PROGRAM PREVIEW | **STUDENT EDITION**

Amplify Desmos Math
CALIFORNIA

Grade 6

UNIT 6 | SUB-UNIT 1

Solving Equations

About Amplify

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Amplify Desmos Math
CALIFORNIA

Grade 6

Unit 6: Expressions and Equations

Sub-Unit 1: Solving Equations

Student Edition

Unit 6

Expressions and Equations

Big Ideas in This Unit

CC2 Fraction Relationships | Generalizing Multiple Representations

Patterns Inside Numbers | Relationships Between Variables

CC3 Model the World | Nets and Surface Area

NS Generalized Numbers Leading to Algebra

Ratios, Percents, and Proportional Relationships

Questions for Investigation

- How do we represent an unknown or changing value in a math problem?
- How can we use expressions and equations to represent different mathematical situations?
- How do independent and dependent variables relate to one another?

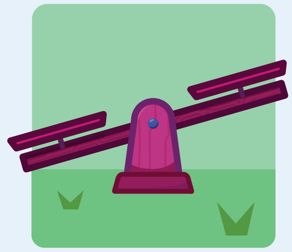
Explore: Detecting Counterfeit Coins
How can a balance scale help detect a counterfeit coin?

Sub-Unit

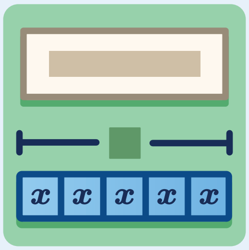
1

Solving Equations

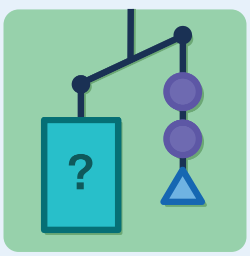
Explore
Detecting Counterfeit Coins



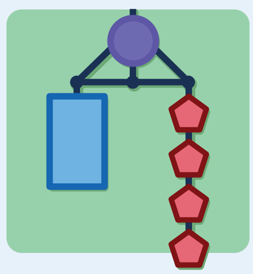
Lesson 1
Weight for It



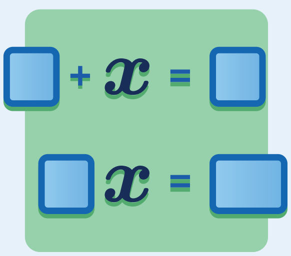
Lesson 2
Five Equations



Lesson 3
Hanging Around



Lesson 4
Hanging It Up



Lesson 5
Swap and Solve

Name: ____________ Date: ________ Period: ________

Relationships Between Variables | Building Toward 6.EE.5, SMP.2, SMP.3, SMP.8

Explore: Detecting Counterfeit Coins

How can a balance scale help detect a counterfeit coin?

Warm-Up

1 Which one doesn't belong?

A.

Nimon/Shutterstock.com

B.


AndrewStarikov/Shutterstock.com

C.

Benton Frizer/Shutterstock.com

D.

Benton Frizer/Shutterstock.com

Explain your thinking.

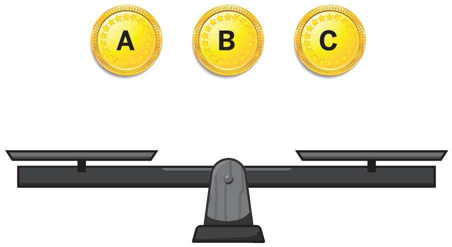
Activity

Name: ______ Date: ______ Period: ______

Counterfeit Coin

Here are three identical coins. One of these coins is counterfeit, so it is a little lighter or heavier than the other coins. The balance scale helps determine the counterfeit coin.

2 Is it possible to know which coin is counterfeit after just one weighing? Will you always know which coin is counterfeit after just one weighing?



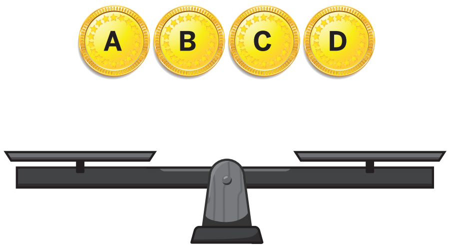
3 What is the smallest number of weighings you would need to perform to determine a coin is counterfeit?

Name: .... Date: .... Period: ....

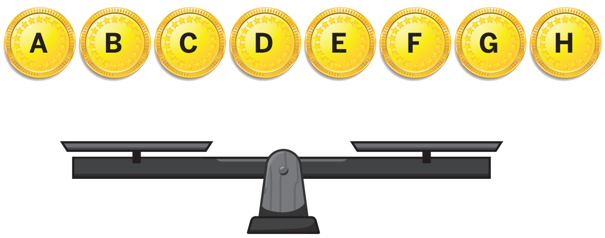
Counterfeit Coin (continued)

What is the smallest number of weighings you would need to perform so you could always say which coin is counterfeit if there are:

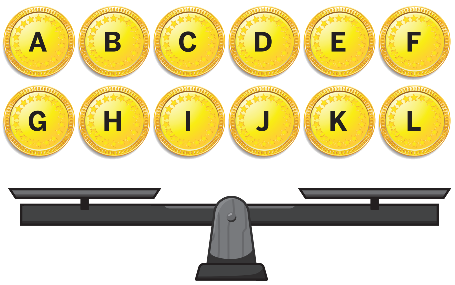
4 Four coins?



5 Eight coins?



6 Twelve coins?



Activity

Name: Date: Period:

Building Math Habits of Mind

Discuss:

- Which of these habits of mind did you strengthen during this activity?
- How did you use the one(s) you selected?

I can slow down and first make sense of a challenging problem before trying to solve it.

Not yet **Almost** **I got it!**

I can represent real-world problems using equations and inequalities and interpret their solutions within the context of the problem.

Not yet **Almost** **I got it!**

I can justify my thinking and ask questions to help me understand the thinking of others.

Not yet **Almost** **I got it!**

I can apply the math that I know to solve real-world problems, making assumptions and revising my thinking as needed.

Not yet **Almost** **I got it!**

I can select an appropriate tool to help me solve problems.

Not yet **Almost** **I got it!**

I can communicate my thinking and solutions clearly to others.

Not yet **Almost** **I got it!**

I can look for structure or patterns to help me solve problems.

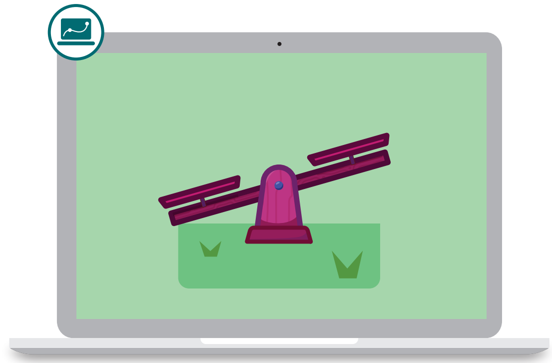
Not yet **Almost** **I got it!**

I can look for repeated calculations and other repeated steps to make generalizations.

