VOLUME 2

enVision® Mathematics

SAVVAS

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Lesson 5-1
Write Two-Step Equations

Go Online

I can...
represent a problem with a two-step equation.

Explore It!

ACTIVITY

Marley collects golf balls. His neighbor Tucker collects 3 more than twice as many golf balls as Marley.

A. How can you use a table to represent the number of golf balls in Marley's collection, m, and the number of golf balls in Tucker's collection?

B. How can you use an algebraic expression to represent the number of golf balls in Tucker's collection?

Focus on math practices

Look for Relationships How do the terms of the expression you wrote in Part B relate to the values in the table?

Essential Question How does an equation show the relationship between variables and other quantities in a situation?

VISUAL LEARNING ASSESS

EXAMPLE 1 Write a Two-Step Equation to Represent a Situation

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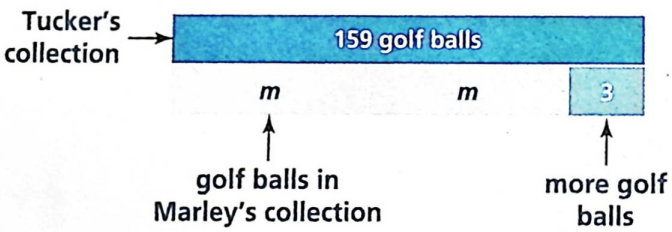
What equation can be used to represent the numbers of golf balls in Marley's and Tucker's collections?

Model with Math
How can an equation represent a given situation?

Use a bar diagram to represent the situation.



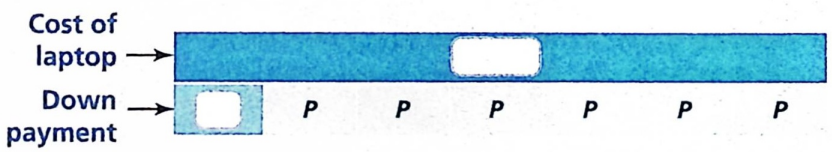
Use the bar diagram to write an equation.

Tucker's collection	=	twice Marley's collection	+	more golf balls
159	=	$2m$	+	3

The equation $159 = 2m + 3$ can be used to represent Marley's and Tucker's golf ball collections.

Try It!

Cole buys a new laptop for $335. He makes a down payment of $50 and pays the rest in 6 equal monthly payments, p. What equation represents the relationship between the cost of the laptop and Cole's payments?



cost = ☐ + ☐ × monthly payment

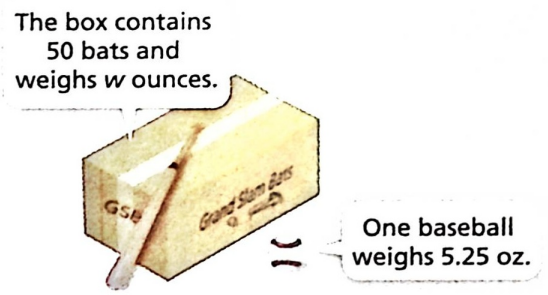
☐ = ☐ + ☐ × ☐

☐ = ☐

Convince Me! Why are both multiplication and addition used in the equation that represents Cole's monthly payments?

EXAMPLE 2 Write More Two-Step Equations

A baseball weighs 25.75 ounces less than a bat. Write an equation that represents the relationship between the weights of a baseball and a bat in terms of the weight of the box, *w*.



weight of one baseball	=	weight of one bat	−	difference in weight
5.25	=	$\frac{\text{weight of box}}{\text{number of bats in box}}$	−	25.75
5.25	=	$\frac{w}{50}$	−	25.75

The equation $5.25 = \frac{w}{50} - 25.75$ can be used to represent the relationship between the weights of a baseball and a bat.

Try It!

Marcia and Tamara are running a race. Marcia has run 4 kilometers. Tamara has completed $\frac{3}{4}$ of the race and is 2.5 kilometers ahead of Marcia. Write an equation that represents the relationship between the distances each girl has run. Let *k* represent the total length of the race in kilometers.

