Unit 6, Lesson 6

Percent Increase and Decrease with Equations

Let's use equations to represent increases and decreases.

6.1 Math Talk: Starting with 50

Solve each equation mentally.

- $a \cdot 50 = 10$
- $b \cdot 50 = 60$
- $c \cdot 50 = 51$
- $d \cdot 50 = 49$

6.2 Matching Equations

For each situation:

- Draw a diagram to represent the situation.
- Match an equation to the situation.
- Solve the equation to find the initial value, x.

$0.32x = 52$

$0.68x = 52$

$1.32x = 52$

$1.68x = 52$

1. The water level in a reservoir is now 52 meters. If this was a 32% increase, what was the initial depth?

   Diagram:

   Equation:

   Solution:

2. The snow is now 52 inches deep. If this was a 68% decrease, what was the initial depth?

   Diagram:

   Equation:

   Solution:

3. Write a story for one of the equations that doesn't have a match.

Are you ready for more?

An astronaut was exploring a distant planet and found some glowing goo at the bottom of a very deep crater. She brought a 10-gram sample of the goo to her laboratory. When the goo was exposed to light, the total amount of goo increased by 100% every hour.

1. How much goo will she have after 1 hour? After 2 hours? After 3 hours? After n hours?

2. When she put the goo in the dark, it shrank by 75% every hour. How many hours will it take for the goo that was exposed to light for n hours to return to the original size?

6.3 Decorating Fabric

Write an equation to represent each situation. Then, solve the equation.

1. A piece of fabric weighed 15 ounces. After it was decorated with zardozi, the weight had increased by 82%. What is the weight of the finished piece?

2. Another finished zardozi piece weighs 22 ounces. This is a 76% increase from the original weight of the fabric. What was the original weight?

3. Before making a mola, the layers of fabric weighed 4.7 ounces. When the mola was finished, the weight had decreased by 17%. What is the weight of the finished mola?

4. Another finished mola weighs 4.9 ounces. This is a 21% decrease from the original weight of the fabric. What was the original weight?

Are you ready for more?

A piece of fabric weighed 12 ounces. After it was decorated with zardozi, the finished piece weighed 27 ounces. By what percentage did the weight increase? Explain your reasoning.

6.4 Representing Percent Increase and Decrease: Equations

1. Last year, scientists counted 12 foxes in a conservation area. This year, they counted 50% more than that. How many foxes did they count this year?

   Explain why this situation can be represented by the equation $(1.5) \cdot 12 = f$. Make sure that you explain what f represents.

2. Write an equation to represent each of the following situations.

   a. After replacing some grass with rocks, a business decreased its water usage by 20%. If their old water usage was 15,000 gallons per week, how much do they use now?

   b. After a 25% discount, the price of a T-shirt was $12. What was the price before the discount?

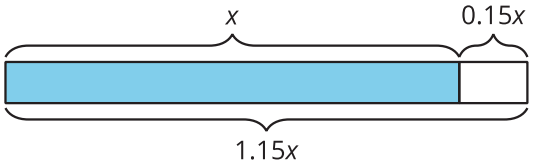
   c. Compared to last year, the population of Boom Town has increased by 25%.The population is now 6,600. What was the population last year?

Lesson 6 Summary

We can use equations to express percent increase and percent decrease.

For example, if y is 15% more than x, we can represent this by using any of these equations:

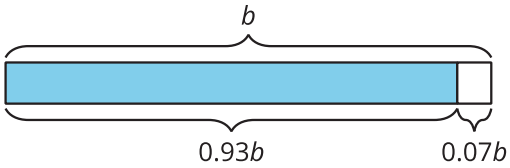
$y = x + 0.15x$ $y = (1 + 0.15)x$ $y = 1.15x$



So if someone makes an investment of x dollars, and its value increases by 15% to reach \$1,250, then we can write the equation $1.15x = 1{,}250$ to find the value of the initial investment.

Here is another example: if a is 7% less than b, we can represent this by using any of these equations:

$a = b - 0.07b$ $a = (1 - 0.07)b$ $a = 0.93b$



So if the amount of water in a tank decreased 7% from its starting value of b to its ending value of 348 gallons, then we can write $0.93b = 348$.

Often, an equation is the most efficient way to solve a problem involving percent increase or percent decrease.