Not yet **Almost** **I got it!**

Name: ________________ Date: ________ Period: ________

Generalizing With Multiple Representations 6.EE.6, 6.EE.7, SMP.1, SMP.2

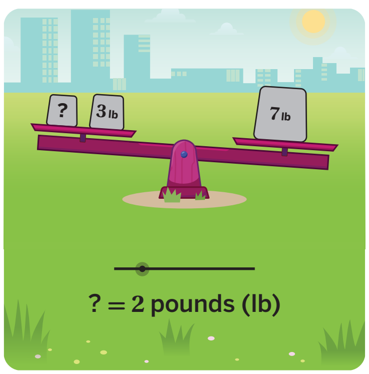


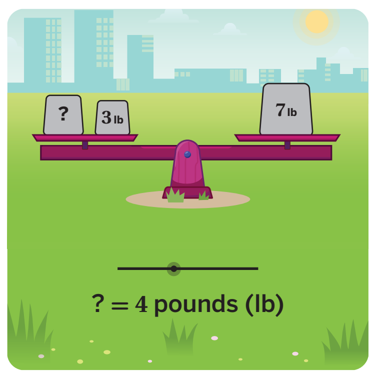
Weight for It

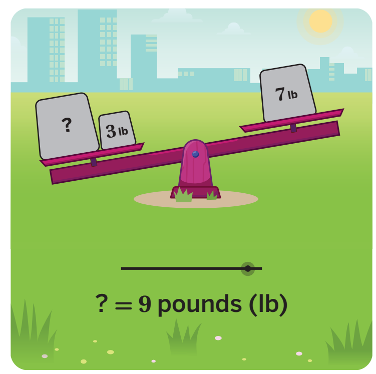
Let's use a seesaw to determine the weights of different animals.

Warm-Up

1 **a** Take a look at some weights on a seesaw.







b What do you notice? What do you wonder?

I notice:

I wonder:

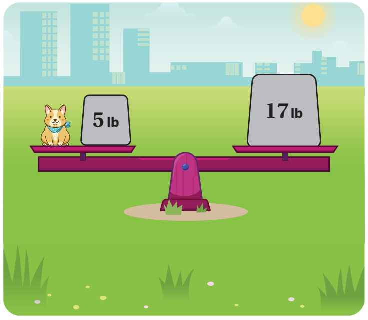
Activity 1

Name: Date: Period:

Equations and Tape Diagrams

2 This dog and a 5-pound weight balance a 17-pound weight.

How much does the dog weigh?



3 Tariq wrote an *equation* to represent the situation. He used the **variable** d to represent the dog's weight.

Explain how Tariq's equation is like the seesaw situation.

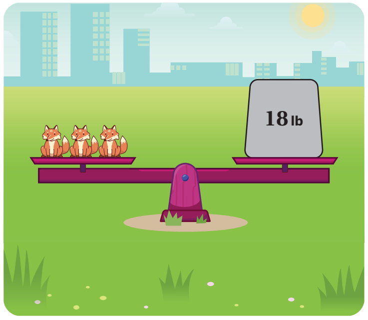
Tariq

$d + 5 = 17$

Name: Date: Period:

Equations and Tape Diagrams (continued)

4 These 3 foxes balance with an 18-pound weight. Each fox weighs the same amount.



a Choose an equation that represents this situation.

A. $3 + x = 18$

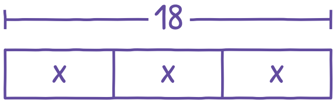
B. $3 \cdot x = 18$

C. $x + x + x = 18$

D. $3 + 18 = x$

b How much does each fox weigh?

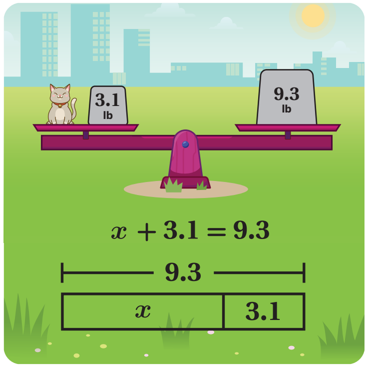
5 Tariq drew a tape diagram to determine the weight of each fox.



How are the tape diagram and the equation you chose in the previous problem alike?

6 This cat and a 3.1-pound weight balance a 9.3-pound weight.

How much does the cat weigh? Use the tape diagram if it helps with your thinking.

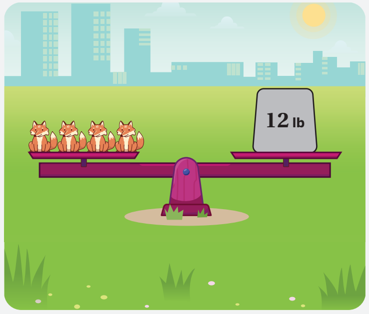
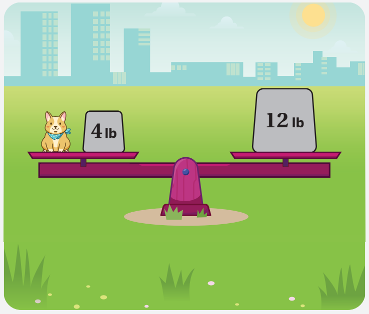


Activity 2

Name: ________ Date: ________ Period: ________

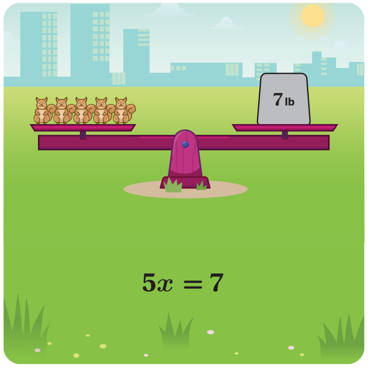
Determining Unknown Weights

7 For each equation or tape diagram, put a check mark under the balanced seesaw it represents.

		
$4 \cdot x = 12$		
$4 + x = 12$		
$x + x + x + x = 12$		
$x = 8$		
$\overbrace{\boxed{x}\boxed{x}\boxed{x}\boxed{x}}^{12}$		
$x = 3$		
$\overbrace{\boxed{4}\boxed{\quad x \quad}}^{12}$		

8 These 5 squirrels balance with a 7-pound weight. Each squirrel weighs the same amount.

How much does each squirrel weigh? Draw a tape diagram if it helps with your thinking.



Activity 3

Name: ______ Date: ______ Period: ______

Challenge Creator

9 You will use the Activity 3 Sheet to create your own seesaw challenge.

a **Make It!** On the Activity 3 Sheet, create a balanced seesaw challenge.

b **Solve It!** On this page, write an equation that represents your balanced seesaw problem. Then determine the weight of your animal. Draw a tape diagram if it helps with your thinking.

