Unit 4, Lesson 5

Represent Situations with Equations

Let's use equations to represent and solve real-world problems.

5.1 Jada's Reading Routine

Jada reads 25 pages of a book every day. After several days, she has read the entire book.

5.2 Storytime

Here are three situations and six equations. Which equation best represents each situation? If you get stuck, consider drawing a diagram.

$x + 5 = 20$ $\quad$ $x = 20 + 5$ $\quad$ $5x = 20$

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

1. After Elena rode her bike for 5 miles on Friday, she had biked a total of 20 miles for the week. She biked x miles before Friday.

2. Andre's school has 20 clubs, which is five times as many clubs as his cousin's school has. His cousin's school has x clubs.

3. Jada volunteers at the animal shelter. She divides 5 cups of cat food equally to feed 20 cats. Each cat receives x cups of food.

5.3 Choosing Equations to Match Situations

Circle **all** of the equations that describe each situation. Then find the solution for those equations and tell what it means in the situation.

1. Kiran scores 223 fewer points in a computer game than Mai. Mai scores 409 points. How many points does Kiran score?

   $z =$ _____

   - $223 = 409 - z$
   - $409 - 223 = z$
   - $409 + 223 = z$
   - $409 = 223 + z$

2. Clare learned that on a sunny day, one solar panel produces 1.5 kilowatt hours (kWh) of electricity. That's enough electricity to charge a smartphone 100 times! How many kWh of electricity is used to charge a smartphone one time?

   $p =$ _____

   - $1.5p = 100$
   - $1.5 = 100p$
   - $p = 1.5 \cdot 100$
   - $1.5 \div 100 = p$

3. Han is charging a school tablet with a new charging cable, which is $2\frac{5}{6}$ feet longer than the old cable. The new cable is 6 feet long. How long is the old cable?

   $x =$ _____

   - $x + 2\frac{5}{6} = 6$
   - $x = 6 + 2\frac{5}{6}$
   - $x - 6 = 2\frac{5}{6}$
   - $6 - 2\frac{5}{6} = x$

4. Noah is cutting a 12-inch strip of tape into pieces that are each $1\frac{1}{2}$ inches long. How many pieces can he make?

   $n =$ _____

   - $\frac{3}{2}n = 12$
   - $n = \frac{3}{2} \cdot 12$
   - $12n = \frac{3}{2}$
   - $n = 12 \cdot \frac{2}{3}$

Are you ready for more?

Mai's mother was 28 when Mai was born. Mai is now 12 years old. In how many years will Mai's mother be twice Mai's age? How old will they be then?

5.4 Writing Equations to Represent Percentage Problems

Write an equation to represent the relationship in each statement. Then solve the equation to answer the question. Show your reasoning.

1. 40% of a number n is 58. What is that number?

2. 60% of c is 43.2. What is the value of c?

3. 38% of e is 190. What is the value of e?

Lesson 5 Summary

Writing and solving equations can help us answer questions about situations.

A scientist has 13.68 liters of oil and needs 16.05 liters for an experiment. How many more liters of oil does she need for the experiment?

- We can represent this situation with the equation: $13.68 + x = 16.05$
- We can solve the equation by subtracting 13.68 from each side. This gives us some new equations that also represent the situation:

$$x = 16.05 - 13.68$$

$$x = 2.37$$

- The solution $x = 2.37$ means the scientist needs 2.37 more liters of oil.

Volunteers at a food pantry divide a 54-pound bag into portions that each weigh $\frac{3}{4}$ pound. How many portions can they make?

- We can represent this situation with the equation: $\frac{3}{4}x = 54$
- We can find the value of x by dividing each side by $\frac{3}{4}$. This gives us some new equations that represent the same situation:

$$x = 54 \div \frac{3}{4}$$

$$x = 72$$

- The solution $x = 72$ means the volunteers can make 72 portions.