 2, Lesson 7)

Digital Teacher Presentation Screen

Grade 8: Solving Equations with Parentheses

(accompanies *More Balanced Moves*, Unit 4, Lesson 4)

Digital Teacher Presentation Screen

Goal:

Solve for the unit rates in real-life situations and compare them in context.

Teacher Presentation Slides

Invite students to drag the lever, which changes the speed (rate) of the train. Have them explore the relationship between track length, the time it takes to complete a lap, and the speed.

Modeled Review

Ask:

- "What is a unit rate?"
- "What information is needed to calculate the unit rate?"

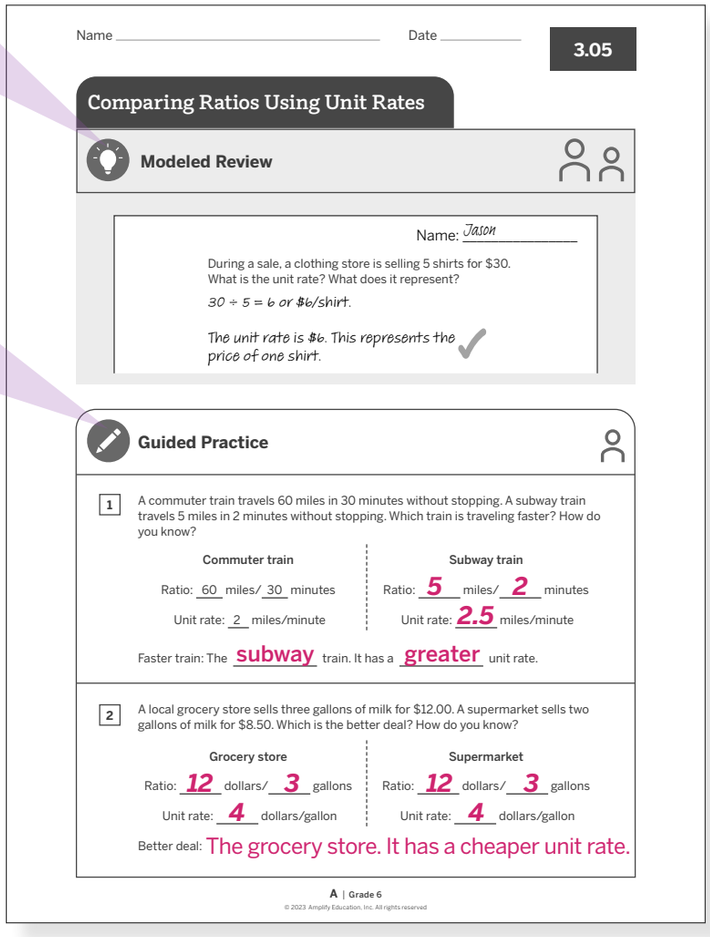
Guided Practice

Model:

- How to calculate unit rates.
- How to use unit rates to compare the speeds of the trains and the prices of milk.
- How to justify which train is faster using mathematically precise language.

Ask:

- "Unit rates measure a quantity per one unit."
- "Unit rates can be used to make comparisons and decisions in real life."



Name _____ Date _____ 3.05

Comparing Ratios Using Unit Rates

Modeled Review

Name: Jason

During a sale, a clothing store is selling 5 shirts for $30. What is the unit rate? What does it represent?

30 ÷ 5 = 6 or $6/shirt.

The unit rate is $6. This represents the price of one shirt. ✓

Guided Practice

1 A commuter train travels 60 miles in 30 minutes without stopping. A subway train travels 5 miles in 2 minutes without stopping. Which train is traveling faster? How do you know?

Commuter train	Subway train
Ratio: 60 miles/ 30 minutes	Ratio: 5 miles/ 2 minutes
Unit rate: 2 miles/minute	Unit rate: 2.5 miles/minute

Faster train: The subway train. It has a greater unit rate.

2 A local grocery store sells three gallons of milk for $12.00. A supermarket sells two gallons of milk for $8.50. Which is the better deal? How do you know?

Grocery store	Supermarket
Ratio: 12 dollars/ 3 gallons	Ratio: 12 dollars/ 3 gallons
Unit rate: 4 dollars/gallon	Unit rate: 4 dollars/gallon

Better deal: The grocery store. It has a cheaper unit rate.