My Equation	Weight of My Animal

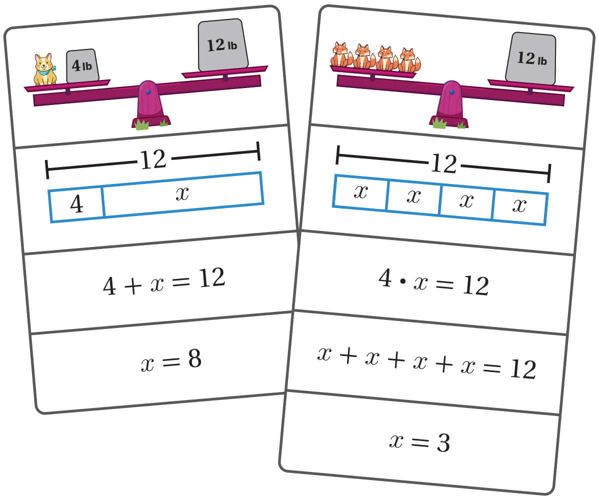
c **Swap It!** Swap your challenge with one or more partners. Write your partner's equation, then determine the weight of their animal. Draw a tape diagram if it helps with your thinking.

	Equation	Weight of One Animal
Partner 1		
Partner 2		
Partner 3		
Partner 4		

10 Synthesis

Discuss:

- How can you tell if an equation and a tape diagram match?
- What does the **variable** stand for in each representation?

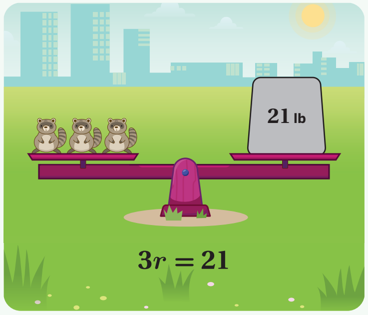


13 Summary 6.01

You can use seesaws and tape diagrams to represent *equations* and help determine unknown values.

We often use a letter, such as x or a, as a placeholder for an unknown number in tape diagrams and equations. This letter is called a **variable**.

For example, if 3 equal-weight racoons weigh a total of 21 pounds, you can represent the weight of each raccoon with r and write the equation $3r = 21$.

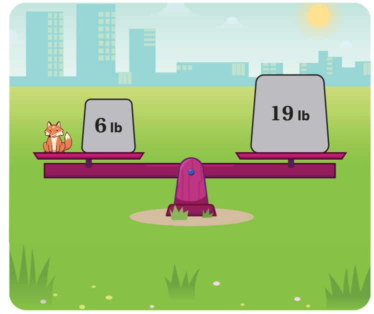


variable A letter or symbol that represents a value or set of values.

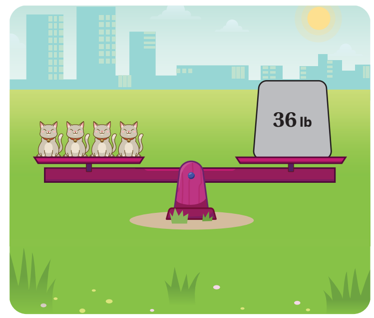
Practice
6.01

Name: ______________ Date: ________ Period: ________

1. Determine the weight of 1 fox.

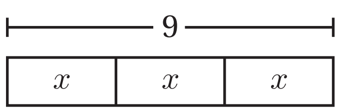


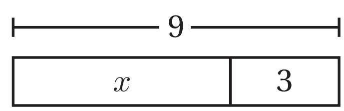
2. All 4 cats weigh the same amount. Determine the weight of 1 cat.



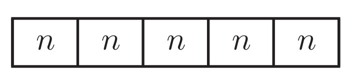
3. Match each equation to the tape diagram it represents.

$3 + x = 9$ $\quad$ $x + x + x = 9$ $\quad$ $x = 9 \div 3$ $\quad$ $3 \bullet x = 9$ $\quad$ $x = 9 - 3$





Problems 4–5: Kwabena is trying to determine the value of n in the equation $5 \bullet n = 35$. He begins drawing a tape diagram, but isn't sure how to complete it.



4. Complete Kwabena's tape diagram so it represents the equation $5 \bullet n = 35$.

5. Determine the value of n.

Practice 6.01

Name: ______________________ Date: __________ Period: __________

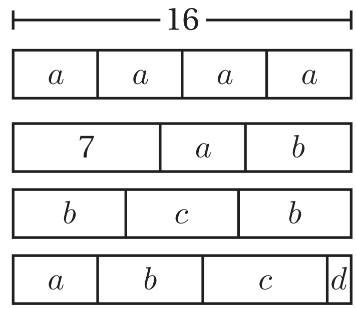
6. Determine the value of a, b, c, and d.

$a =$ ________

$b =$ ________

$c =$ ________

$d =$ ________



Spiral Review

Problems 7–8: Calculate the price per pound for each item.

7. \$2.52 for 4.5 pounds of potatoes.

8. \$7.75 for 2.5 pounds of broccoli.

Problems 9–14: Determine the missing value to create a true equation.

9. $7 + \square = 10$

10. $\square \cdot 5 = 45$

11. $23 - \square = 11$

12. $\square \div 4 = 8$

13. $\square \cdot \frac{1}{4} = 5$

14. $\square \div 10 = 12.5$

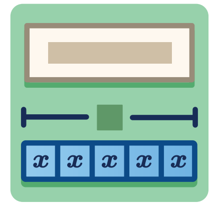
Unit 6
Lesson
2

Name: ______ Date: ______ Period: ______

Generalizing With Multiple Representations | Relationships Between Variables

6.EE.5, 6.EE.7, SMP.1, SMP.2

Five Equations



Let's represent situations with equations and tape diagrams.

Warm-Up

1. Here is a situation. Let's make sense of it together as a class.

______ cats weigh ______ pounds total.

Each cat weighs the same, so they each weigh ______ pounds.

a **Discuss:** What is this situation about?

b Let's look at the missing information. What does the variable c represent?

c Create a tape diagram or sketch that represents this situation.

d Use your tape diagram or sketch to determine the value of c.

Activity 1

Name: ________ Date: ________ Period: ________

Equations and Tape Diagrams

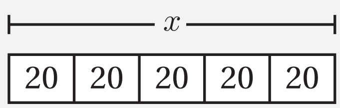
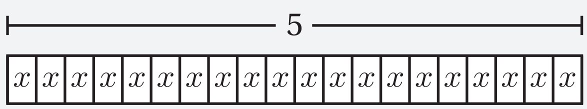
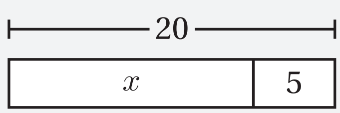
Here are five equations.

$x + 5 = 20$	$20 = x - 5$	$5 \cdot 20 = x$	$5x = 20$	$20x = 5$

2. Circle two equations that have something in common.

Discuss: How are these equations alike? How are they different?

3. Match each tape diagram with one of the equations. Two equations will not have matches.

Tape Diagram	Equation
	
	
	

4. Draw a tape diagram for an equation that did not have a match.

Tape Diagram	Equation

Name: .... Date: .... Period: ....

