

Solve Problems with Equations

Name: _____

Prerequisite: Solve Problems with Proportional Relationships

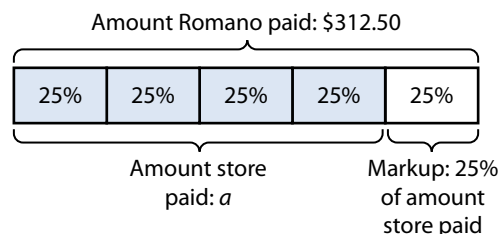
Study the example problem showing how to solve problems with proportional relationships. Then solve problems 1–6.

Example

Romano pays \$312.50 for a television set. The markup on the price of the television set is 25%. What equation could you use to find the amount of money that the store paid for the television set?

You can draw a tape diagram to help you understand the problem.

$$\begin{array}{rclcl}
 \text{Amount} & & \text{amount store} & & \text{Markup, 25\%} \\
 \text{Romano} & = & \text{paid, } a & + & \text{of } a \\
 \text{paid} & & \downarrow & & \downarrow \\
 312.50 & = & a & + & 0.25a
 \end{array}$$



- 1** Write an expression for the amount of money represented by each section of the tape diagram. How much money is represented by each section?

- 2** Explain how to find the amount a that the store paid using arithmetic.

- 3** Explain how to solve the equation $312.50 = a + 0.25a$ to find the value of a .

Vocabulary

markup a percent added to the cost of an item to determine the selling price.

Solve.

- 4 Arlene sells computers and tablets. She earns an 8% commission on every dollar of sales that she makes. In one month she earned a total of \$2,560 in commissions. Write an equation for Arlene's sales, s , in dollars that month. Then find her sales.

Show your work.

Solution: _____

- 5 A store advertises a sale as "Get 30% off your highest priced item when you buy 2 or more items." Lee buys items with prices of \$30 and \$20. Find the percent of discount on the total purchase. Explain your answer.

- 6 The owner of a sporting goods store buys pairs of rollerblades for \$60 and marks them up 25%. Several months later, he decides to clear his inventory and sells each pair of rollerblades at a discount of 20%. What is the total price of a pair of these rollerblades with the discount and a 6% sales tax?

Show your work.

Solution: _____



Vocabulary

commission a percent of a sales amount earned by the person making the sale.

sales tax a percent of a purchase that is added to the purchase and paid to a government.

Solve Two-Step Problems with Fractions

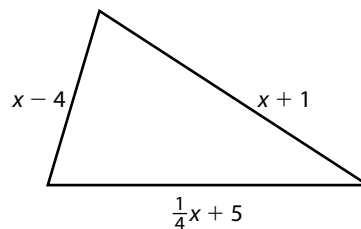
Study the example showing how to solve two-step problems that involve fractions. Then solve problems 1–8.

Example

The perimeter of the triangle shown is 20 inches. Write an expression for the perimeter. Then write an equation that you can use to find the length of each side.

$$\text{Perimeter: } (x - 4) + (x + 1) + \left(\frac{1}{4}x + 5\right) = \frac{9}{4}x + 2$$

$$\text{Equation: } \frac{9}{4}x + 2 = 20$$



- 1** In the example, explain how the term $\frac{9}{4}x$ was obtained in the expression for the perimeter.
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- 2** To find the value of x in the equation $\frac{9}{4}x + 2 = 20$, you first get the term with x by itself on one side of the equation. How can you do that? What equation do you then have?
-

- 3** How can you find the value of x in the equation you wrote for problem 2? What is the value of x ?
-

- 4** Find the length of each side of the triangle. Check that the perimeter is equal to 20 inches.

Show your work.

Solution: _____



Solve.

- 5 Solve the equation $\frac{2}{5}x - 1 = 9$. Complete each step of the solution and check your solution.

$$\begin{aligned}\frac{2}{5}x - 1 &= 9 \\ \frac{2}{5}x - 1 &\quad \quad \quad = 9 \quad \quad \quad \\ \frac{2}{5}x &= \quad \quad \quad \\ \frac{2}{5}x &\quad \quad \quad = \quad \quad \quad \\ x &= \quad \quad \quad\end{aligned}$$

Check: _____

- 6 Paco says that the solution to $\frac{2}{5}x - 1 = 9$ is $x = 4$. Do you agree? Explain.

- 7 The width of a rectangle is two-thirds of the length. The perimeter of the rectangle is 15 centimeters. What is the length, ℓ , of the rectangle? Explain.

- 8 You buy $1\frac{1}{4}$ yards of fabric and an \$8 clothing pattern. Your total cost with a 6% sales tax added is \$18.55. What is the cost per yard of the fabric?