A | Grade 6

Guided Practice

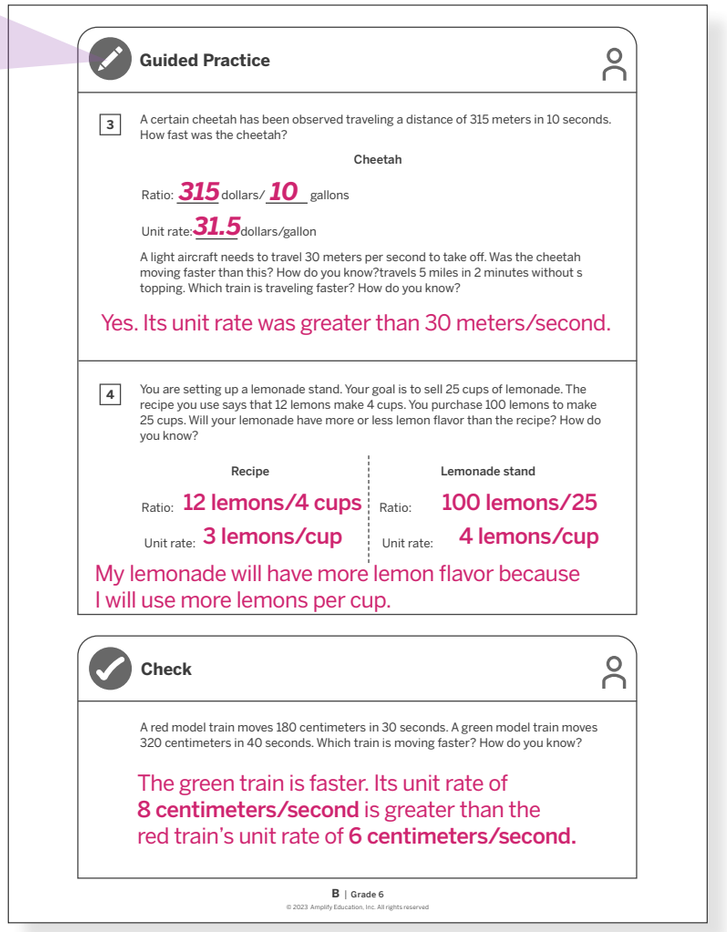
Ask:

- "What are the steps you can take to find a unit rate?"
- "How can you use the unit rate to decide which train is faster? Which store has the better deal?"

Additional Practice

Compare the unit rates.

1. An amusement park is selling 4 tickets for $18 or 5 tickets for $20. Which is the better deal? Explain your thinking.
2. A car travels 8 miles in 12 minutes at a constant speed. A motorcycle travels 6 miles in 10 minutes at a constant speed. Which was faster? Explain your thinking.
3. Jason is making pies. Store A sells 6 cans of filling for $21. Store B sells 4 cans for $9. Which store has the better deal? Explain your thinking.



Guided Practice

3 A certain cheetah has been observed traveling a distance of 315 meters in 10 seconds. How fast was the cheetah?

Cheetah

Ratio: 315 dollars/ 10 gallons

Unit rate: 31.5 dollars/gallon

A light aircraft needs to travel 30 meters per second to take off. Was the cheetah moving faster than this? How do you know?travels 5 miles in 2 minutes without s topping. Which train is traveling faster? How do you know?

Yes. Its unit rate was greater than 30 meters/second.

4 You are setting up a lemonade stand. Your goal is to sell 25 cups of lemonade. The recipe you use says that 12 lemons make 4 cups. You purchase 100 lemons to make 25 cups. Will your lemonade have more or less lemon flavor than the recipe? How do you know?

Recipe	Lemonade stand
Ratio: 12 lemons/4 cups	Ratio: 100 lemons/25
Unit rate: 3 lemons/cup	Unit rate: 4 lemons/cup

My lemonade will have more lemon flavor because I will use more lemons per cup.

Check

A red model train moves 180 centimeters in 30 seconds. A green model train moves 320 centimeters in 40 seconds. Which train is moving faster? How do you know?

The green train is faster. Its unit rate of **8 centimeters/second** is greater than the red train's unit rate of **6 centimeters/second.**

B | Grade 6

Check: Recommended Actions

What Students Did	Example	Recommended Action
Almost there Correctly calculated unit rates but did not interpret them in context.	*The red train is faster because its rate is smaller.*	Mini-lesson: • Calculating and Interpreting Unit Rates
Got it! Calculated unit rates and compared them in context.	*The rate of the red train is 6 centimeters/second. The rate of the green train is 8 centimeters/second. The green train is faster because the rate is greater.*	No action necessary.

Name _____ Date _____ **3.05**

Comparing Ratios Using Unit Rates

Modeled Review

Name: Jason

During a sale, a clothing store is selling 5 shirts for $30.
What is the unit rate? What does it represent?

$30 \div 5 = 6$ or $6/shirt.

The unit rate is $6. This represents the price of one shirt. ✓

Guided Practice

1 A commuter train travels 60 miles in 30 minutes without stopping. A subway train travels 5 miles in 2 minutes without stopping. Which train is traveling faster? How do you know?

Commuter train	Subway train
Ratio: 60 miles/ 30 minutes	Ratio: _____ miles/_____ minutes
Unit rate: 2 miles/minute	Unit rate: _____ miles/minute

Faster train: The _____ train. It has a _____ unit rate.