Equations and Tape Diagrams (continued)

5. For each equation, circle the value of x that makes the equation true.

Equation	Values
$x + 5 = 20$	$4, 10, 15, 25$
$20 = x - 5$	$5, 15, 25, 30$
$5 \bullet 20 = x$	$4, 15, 100, 200$
$5x = 20$	$4, 5, 10, 15$
$20x = 5$	$\frac{1}{4}, \frac{1}{2}, 4, 100$
$\frac{x}{5} = 20$	$\frac{1}{2}, 10, 20, 100$
$4x = 20$	$\frac{1}{2}, 4, 5, 80$
$\frac{x}{4} = 20$	$5,20, 40, 80$

6. **Discuss:** How did you determine which value makes each equation true?

Activity
2

Name: .... Date: .... Period: ....

Which Equation?

4 cats weigh 48 pounds total. Each cat weighs the same, so they each weigh c pounds.

Equation	Solution to the Equation	Solution's Meaning
$4c = 48$	$c = 12$	Each cat weighs 12 pounds.

7. What do you think a **solution to an equation** is?

You will use a set of description and situation cards.

8. Match each card with the equation that represents it.

9. Circle the solution to each equation and write the solution's meaning for each situation.

	$x - 9 = 22$	$9x = 22$	$9 + x = 22$
Matching Cards			
Solution to the Equation ($x =$ _____)			
Solution's Meaning			

Synthesis

8. **Discuss:** How can you tell which equation represents a situation? Use the example if it helps with your thinking.

Kwasi rides the subway 20 stops to get to work. After x stops, he has 5 stops left.

$x + 5 = 20$ $\qquad$ $5x = 20$

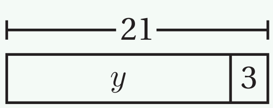
Summary 6.02

A tape diagram can help us visualize an equation and determine its solution.

When we work with an equation that represents a situation, it is important to determine what the variable represents when we determine the solution.

Here is an example.

Emmanuel needed \$21 to buy a gift. He had \$3 and borrowed the rest from his parents.

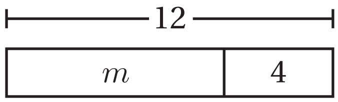
Equation	Tape Diagram	Solution to the Equation	Solution's Meaning
$3 + y = 21$		$y = 18$	Emmanuel borrowed \$18 from his parents.

substitute To replace a variable with a value or other expressions.

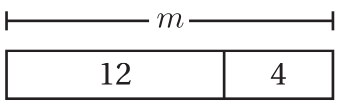
solution to an equation A value of the variable that makes the equation true.

Name: ______________ Date: ______________ Period: ______________

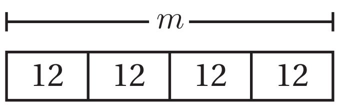
1. Match each equation to the tape diagram that represents it.

a 

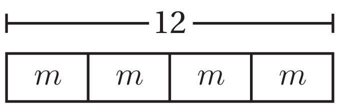
______ $12 = 4m$

b 

______ $m \div 4 = 12$

c 

______ $12 + 4 = m$

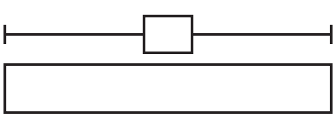
d 

______ $12 - 4 = m$

2. Which equations from Problem 1 has a solution of $m = 48$.

Problems 3–6: Aaliyah filled a water bottle with 24 ounces of water before school. She drank 15 ounces at lunch. There are x ounces of water left.

3. Draw a tape diagram to represent the situation.



4. Select *all* the equations that could represent this situation.

- ☐ A. $24 - 15 = x$
- ☐ B. $24 + 15 = x$
- ☐ C. $x + 15 = 24$
- ☐ D. $15x = 24$
- ☐ E. $24 \div 15 = x$

5. Determine the solution to one of the equations you selected in Problem 3.

6. Explain the solution's meaning in this situation.

Practice
6.02

Name: ______________________ Date: __________ Period: __________

Spiral Review

Problems 7–9: Fill in each blank to create a true equation.

7. $2.83 - 1.6 = \square$

8. $\square + 2.1 = 7$

9. $\frac{3}{4} \cdot \square = 8$

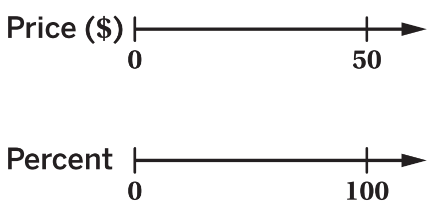
10. Fill in each blank using whole numbers from 0 to 9 so that x is the same value in each equation. Use each number only once.

$x = \square \cdot \square$ $\quad$ $x = \square + \square$ $\quad$ $x + \square = \square$

11. Select *all* the true equations.

- ☐ A. $5 + 0 = 0$
- ☐ B. $15 \cdot 0 = 0$
- ☐ C. $1.4 + 2.7 = 4.1$
- ☐ D. $\frac{2}{3} \cdot \frac{5}{9} = \frac{7}{12}$
- ☐ E. $4\frac{2}{3} = 5 - \frac{1}{3}$

12. Hailey paid $40 for a jacket. The regular price was $50. What percent of the regular price did Hailey pay? Use the double number line if it helps with your thinking.

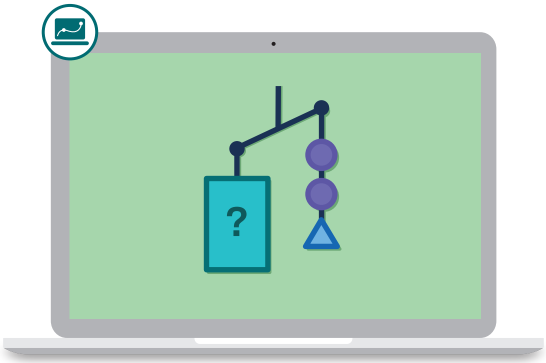


Unit 6
Lesson
3

Name: .... Date: .... Period: ....

