

TOPIC 9

Use Equations to Solve Problems



OVERVIEW

Topic 9 focuses on solving two-step word problems involving addition, subtraction, multiplication, and division of whole numbers. Your child will learn to look for patterns, especially multiplication and division patterns, to enhance their ability to solve word problems throughout Topic 9. Your child will also analyze equations to determine whether they are true.

PATTERNS AND EQUATIONS

Identify, Create, and Extend Patterns Your child will work with sequences of numbers that follow patterns based on repeated addition, subtraction, multiplication, or division.

Here is how your child would find the next 3 numbers in each sequence and describe the pattern.

18, 25, 32, 39, ____, ____, ____

Next 3 numbers: 46, 53, 60

Pattern: Add 7

2, 4, 8, 16, ____, ____, ____

Next 3 numbers: 32, 64, 128

Pattern: Multiply by 2

251, 239, 227, 215, __, __, __

Next 3 numbers: 203, 191, 179

Pattern: Subtract 12

Analyze Equations Your child will learn that for an equation to be true, the value on the left side of the equation must be equal to the value on the right side of the equation. The image of a level balance is used to represent a true equation.

Is $12 \times 4 = 6 \times 8$ a true equation?



$$12 \times 4 = 48$$

$$6 \times 8 = 48$$

$$48 = 48$$

So, the equation is true.

Your child will sometimes be asked to find the value for the variable that makes the equation true.

$$9 \times f = 27$$

$$9 \times 3 = 27$$

So, $f = 3$.

REPRESENT TWO-STEP PROBLEMS

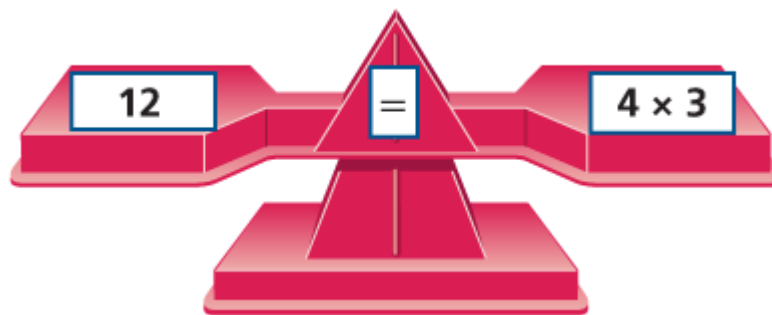
Algebraic Language Your child will begin to use formal algebraic language by using letters (called *variables*) to represent unknown quantities in a problem.

Here is how your child might solve the problem, "Tennis balls come in tubes of 3 balls each. Frank has 12 tennis balls. How many tubes of tennis balls does he have?"

Let n represent the number of tubes Frank has.

$$12 = n \times 3$$

Find the value for the variable that makes the equation true.



4 is a value that makes the equation true.

So, Frank has 4 tubes of tennis balls.

When solving two-step problems, your child will use one letter to represent the answer to a hidden question, and a different letter to represent the answer to the original question.

Here is how your child might solve the problem, "Jen buys a backpack and a sleeping bag. She has a coupon for \$10 off. What is Jen's final cost?"

DATA	Item	Price
	Grill	\$256
	Backpack	\$89
	Lantern	\$78
	Sleeping Bag	\$128

First, find and answer the hidden question.

What is the cost of a backpack and a sleeping bag?

$$x = 89 + 128$$

$$x = 217$$

The backpack and sleeping bag cost \$217.

Then use the answer to the hidden question to answer the original question.

What is Jen's final cost?

$$c = 217 - 10$$

$$c = 207$$

Jen's final cost is \$207.

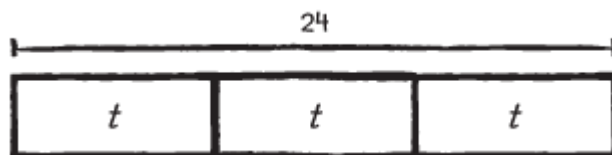
Bar Diagrams and Equations Your child will use bar diagrams to represent the relationships in a problem. In two-step problems, a different bar diagram is used to represent each step. Letters are used to represent unknowns in the bar diagrams. Then equations are written to represent the same relationships represented in the bar diagrams.

Here is how your child might use bar diagrams to solve the problem, "The 24 teams competing in a baseball tournament are divided equally into 3 leagues. Each league is divided equally into 2 regions. How many teams are in each region?"

First, find and answer the hidden question.

How many teams are in each league?

Let t represent the unknown number of teams in each league.



$$t = 24 \div 3$$

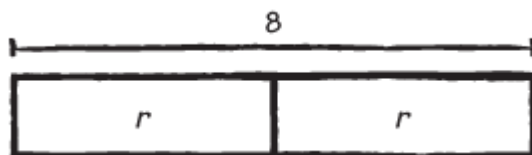
$$t = 8$$

There are 8 teams in each league.

Then use the answer to the hidden question to answer the original question.

How many teams are in each region?

Let r represent the unknown number of regions.



$$r = 8 \div 2$$

$$r = 4$$

There are 4 teams in each region.



CONNECT THE MATH

You can connect the math in this topic to everyday experiences. Look for situations, such as grocery shopping, where you are often presented with 2-step problems, and have your child help solve them. For example, you might say, "If we get four 8-packs of juice and five 6-packs of bottled water, how many drinks will we have in all?" You can also find opportunities to explore true equations in a grocery store. For example, you

can ask your child to figure out if four 6-packs of juice is the same number of drinks as three 12-packs. This kind of analysis is what smart shoppers do!



TOPIC 9 LESSONS

Lesson 9-1	<u>Sequences</u>
Lesson 9-2	<u>Decide if an Equation Is True</u>
Lesson 9-3	<u>Solve Multiplication and Division Equations</u>
Lesson 9-4	<u>Solve Two-Step Real-World Problems: Addition and Subtraction</u>
Lesson 9-5	<u>Solve Two-Step Real-World Problems: Multiplication and Division</u>
Lesson 9-6	<u>Solve Two-Step Real-World Problems: All Operations</u>
Lesson 9-7	MATH THINKING AND REASONING <u>Discuss Math Thinking with Others</u>