2 A local grocery store sells three gallons of milk for $12.00. A supermarket sells two gallons of milk for $8.50. Which is the better deal? How do you know?

Grocery store	Supermarket
Ratio: _____ dollars/_____ gallons	Ratio: _____ dollars/_____ gallons
Unit rate: _____ dollars/gallon	Unit rate: _____ dollars/gallon

Better deal:

Guided Practice

3 A certain cheetah has been observed traveling a distance of 315 meters in 10 seconds. How fast was the cheetah?

Cheetah

Ratio: _____ dollars/_____ gallons

Unit rate: _____ dollars/gallon

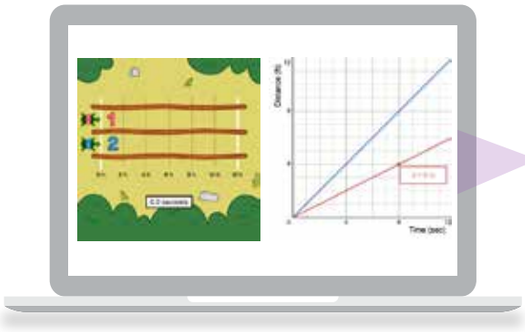
A light aircraft needs to travel 30 meters per second to take off. Was the cheetah moving faster than this? How do you know?travels 5 miles in 2 minutes without s topping. Which train is traveling faster? How do you know?

4 You are setting up a lemonade stand. Your goal is to sell 25 cups of lemonade. The recipe you use says that 12 lemons make 4 cups. You purchase 100 lemons to make 25 cups. Will your lemonade have more or less lemon flavor than the recipe? How do you know?

Recipe	**Lemonade stand**
Ratio:	Ratio:
Unit rate:	Unit rate:

Check

A red model train moves 180 centimeters in 30 seconds. A green model train moves 320 centimeters in 40 seconds. Which train is moving faster? How do you know?



Goal:

Compare proportional relationships by comparing their slopes (as determined using points or equations) or graphs.

Teacher Presentation Slides

Invite students to drag the red point, which changes the speed (slope) of the red turtle. Have them connect the graphs they make to the animated races.

Modeled Review

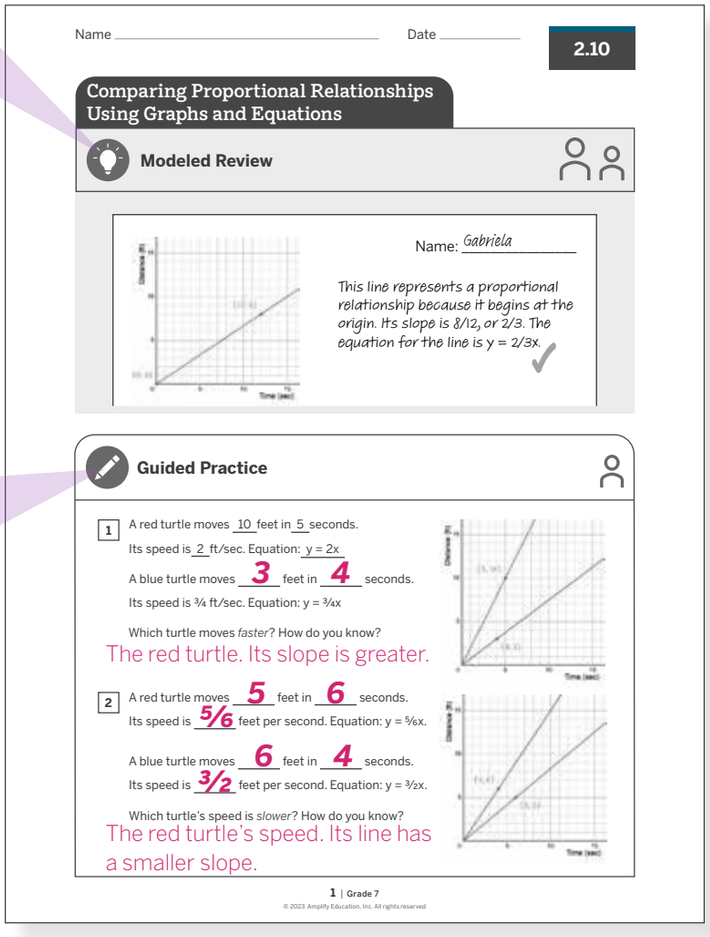
Ask:

- "How did Gabriela calculate the slope of the line?"
- "How did Gabriela determine the equation for the line?"
- "How do you know this line and equation show a *proportional relationship?*"

Guided Practice

Ask:

- "How can you calculate the slope of a proportional relationship using a point on its graph?"
- "How can you determine the equation for a proportional relationship using its slope?"
- "How can the slopes be used to compare the speeds of the turtles?"