Generalizing With Multiple Representations | Relationships Between Variables

6.EE.5, 6.EE.6, 6.EE.7, SMP.6, SMP.7

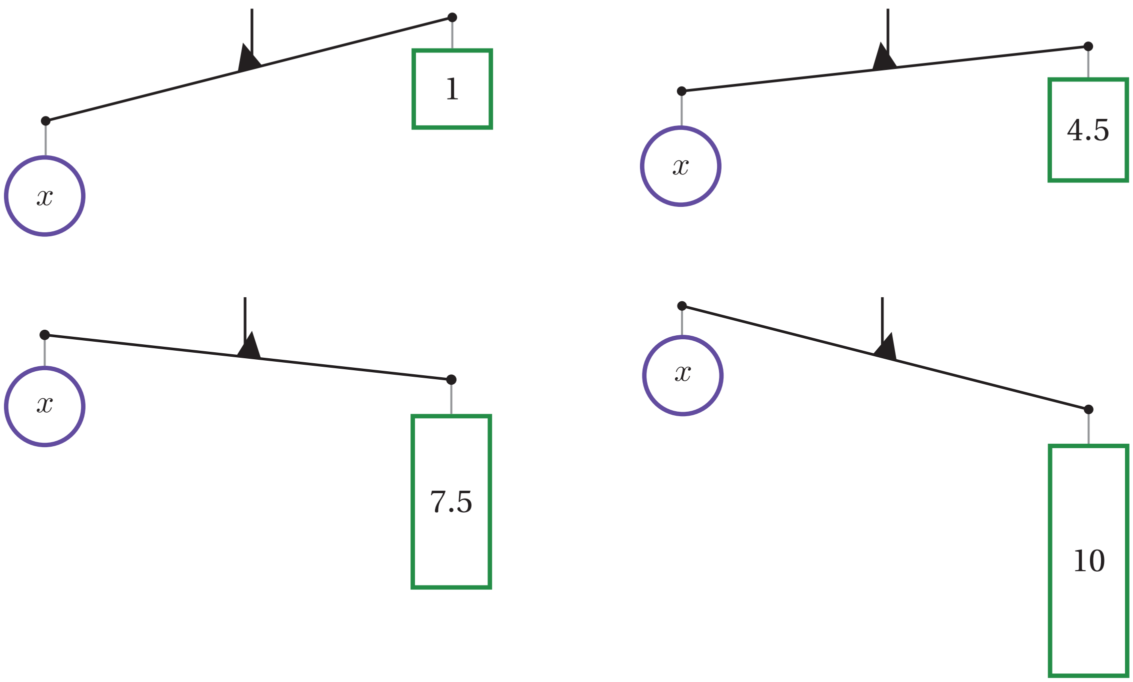


Hanging Around

Let's use balanced hangers to solve equations.

Warm-Up

1 **a** Take a look at the hangers with a circle of weight x on one side and a rectangle of different weights on the other side.



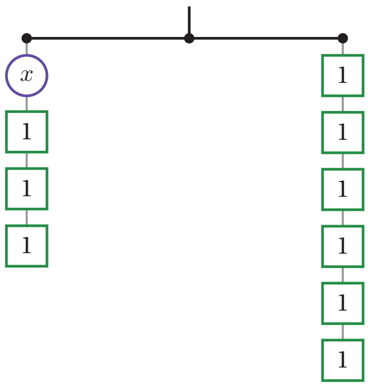
b **Discuss:** What is the weight of the circle? Explain your thinking.

Activity
1

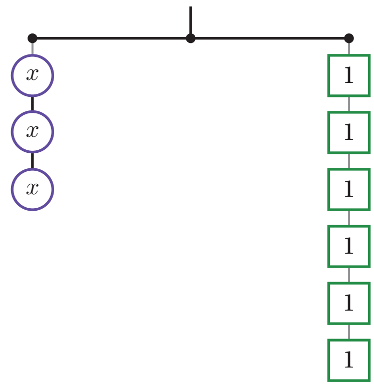
Name: ______ Date: ______ Period: ______

Connect It

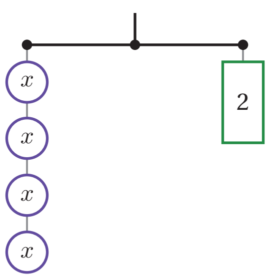
2 What value of x balances the hanger?



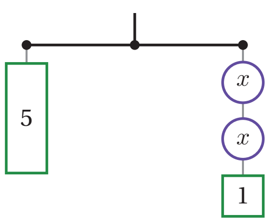
3 What value of x balances the hanger?



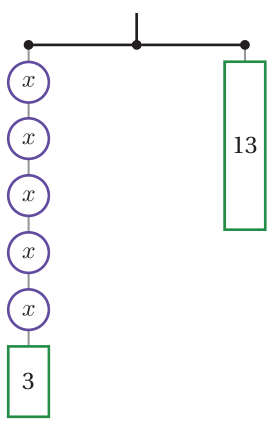
4 **a** Take a look at these hangers and the equations that represent them.



Equation: $4x = 2$



Equation: $5 = 2x + 1$



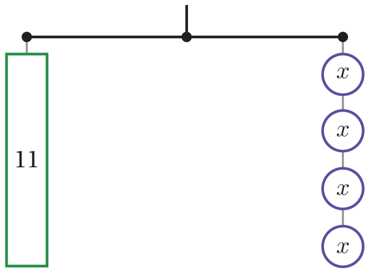
Equation: $5x + 3 = 13$

b Explain how an equation is like a hanger.

Name: ______ Date: ______ Period: ______

Make It, Solve It

5 Select an equation that represents this hanger.



A. $11 + x = 4$

B. $11 = 4x$

C. $11 = x + 4$

D. $11 = x + x + x + x$

Explain your thinking.

6 Use the hanger or the equation from the previous problem to determine the value of x that balances the hanger.

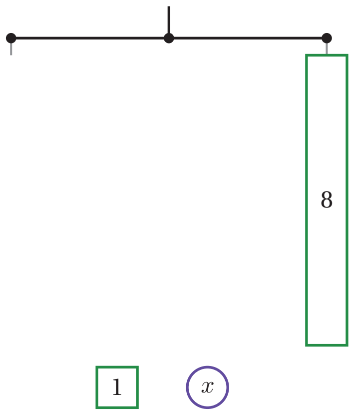
Activity
2

Name: Date: Period:

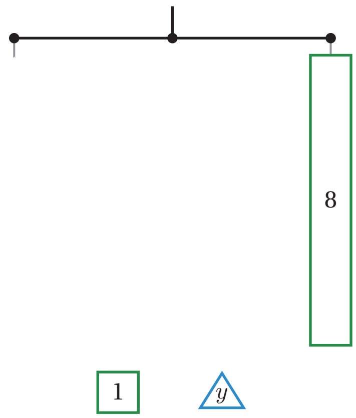
Make It, Solve It (continued)

7 Make a balanced hanger to represent each equation.

$$5x = 8$$



$$5 + y = 8$$



8 **a** Make a balanced hanger that represents $6 = x + 2$.

b What is the value of x that balances the hanger?

Activity 3

Name: .... Date: .... Period: ....

Challenge Creator

9 You will use the Activity 3 Sheet to create your own hanger challenge.

a **Make It!** On the Activity 3 Sheet, create your own balanced hanger challenge.

b **Solve It!** On this page, write the equation that represents your hanger and then determine the value of x that balances your hanger.

My Equation	Solution to My Equation

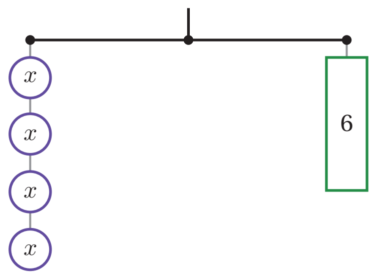
c **Swap It!** Swap your challenge with one or more partners. Write their equation, then determine the value of x that balances their hanger.

	Equation	Solution to Their Equation
Partner 1		
Partner 2		
Partner 3		
Partner 4		

10 Synthesis

How can a balanced hanger help determine the solution to an equation?