Show your work.

Solution: _____

Solve Multi-Step Problems with Decimals

Study the example showing how to solve multi-step problems that involve decimals. Then solve problems 1–9.

Example

Olga buys tickets to a concert. She pays \$27.75 for each ticket plus a handling fee of \$5.50 for the order. The total cost is \$144.25. How many tickets, n , did Olga buy?

You can use an equation to solve the problem.

Cost of tickets + Handling fee = Total cost

$$27.75n + 5.50 = 144.25$$

- 1 What does n represent in the problem?

- 2 What does $27.75n$ represent? Explain.

- 3 How much did Olga pay for the tickets without the handling fee? Explain how you know.

- 4 When solving the equation $27.75n + 5.50 = 144.25$, what can you do to get $27.75n$ by itself on one side of the equation? What is the result?

- 5 How can you solve the simplified equation that you wrote in problem 3? Solve the equation.



Solve.

6 Solve the equation $18.2 + 1.5x = 37.7$.

a. How can you get $1.5x$ by itself on one side of the equation? Do this first step to start to solve the equation.

b. How could you use the result of part (a) to find the value of x ?

7 Solve the equation $0.04x - 3.82 = 0.68$.

Show your work.

Solution: _____

8 Solve the equation $8.5 - 1.2x = 6.7$.

Show your work.

Solution: _____

9 Nita simplified the equation in problem 8 to $1.8 = 1.2x$. How did she get that? Is this a valid way to solve the equation? Explain.

Solve Problems with Equations

Solve the problems.

- 1 Kia buys a shirt that costs \$12.50 and some pairs of socks that are \$2.50 each. She pays a total of \$27.50. How many pairs of socks did Kia buy?

Show your work.

How can you get the term with the variable by itself on one side of the equation?



Solution: _____

- 2 Draw lines to show the correct order of the steps that you could take to solve the equation $\frac{2}{5}(x + \frac{5}{2}) = 27$.

Step 1	$\frac{2}{5}x = 26$
Step 2	$\frac{2}{5}x \cdot \frac{5}{2} = 26 \cdot \frac{5}{2}$
Step 3	$x = 65$
Step 4	$\frac{2}{5}x + 1 = 27$

How can the distributive property help you solve this problem?



- 3 The length of each of the two congruent sides of an isosceles triangle is $3x - 1$. The length of the third side is $2x + 1$. The perimeter is 55 feet. Which equation does NOT represent the perimeter?

- A $8x - 1 = 55$
 B $6x - 2 + 2x + 1 = 55$
 C $2(3x - 1 + 2x + 1) = 55$
 D $2(3x - 1) + (2x + 1) = 55$

It may be helpful to draw a diagram of the triangle and label its sides.



Solve.

4 Karif plans to use a 20% off coupon on a \$27.60 purchase. Tell whether each statement is *True* or *False*.

- a. The discounted price is \$7.60. True False
- b. The discounted price will be 80% of the original purchase price. True False
- c. Karif will save \$22.08 with his coupon. True False
- d. Karif would save more money if he used a \$5 off coupon. True False

A coupon gives the customer a discount.



5 T-shirts are on sale for \$4 off the regular price. Jeb buys 5 T-shirts for a total of \$45.05, including a 6% sales tax. Which equation can Jeb use to find the regular price, r , of 1 T-shirt?

- A** $0.06(5r - 4) = 45.05$ **C** $1.06 \cdot 5(r - 4) = 45.05$
- B** $5(r - 4) = 1.06 \cdot (45.05)$ **D** $5(r - 4) + 0.06r = 45.05$

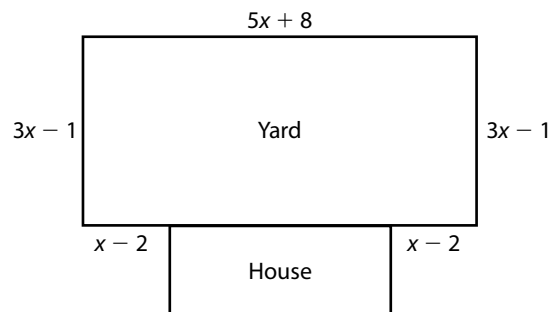
How can you express the sale price of 5 T-shirts?



6 Jelani's family is putting up a fence around their yard shown in the diagram below. They don't need to fence the wall of the house that is against the yard. They need 106 feet of fencing. The length of the yard is $5x + 8$. Find the length of the yard.

Show your work.

Have you answered the question that the problem asks?



Solution: _____