Name _____ Date _____ 2.10

Comparing Proportional Relationships Using Graphs and Equations

Modeled Review

Name: Gabriela

This line represents a proportional relationship because it begins at the origin. Its slope is 8/12, or 2/3. The equation for the line is y = 2/3x. ✓

Guided Practice

1 A red turtle moves 10 feet in 5 seconds.
Its speed is 2 ft/sec. Equation: y = 2x
A blue turtle moves 3 feet in 4 seconds.
Its speed is ¾ ft/sec. Equation: y = ¾x
Which turtle moves *faster*? How do you know?
The red turtle. Its slope is greater.

2 A red turtle moves 5 feet in 6 seconds.
Its speed is 5/6 feet per second. Equation: y = 5/6x.
A blue turtle moves 6 feet in 4 seconds.
Its speed is 3/2 feet per second. Equation: y = 3/2x.
Which turtle's speed is *slower*? How do you know?
The red turtle's speed. Its line has a smaller slope.

1 | Grade 7

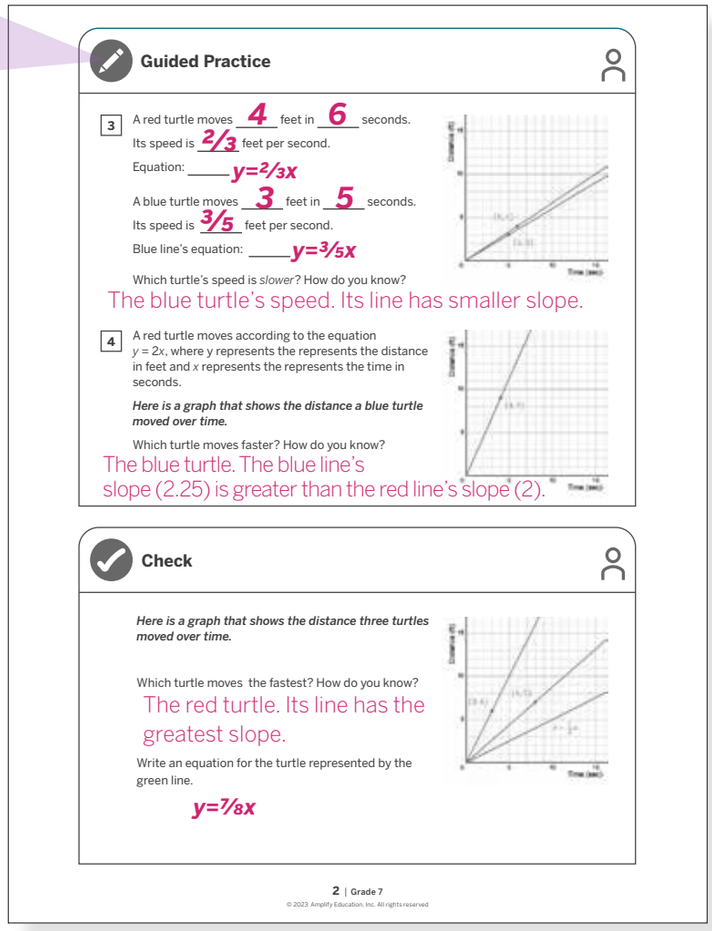
Guided Practice

Ask:

- How can you tell from the equations which turtle is faster or slower?
- How can you tell from the graphs themselves, without any arithmetic, which turtle is faster or slower?

Say:

- "When time is on the *x*-axis and distance is on the *y*-axis, a steeper line means a greater slope, which means the turtle moves at a faster rate."
- "For a steeper line, notice how a turtle has moved farther in a given amount of time."



Guided Practice

3 A red turtle moves 4 feet in 6 seconds.
Its speed is 2/3 feet per second.
Equation: y=2/3x
A blue turtle moves 3 feet in 5 seconds.
Its speed is 3/5 feet per second.
Blue line's equation: y=3/5x
Which turtle's speed is *slower*? How do you know?
The blue turtle's speed. Its line has smaller slope.

4 A red turtle moves according to the equation $y = 2x$, where y represents the represents the distance in feet and x represents the represents the time in seconds.
Here is a graph that shows the distance a blue turtle moved over time.
Which turtle moves faster? How do you know?
The blue turtle. The blue line's slope (2.25) is greater than the red line's slope (2).