Use the hanger and equation if that helps you with your thinking.



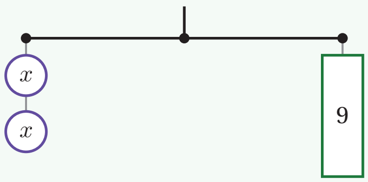
$4x = 6$

13 Summary 6.03

Hangers are a helpful way to represent equations. A hanger is balanced when the weight on both sides is equal.

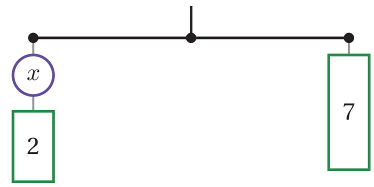
Here is an example.

This hanger represents the equation $2x = 9$, or $x + x = 9$. The solution to this equation is the value of x that will keep the hanger balanced. The solution for this hanger is 4.5 because $4.5 + 4.5 = 9$ or $2(4.5) = 9$.



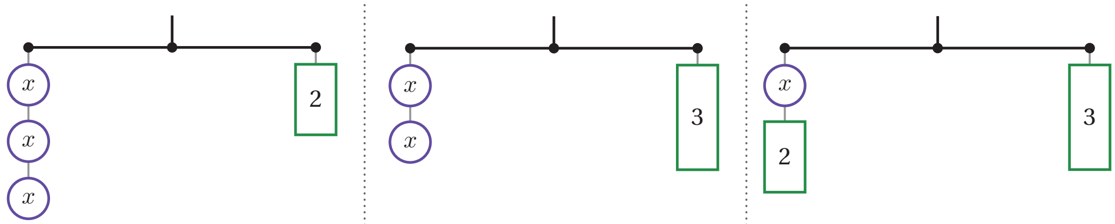
Name: ______________________ Date: __________ Period: __________

1. Anushka says that to balance this hanger the value of x must be 7. Is she correct? Explain your thinking.



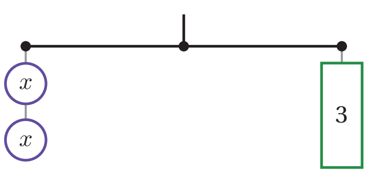
2. Match each equation to the hanger it represents. One equation will have no match.

$2x = 3$	$2 + x = 3$	$3 + x = 2$	$3x = 2$

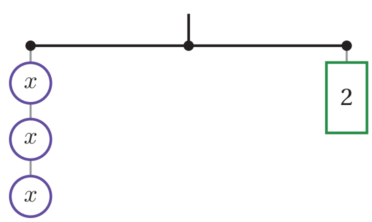


Problems 3–4: Determine the value of x that balances the hanger.

3.



4.



Spiral Review

Problems 5–8: Determine the value of each expression.

5. $12 + 2.4$

6. $12 \cdot 2.4$

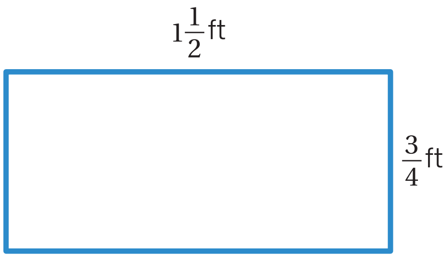
7. $12 - 2.4$

8. $12 \div 2.4$

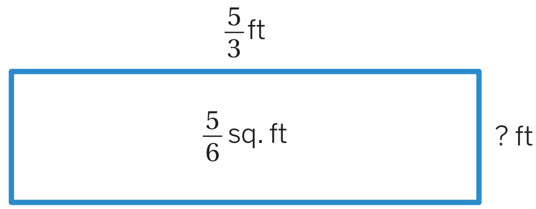
Practice
6.03

Name: ______________ Date: ______ Period: ______

9. Calculate the area of this rectangle.



10. Calculate the length of this rectangle.



11. Precious set a goal to save $\$20$ for a new game. Complete the table to show how much money Precious saved at different percentages of her goal.

Percentage of Goal (%)	Money Saved ($)
25	
75	
125	

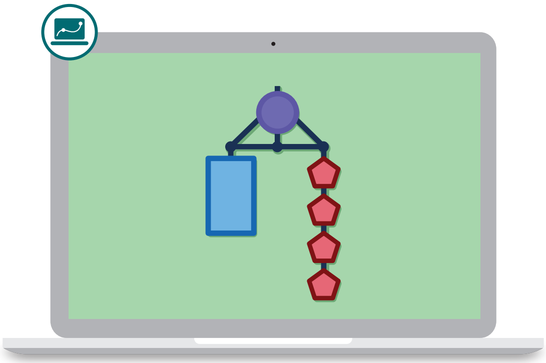
12. Select *all* of the equations that have a solution of $m = 7$.

- ☐ **A.** $2m = 21$
- ☐ **B.** $m + 9 = 16$
- ☐ **C.** $3m = 21$
- ☐ **D.** $40 - m = 23$
- ☐ **E.** $m - 6 = 1$

Unit 6
Lesson
4

Name: ______ Date: ______ Period: ______

Fraction Relationships | Generalizing With Multiple Representations | 6.EE.5, 6.EE.6, 6.EE.7, 6.NS.1, SMP.5, SMP.7



Hanging It Up

Let's use a variety of strategies to solve equations.

Warm-Up

Determine the value of each expression mentally. Try to think of more than one strategy.

1. $10 \div \frac{1}{3}$

2. $10 \div \frac{2}{3}$

3. $\frac{10}{3} \div \frac{1}{3}$

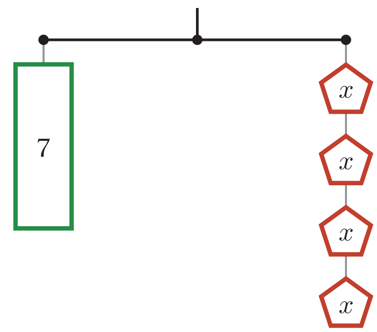
4. $\frac{10}{9} \div \frac{1}{3}$

Activity 1

Name: .... Date: .... Period: ....

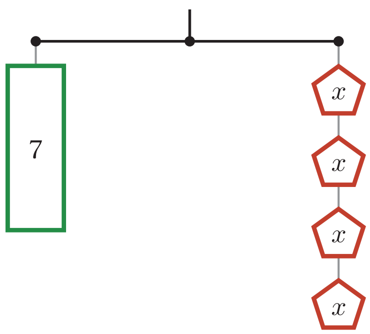
Methods for Solving

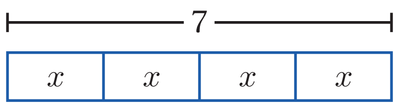
5 **a** Write an equation that matches the hanger.



b What is the *solution* to this equation?

6 Here are two different representations of the equation $7 = 4x$.





Discuss: How can you determine the solution using each representation?