EXAMPLE 3 Interpret Quantities and Operations in Equations

Claire bought 8 tickets for a total cost of $104. She had used a coupon code to get $3 off each ticket. Let *x* be the original cost of each ticket. Which of the following equations correctly represents the situation?

$3(x - 8) = 104$ — Total cost

$3(x - 8)$: $3 discount times the difference of 8 tickets and the cost per ticket

$8x - 3 = 104$ — Total cost

$8x - 3$: 8 tickets times the cost per ticket minus a total discount of $3

$8(x - 3) = 104$ — Total cost

$8(x - 3)$: 8 tickets times the difference of the cost per ticket and $3.

The equation $8(x - 3) = 104$ represents this situation.

Try It!

At the mall, Claire buys a hat that is 60% off and socks that are reduced to $5.49. She spends a total of $9.49. Let *x* represent the cost of the hat. Which of the following equations correctly represents Claire's shopping trip?

$0.4x + 5.49 = 5.09$ $0.4x + 5.49 = 9.49$ $0.6x + 9.49 = 5.49$

KEY CONCEPT

You can write an equation with more than one operation to represent a situation.

$3(x + 5) = 24$

This two-step equation uses multiplication and addition.

$\frac{x}{4} - 15 = 18$

This two-step equation uses division and subtraction.

Do You Understand?

1. **Essential Question** How does an equation show the relationship between variables and other quantities in a situation?

2. **Use Structure** Do the equations $\frac{1}{5}x + 2 = 6$ and $\frac{1}{5}(x + 2) = 6$ represent the same situation? Explain.

3. How do you decide which operations to use when writing an equation?

Do You Know How?

4. Rita started the day with r apps. Then she deleted 5 apps and still had twice as many apps as Cora has. Write an equation that represents the number of apps each girl has.

5. Write a problem that could be represented by the equation $5n - 6 = 19$.

6. Kayleigh babysat for 11 hours this week. That was 5 fewer than $\frac{2}{3}$ as many hours as she babysat last week, h. Write an equation to represent the number of hours she babysat each week.

Name: _____

Practice & Problem Solving

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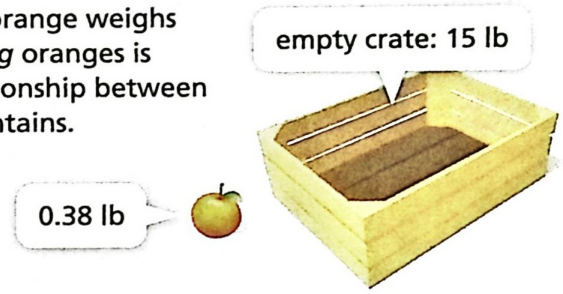
7. A farmer ships oranges in wooden crates. Suppose each orange weighs the same amount. The total weight of a crate filled with g oranges is 24.5 pounds. Write an equation that represents the relationship between the weight of the crate and the number of oranges it contains.

$24.5 = \square + \square \times \square$



8. Jordan wrote the following description: Three fewer than one fourth of x is 12. Write an equation to represent the description.

9. At a graduation dinner, an equal number of guests were seated at each of 3 large tables, and 7 late-arriving guests were seated at a smaller table. There were 37 guests in all. If n represents the number of people seated at each of the large tables, what equation represents the situation?

10. Last night, 4 friends went out to dinner at a restaurant. They split the bill evenly. Each friend paid \$12.75 for his or her meal and each left the same amount for a tip, t. The total dinner bill including the tip was \$61. What equation could you use to describe the situation?

11. Mia buys $4\frac{1}{5}$ pounds of plums. The total cost after using a coupon for 55¢ off her entire purchase was \$3.23. If c represents the cost of the plums in dollars per pound, what equation could represent the situation?

For 12 and 13, use the equation shown at the right.

$$\frac{g+3}{6} = 15$$

12. Describe a situation that the equation could represent.

13. Reasoning Would the situation you wrote for Problem 12 work if the denominator in the equation were doubled? Explain why or why not.