Check

Here is a graph that shows the distance three turtles moved over time.
Which turtle moves the fastest? How do you know?
The red turtle. Its line has the greatest slope.
Write an equation for the turtle represented by the green line.
y=7/8x

2 | Grade 7

Check: Recommended Actions

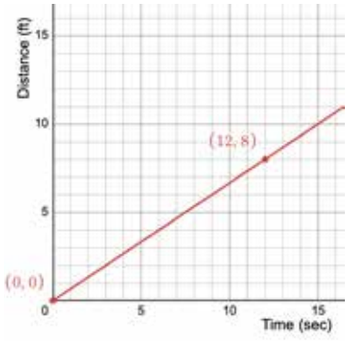
What Students Did	Example	Recommended Action
Almost there Calculated the reciprocal of the slope (horizontal distance divided by vertical distance) or thought shallower lines represented greater speeds.	*The equation for a proportional relationship whose line passes through the point (8, 7) is y= 8/7x.*	Mini-lessons: • Calculating the Slope of a Line • Interpreting the Slope of a Line
Got it! Generated equations and used them (or slopes or graphs) to compare proportional relationships.	*The red turtle moves the fastest, and the equation for the green line is y = 7/8x.*	No action necessary.

Name _____ Date _____

2.10

Comparing Proportional Relationships Using Graphs and Equations

Modeled Review



Name: Gabriela

This line represents a proportional relationship because it begins at the origin. Its slope is 8/12, or 2/3. The equation for the line is y = 2/3x. ✓

Guided Practice

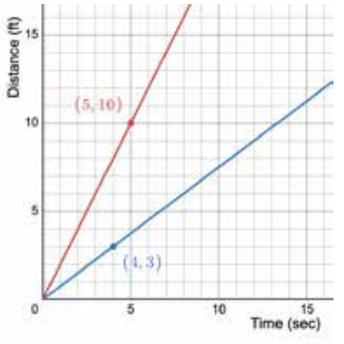
1 A red turtle moves 10 feet in 5 seconds.

Its speed is 2 ft/sec. Equation: y = 2x

A blue turtle moves _____ feet in _____ seconds.

Its speed is ¾ ft/sec. Equation: y = ¾x

Which turtle moves *faster*? How do you know?



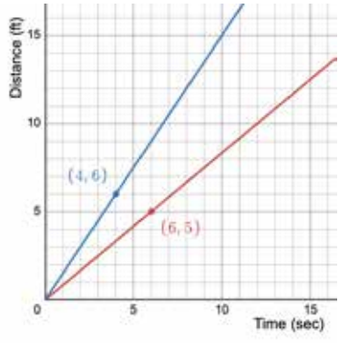
2 A red turtle moves _____ feet in _____ seconds.

Its speed is _____ feet per second. Equation: y = ⅚x.

A blue turtle moves _____ feet in _____ seconds.

Its speed is _____ feet per second. Equation: y = ³⁄₂x.

Which turtle's speed is *slower*? How do you know?



Guided Practice

3 A red turtle moves _____ feet in _____ seconds.

Its speed is _____ feet per second.

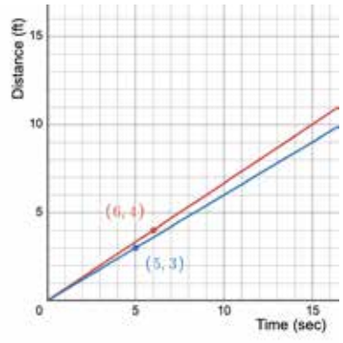
Equation: _____

A blue turtle moves _____ feet in _____ seconds.

Its speed is _____ feet per second.

Blue line's equation: _____

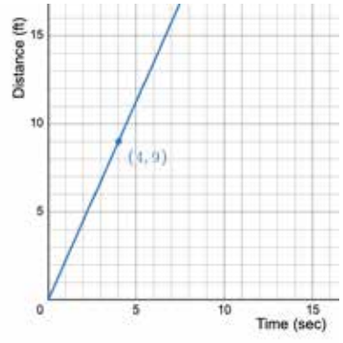
Which turtle's speed is *slower*? How do you know?



4 A red turtle moves according to the equation $y = 2x$, where y represents the represents the distance in feet and x represents the represents the time in seconds.

Here is a graph that shows the distance a blue turtle moved over time.

Which turtle moves faster? How do you know?

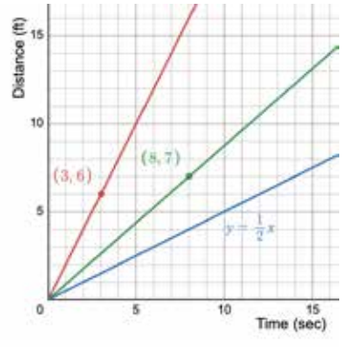


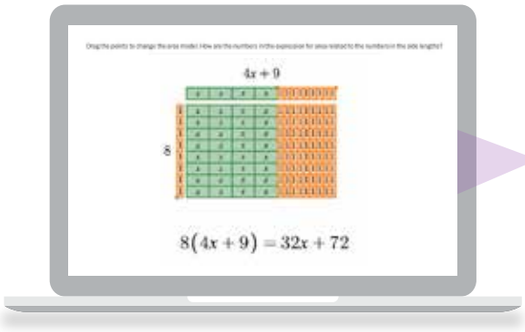
Check

Here is a graph that shows the distance three turtles moved over time.