7 Here is how Fabiana solved the equation $7 = 4x$. Describe her strategy.

Fabiana

$$\frac{7}{4} = \frac{4x}{4}$$

Activity 2

Name: ______ Date: ______ Period: ______

Solving and Solutions

8 Match each solution to its equation. One solution will not have a match.

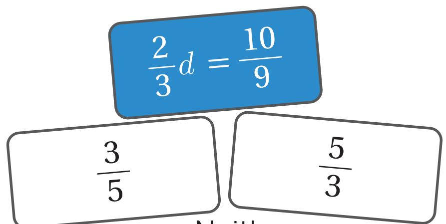
13	4.8	$\frac{5}{3}$	$\frac{3}{5}$	$\frac{1}{8}$

$2a = \frac{1}{4}$	$2.6 = \frac{1}{5}b$	$\frac{c}{4} = 1.2$	$\frac{2}{3}d = \frac{10}{9}$

9 Imani and Deiondre solved this equation.

Imani said the solution is $d = \frac{3}{5}$.

Deiondre said the solution is $d = \frac{5}{3}$.



Whose solution is correct? Circle one.

Imani's | Diondre's | Both | Neither

Explain your thinking.

Activity 2

Name: ______ Date: ______ Period: ______

Solving and Solutions (continued)

10 Here are Fabiana's and Alejandro's strategies for solving $\frac{c}{4} = 1.2$.

Fabiana

$$\frac{c}{4} = 1.2$$
$$\times 4 \qquad \times 4$$
$$c = 4.8$$

Alejandro

$$\frac{c}{4} = 1.2$$
$$\frac{c}{4} = 1$$
so . . .
$$\frac{4.8}{4} = 1.2$$

Discuss: How are their strategies alike? How are they different?

11 Use Fabiana's strategy to solve the equation $3.5 = x + 2.01$.

Activity 3

Name: ______ Date: ______ Period: ______

Repeated Challenges

12

- Decide with your partner who will complete Column A and who will complete Column B.
- The solutions in each row should be the same. Compare your solutions, then discuss and resolve any differences.
- Solve as many equations as you have time for. Sense-making is more important than speed.

	Column A	Column B
a	$36 = 4x$ $x =$ ______	$7x = 63$ $x =$ ______
b	$13 = x + 5$ $x =$ ______	$21 = x + 13$ $x =$ ______
c	$\frac{1}{3} = 2x$ $x =$ ______	$3x = \frac{1}{2}$ $x =$ ______
d	$x + 6.17 = 9$ $x =$ ______	$12.22 = x + 9.39$ $x =$ ______

Activity
3

Name: ________ Date: ________ Period: ________

Repeated Challenges (continued)

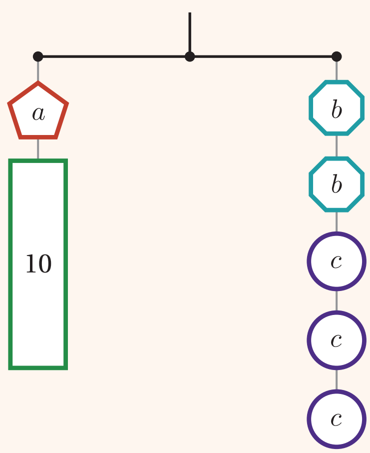
	Column A	Column B
e	$x + 1.8 = 14.7$ $x =$ ________	$x + 5.3 = 18.2$ $x =$ ________
f	$\frac{1}{2}x = 16$ $x =$ ________	$4 = \frac{1}{8}x$ $x =$ ________
g	$\frac{7}{8} = x + \frac{1}{4}$ $x =$ ________	$x + \frac{1}{16} = \frac{11}{16}$ $x =$ ________

You're invited to explore more.

13 Complete the table with values for a, b, and c that will make the hanger balance.

Try to determine as many different sets of values as you can.

a	b	c



14 Synthesis

Discuss: What is a strategy for solving an equation?

Use the examples if they help with your thinking.

$3x = 18$

$3 + x = 15.6$

17 Summary 6.04

There are many strategies to solve equations, such as drawing models, using number sense to determine the value that makes an equation true, making a hanger balanced, or using inverse operations to isolate a variable.

Here are two examples that use inverse operations to solve an equation.

Equation	Explanation
$x + 1.5 = 3.25$	Original equation
$x + 1.5 - 1.5 = 3.25 - 1.5$	Subtract 1.5 from both sides.
$x = 1.75$	The solution to this equation is 1.75.

Equation	Explanation
$\frac{1}{2}y = 54.$	Original equation
$\frac{1}{2}y \div \frac{1}{2} = 54 \div \frac{1}{2}$	Divide both sides by $\frac{1}{2}$.
$y = 108$	The solution to this equation is 108.

Practice
6.04

Name: ______________________ Date: __________ Period: __________

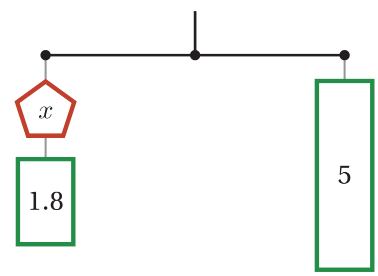
1. Select *all* the equations that have a solution of $n = 11$.

☐ **A.** $2n = 22$ ☐ **B.** $23 - n = 12$ ☐ **C.** $4n = 411$

☐ **D.** $n \div 1 = 11$ ☐ **E.** $n - 7 = 4$

Problems 2–3: Use the hanger diagram if it helps with your thinking.

2. Determine the value of x in the equation $x + 1.8 = 5$.



3. Vihaan says the solution to $x + 1.8 = 5$ is $x = 6.8$. Explain how you know this is incorrect.

Problems 4–9: Solve each equation. Draw a hanger or tape diagram if it helps with your thinking.

4. $4m = 8$

5. $\frac{1}{2}a = \frac{5}{8}$

6. $10d = 32$

7. $w + 5.2 = 17$

8. $1.5x = 0.9$

9. $24.6 = 6.1 + c$

Practice
6.04

Name: ____________ Date: ________ Period: ________

10. Fill in each blank using the numbers 0 to 9 so that x has the same value in each pair of equations. Each number can only be used once.

$x = \square$

$x + \square = \square$

$x = \square$

$x + \square = \square$

Spiral Review

11. Calculate each product.

Expression	Product
$212 \cdot 2$	
$21.2 \cdot 0.2$	
$21.2 \cdot 0.02$	

12. Kweku and Javier each used a different strategy to determine 25% of 60. Whose strategy is correct? Circle one.

Kweku
60×25

Javier
$60 \div 4$

Kweku's Javier's Both Neither

Explain your thinking.

Problems 13–14: A rectangle has an area of 14 square units. It has side lengths x and y. Determine the value of y based on the value of x.

13. $x = 2\frac{1}{3}$

14. $x = 4\frac{1}{5}$

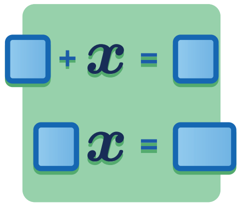
Unit 6
Lesson
5

Name: ______ Date: ______ Period: ______

Generalizing With Multiple Representations

6.EE.6, 6.EE.7, SMP.1, SMP.2, SMP.6

Swap and Solve



Let’s write and solve equations.