Which turtle moves the fastest? How do you know?

Write an equation for the turtle represented by the green line.





Goal:

Solve single-variable equations with parentheses using multiple balanced steps, including the distributive property.

Teacher Presentation Screen

Invite students to change the length and width of the area model by dragging the orange and green points. Have them make connections between the numbers in these factors and the product.

Modeled Review

Say:

- "Amethyst and Joseph solved the same equation two different ways."

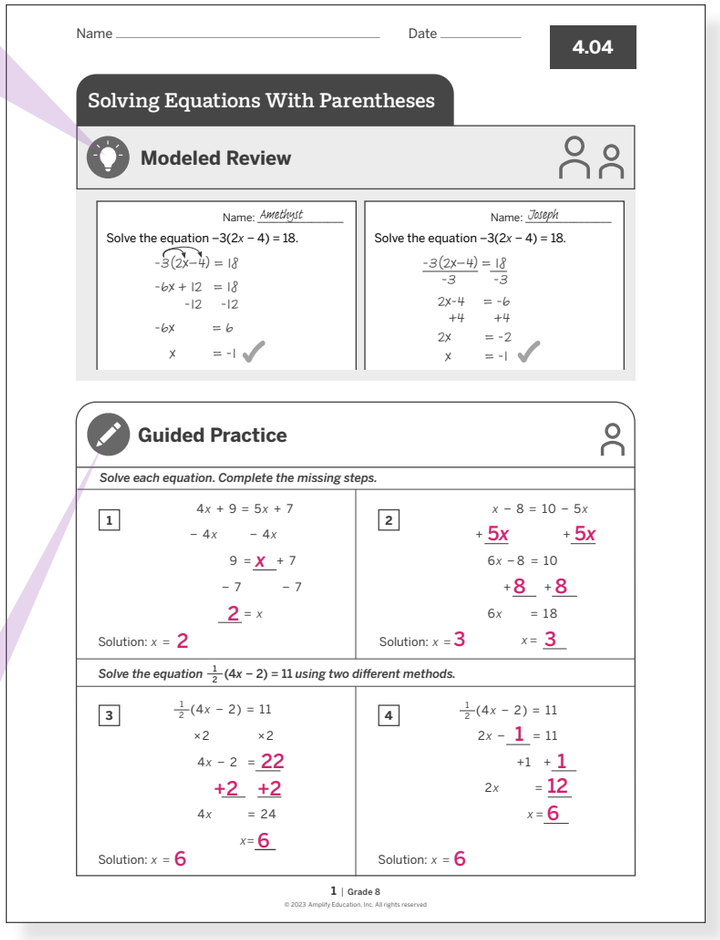
Ask:

- "What steps did each student take to solve the equation? What was each student's first step?"
- "What is the same about each student's work? What is different?"
- "Whose strategy do you think is more efficient for solving this equation?"

Guided Practice

Say:

- "Problems 3 and 4 ask you to solve the same equation two different ways, just like Amethyst and Joseph."



Name _____ Date _____ 4.04

Solving Equations With Parentheses

Modeled Review

Name: Amethyst

Solve the equation $-3(2x-4) = 18$.

$-3(2x-4) = 18$
$-6x + 12 = 18$
$-12 \quad -12$
$-6x = 6$
$x = -1$ ✓

Name: Joseph

Solve the equation $-3(2x-4) = 18$.

$\frac{-3(2x-4)}{-3} = \frac{18}{-3}$
$2x - 4 = -6$
$+4 \quad +4$
$2x = -2$
$x = -1$ ✓

Guided Practice

Solve each equation. Complete the missing steps.

1. $4x + 9 = 5x + 7$
$-4x \quad -4x$
$9 = x + 7$
$-7 \quad -7$
$2 = x$
Solution: $x = 2$

2. $x - 8 = 10 - 5x$
$+5x \quad +5x$
$6x - 8 = 10$
$+8 \quad +8$
$6x = 18$
Solution: $x = 3$ $x = 3$

Solve the equation $\frac{1}{2}(4x - 2) = 11$ using two different methods.

3. $\frac{1}{2}(4x - 2) = 11$
$\times 2 \quad \times 2$
$4x - 2 = 22$
$+2 \quad +2$
$4x = 24$
$x = 6$
Solution: $x = 6$

4. $\frac{1}{2}(4x - 2) = 11$
$2x - 1 = 11$
$+1 \quad +1$
$2x = 12$
$x = 6$
Solution: $x = 6$

1 | Grade 8

Guided Practice

Review how to distribute negative quantities in Problem 5.

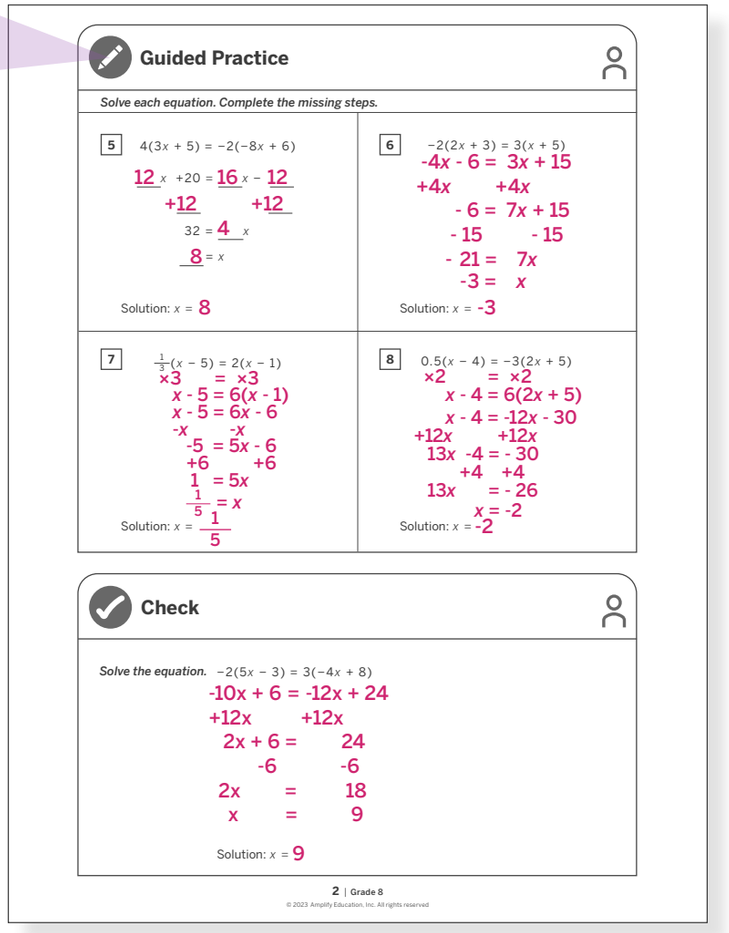
Say:

- "Before solving each equation, think about what steps and strategies you might want to use."
- "When you have finished solving, you can substitute the value of x into the original equation to check that it is true."

Additional Practice

Solve each equation.

- $\frac{1}{2}(6x + 8) = -(3x - 12)$
- $-5(x + 4) = -3(-2x - 8)$
- $-(-6x - 5) = 2(2x - 1)$
- $0.25(8x - 4) = 3(-x + 1)$



Guided Practice

Solve each equation. Complete the missing steps.

5. $4(3x + 5) = -2(-8x + 6)$

$12x + 20 = 16x - 12$

$+12 \quad +12$

$32 = 4x$

$8 = x$

Solution: $x = 8$

6. $-2(2x + 3) = 3(x + 5)$

$-4x - 6 = 3x + 15$

$+4x \quad +4x$

$-6 = 7x + 15$

$-15 \quad -15$

$-21 = 7x$

$-3 = x$

Solution: $x = -3$

7. $\frac{1}{3}(x - 5) = 2(x - 1)$

$\times 3 \quad = \times 3$

$x - 5 = 6(x - 1)$

$x - 5 = 6x - 6$

$-x \quad -x$

$-5 = 5x - 6$

$+6 \quad +6$

$1 = 5x$

$\frac{1}{5} = x$

Solution: $x = \frac{1}{5}$

8. $0.5(x - 4) = -3(2x + 5)$

$\times 2 \quad = \times 2$

$x - 4 = 6(2x + 5)$

$x - 4 = -12x - 30$

$+12x \quad +12x$

$13x - 4 = -30$

$+4 \quad +4$

$13x = -26$

$x = -2$

Solution: $x = -2$

Check

Solve the equation. $-2(5x - 3) = 3(-4x + 8)$

$-10x + 6 = -12x + 24$

$+12x \quad +12x$

$2x + 6 = 24$

$-6 \quad -6$

$2x = 18$

$x = 9$

Solution: $x = 9$

2 | Grade 8

Check: Recommended Actions

What Students Did	Example	Recommended Action
Almost there Used a distributive strategy and modified equations with balanced moves, but did not distribute the negative quantity to both terms.	*I can expand -2(5x - 3) so it becomes -10x - 6.*	Mini-lesson: • Distributive Property with Negative Numbers
Got it! Started by applying the Distributive Property of multiplying or dividing both sides of the equation. Applied further balanced moves to solve.	Solved the equation $-2(5x-3) = 3(-4x+8)$, finding the solution $x = 9$.	No action necessary.