Warm-Up

1. Here is a situation with hidden information. Let’s make sense of it as a class.

Takeshi has ____ to spend on laundry. It costs ____ to wash and dry each load. Takeshi can wash ____ loads of laundry.

2. Dhruv and Nyanna each wrote an equation to represent this situation.

Dhruv	Nyanna
$p = 21 \cdot 3.50$	$3.50p = 21$

Whose equation is correct? How do you know?

Activity 1

Name: ________ Date: ________ Period: ________

Solving Equations with a Partner

3. With your partner, decide who will be Partner A and who will be Partner B. For each equation, the person who has the variable on their side will go first! Share the operation to isolate the variable with your partner to solve each equation. Together, explain what you did and check your solution.

Partner A		Partner B	Rationale	Check
18 $\frac{18}{2}$ 9	$=$ $=$ $=$	$2x$ $\frac{2x}{2}$ x	**Partner** <u>B</u>: Because $2x$ represents 2 times x, I need to divide the side with the variable by 2. **Partner** <u>A</u>: To maintain equality both sides need to be divided by 2.	$18 = 2x$ $18 = 2 \cdot 9$ $18 = 18$ ✅
$\frac{x}{5}$	$=$		**Partner** ____: **Partner** ____:	
5	$=$	$x + 2.17$	**Partner** ____: **Partner** ____:	
17	$=$	$x - 9$	**Partner** ____: **Partner** ____:	

Activity
2

Name: Date: Period:

Trade and Solve

Takeshi has $21 to spend on laundry. It costs $3.50 to wash and dry each load. Takeshi can wash p loads of laundry.

Equation	Solution	Solution Check	Solution's Meaning
$3.50p = 21$	$p = 6$	$3.50 \cdot 6 = 21$	Takeshi can wash and dry 6 loads of laundry for $21.

4. What do you think a solution's meaning is?

5. Here is a new set of equations. Circle an equation and solve it for x.

Equations:

$x + \frac{3}{4} = 6$ $\quad$ $\frac{3}{4}x = 6$ $\quad$ $6x = \frac{3}{4}$ $\quad$ $x - 0.25 = 20$ $\quad$ $0.25x = 20$

6. Write a situation to match this equation. Make sure to include what the variable represents in your situation.

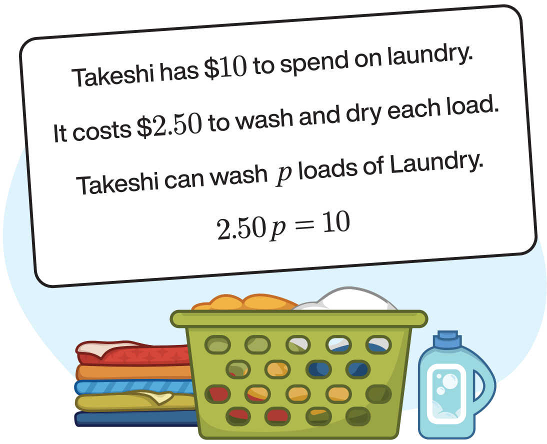
7. You will need two different partners for this problem. With each partner, trade the slips of paper with your situations and complete the table for their situation.

Partner's Name	Equation	Solution	Solution Check	Solution's Meaning

Synthesis

8. **Discuss:**

- What do you think is important to remember when writing equations to represent situations?
- How do the **properties of equalities** help you determine the solution to equations?



Summary 6.05

Writing an equation to match a situation is a helpful tool when trying to determine an unknown value. The **properties of equality** tell you the equation will still be true if you perform the exact same operations on both sides of the equal sign. The table shows the four properties of equality, using the variables a and b to represent any numbers.

Property of Equality	The equation will still be true, when the same
addition property of equality	number is added to both sides of the equation.
subtraction property of equality	number is subtracted from both sides of the equation.
multiplication property of equality	number is multiplied by both sides of the equation.
division property of equality	nonzero number is divided by both sides of the equation.

properties of equality Rules that apply to all equations such as properties of addition, subtraction, multiplication, and division. It states that if an equation is true, then performing the same operation to both sides of the equal sign will keep the equation true.

Name: .... Date: .... Period: ....

1. Anika buys 5 notebooks that contain 60 pages each. Select *all* the equations that represent the total number of pages, p.

- ☐ **A.** $p = 60 \div 5$
- ☐ **B.** $5 + 60 = p$
- ☐ **C.** $p = 5 \cdot 60$
- ☐ **D.** $p \div 5 = 60$
- ☐ **E.** $5p = 60$

2. Tiara buys a pack of paper with 200 sheets. She divides the sheets of paper equally into 5 binders. Select *all* the equations that represent the number of sheets of paper in each binder, b.

- ☐ **A.** $b = 200 \div 5$
- ☐ **B.** $200 \div b = 5$
- ☐ **C.** $b = 5 \cdot 200$
- ☐ **D.** $b \div 5 = 200$
- ☐ **E.** $5b = 200$

Problems 3–4: Here is an equation: $\frac{1}{2} + x = 4$.

3. Write a situation that the equation could represent.

4. Describe the meaning of the x in your situation.

Problems 5–6: A plant in Zahra's garden grows 0.8 inches taller each week. After x weeks, the plant has grown 6 inches.

5. Write an equation that could represent this situation.

6. Describe the meaning of the x in the situation.

7. Anika traveled 196 miles last week from Yosemite National Park to Lake Tahoe. This was four times as far as Tiara traveled, t.

Select *all* the equations that represent this situation. Then determine how far Tiara traveled?

- ☐ **A.** $4t = 196$
- ☐ **B.** $t = \frac{1}{4} \cdot 196$
- ☐ **C.** $196 \div 4 = t$
- ☐ **D.** $t = 196 \cdot 4$
- ☐ **E.** $\frac{t}{4} = 196$

$t =$ ....

Name: ________ Date: ________ Period: ________

Spiral Review

8. Use the numbers 0 to 9 to complete each equation so that the value of x is the same. Use each number only once.

$\square x = \square$ $\quad\quad$ $x + \square = \square$ $\quad\quad$ $x - \square = \square$

9. Select *all* the equations that have a solution of $c = 1.5$.

- ☐ **A.** $4c = 41.5$
- ☐ **B.** $150 \div c = 100$
- ☐ **C.** $13.5 - c = 10$
- ☐ **D.** $6c = 9$
- ☐ **E.** $0.2c = 0.3$

Problems 10–12: Solve each equation.

10. $6m = 33$ $\quad\quad$ **11.** $p + 7.04 = 11.8$ $\quad\quad$ **12.** $n + \frac{3}{5} = \frac{8}{10}$

13. Compare the information given about triangle C and triangle D.

Triangle C	**Triangle D**
Base $= 12$ inches	Base $= 15$ inches
Height $= 8$ inches	Height $= 6.5$ inches

Which triangle has the greater area?

Explain your thinking.

Notes

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