Name _____ Date _____

4.04

Solving Equations With Parentheses

Modeled Review

Name: Amethyst

Solve the equation $-3(2x - 4) = 18$.

$-3(2x-4) = 18$

$-6x + 12 = 18$

$-12 \quad -12$

$-6x = 6$

$x = -1$ ✓

Name: Joseph

Solve the equation $-3(2x - 4) = 18$.

$\frac{-3(2x-4)}{-3} = \frac{18}{-3}$

$2x - 4 = -6$

$+4 \quad +4$

$2x = -2$

$x = -1$ ✓

Guided Practice

Solve each equation. Complete the missing steps.

1

$4x + 9 = 5x + 7$

$-4x \quad -4x$

$9 = \_\_\_ + 7$

$-7 \quad -7$

$\_\_\_ = x$

Solution: $x =$

2

$x - 8 = 10 - 5x$

$+\_\_\_ \quad +\_\_\_$

$6x - 8 = 10$

$+\_\_\_ \quad +\_\_\_$

$6x = 18$

Solution: $x =$ $x = \_\_\_$

Solve the equation $\frac{1}{2}(4x - 2) = 11$ using two different methods.

3

$\frac{1}{2}(4x - 2) = 11$

$\times 2 \quad \times 2$

$4x - 2 = \_\_\_$

$\_\_\_ \quad \_\_\_$

$4x = 24$

$x = \_\_\_$

Solution: $x =$

4

$\frac{1}{2}(4x - 2) = 11$

$2x - \_\_\_ = 11$

$+1 \quad +\_\_\_$

$2x = \_\_\_$

$x = \_\_\_$

Solution: $x =$

Guided Practice

Solve each equation. Complete the missing steps.

5 $4(3x + 5) = -2(-8x + 6)$

$\_\_\_x + 20 = \_\_\_x - \_\_\_$

$\_\_\_ \quad \_\_\_$

$32 = \_\_\_x$

$\_\_\_ = x$

Solution: $x =$

6 $-2(2x + 3) = 3(x + 5)$

Solution: $x =$

7 $\frac{1}{3}(x - 5) = 2(x - 1)$

Solution: $x =$

8 $0.5(x - 4) = -3(2x + 5)$

Solution: $x =$

Check

Solve the equation. $-2(5x - 3) = 3(-4x + 8)$

Solution: $x =$

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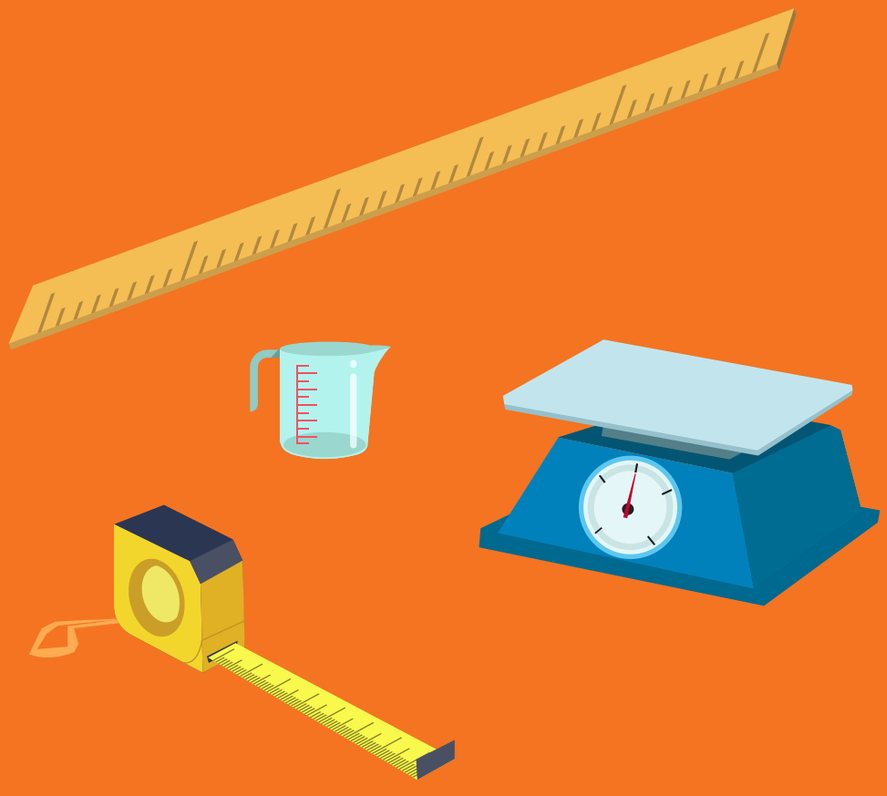

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