Pre-Algebra Workbook Solutions

Ratio and proportion

krista king MATH

RATIO AND PROPORTION

■ 1. Solve for the variable.

$$\frac{2}{5} = \frac{x}{20}$$

Solution:

Cross multiply to get rid of the fractions.

$$2(20) = 5(x)$$

$$40 = 5x$$

Divide both sides by 5 in order to solve for x.

$$\frac{40}{5} = \frac{5x}{5}$$

$$8 = 1x$$

$$x = 8$$

■ 2. Solve for the variable.

$$\frac{6}{10} = \frac{m}{15}$$

Solution:

Cross multiply to get rid of the fractions.

$$6(15) = 10(m)$$

$$90 = 10m$$

Divide both sides by 10 in order to solve for m.

$$\frac{90}{10} = \frac{10m}{10}$$

$$9 = 1m$$

$$m = 9$$

■ 3. Solve for the variable.

$$\frac{d}{7} = \frac{14}{49}$$

Solution:

Cross multiply to get rid of the fractions.

$$49(d) = 7(14)$$

$$49d = 98$$

Divide both sides by 49 in order to solve for d.

$$\frac{49d}{49} = \frac{98}{49}$$

$$1d = 2$$

$$d = 2$$

■ 4. Solve for the variable.

$$\frac{5}{v} = \frac{25}{40}$$

Solution:

Cross multiply to get rid of the fractions.

$$5(40) = 25(v)$$

$$200 = 25v$$

Divide both sides by 25 in order to solve for v.

$$\frac{200}{25} = \frac{25v}{25}$$

$$8 = 1v$$

$$v = 8$$

■ 5. Solve for the variable.

$$\frac{22}{30} = \frac{33}{t}$$

Solution:

Cross multiply to get rid of the fractions.

$$22(t) = 30(33)$$

$$22t = 990$$

Divide both sides by 22 in order to solve for t.

$$\frac{22t}{22} = \frac{990}{22}$$

$$1t = 45$$

$$t = 45$$

■ 6. Solve for the variable.

$$\frac{8}{12} = \frac{20}{x}$$

Solution:

Cross multiply to get rid of the fractions.

$$8(x) = 12(20)$$

$$8x = 240$$

Divide both sides by 8 in order to solve for x.

$$\frac{8x}{8} = \frac{240}{8}$$

$$1x = 30$$

$$x = 30$$

■ 7. Complete the statement.

The reason we multiply the left and right side by the same number when we cross multiply is because, when we're solving equations, we must keep both sides _____.

Solution:

balanced

UNIT PRICE

■ 1. Complete the statement.

Unit price means _____ per _____.

Solution:

price, unit

■ 2. If we can purchase 2 oranges for $\$0.20$, how many oranges can we purchase for $\$2.00$?

Solution:

Write an equation that expresses this proportion. On the left, the ratio we'll use will be "two oranges for $\$0.20$," and we'll equate that to a ratio on the right that says "x oranges for $\$2.00$."

$$\frac{2}{0.20} = \frac{x}{2.00}$$

Cross multiply to get rid of the fractions.

$$2(2.00) = 0.20(x)$$

$$4.00 = 0.20x$$

Divide both sides by 0.20 in order to solve for x.

$$\frac{4.00}{0.20} = \frac{0.20x}{0.20}$$

$$20 = 1x$$

$$x = 20$$

■ 3. If we purchase 2 oranges for $\$0.20$, how much will it cost to purchase 5 oranges?

Solution:

Write an equation that expresses this proportion. On the left, the ratio we'll use will be "two oranges for $\$0.20$," and we'll equate that to a ratio on the right that says "five oranges for x."

$$\frac{2}{0.20} = \frac{5}{x}$$

Cross multiply to get rid of the fractions.

$$2(x) = 0.20(5)$$

$$2x = 1$$

Divide both sides by 2 in order to solve for x.

$$\frac{2x}{2} = \frac{1}{2}$$

$$x = \frac{1}{2}$$

$$x = \$0.50$$

■ 4. Sally went to the candy store and bought 40 jelly beans for $\$0.50$. How much would 60 jelly beans cost her?

Solution:

Write an equation that expresses this proportion. On the left, the ratio we'll use will be "40 jelly beans for $\$0.50$," and we'll equate that to a ratio on the right that says "60 jelly beans for x."

$$\frac{40}{0.5} = \frac{60}{x}$$

Cross multiply to get rid of the fractions.

$$40(x) = 60(0.5)$$

$$40x = 30$$

Divide both sides by 40 in order to solve for x.

$$\frac{40x}{40} = \frac{30}{40}$$

$$x = \$0.75$$

■ 5. Sally went to the candy store and bought 40 jelly beans for $\$0.50$. How many jelly beans can she buy for $\$1$?

Solution:

Because Sally will be spending exactly twice the amount ($\$1$ is double $\$0.50$), she'll get exactly twice the jelly beans. Therefore, she'll be able to buy

$2(40)$ jelly beans

80 jelly beans

■ 6. While Steven is at the grocery store, he's trying to determine which bag of popcorn is the better deal. The first bag is a 10-ounce bag of popcorn for $\$1.59$. The second bag is a 15-ounce bag of popcorn for $\$1.89$. Which bag is the better deal? Why?

Solution:

The better deal will be the bag with the better price per ounce. The price per ounce for the first bag is $\$1.59/10 \approx \$0.16$, while the price per ounce for

the second bag is $\$1.89/15 \approx \$0.13$. Because the second bag has a lower price per ounce, $\$0.13 < \$0.16$, the second bag is a better deal.

■ 7. Justine is comparing prices to determine where to buy hardwood flooring for her kitchen. The first store charges $\$15$ for 2 square feet of flooring, while the second store charges $\$40$ for 5 square feet of flooring. Which store is offering the better deal? Why?

Solution:

The price per square foot at the first store is $\$15/2 = \$7.50$, while the price per square foot at the second store is $\$40/5 = \$8$. The price per square foot is less at the first store, so the first store is offering a better deal.

■ 8. We can purchase 15 pencils for $\$4$. If we want to find the price per pencil, we would divide _____ by _____.

Solution:

price, number of pencils

■ 9. We can purchase 15 pencils for $\$4$. If we want to find the number of pencils we can buy per dollar, we would divide _____ by _____.

Solution:

number of pencils, number of dollars (price)

UNIT MULTIPLIERS

■ 1. When we're setting up a unit multiplier, the units we want to keep need to be placed in the _____ of the fraction.

Solution:

numerator

■ 2. Convert 5 feet into inches.

Solution:

There are 12 inches in 1 foot. The units we want to keep are inches, and the units we want to get rid of are feet, so we'll set up a unit multiplier with inches on top and feet on bottom.

$$5 \text{ feet} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

$$5(12) \text{ inches}$$

$$60 \text{ inches}$$

■ 3. Convert 8 yards to inches.

Solution:

There are 3 feet in 1 yard. The units we want to keep are feet, and the units we want to get rid of are yards, so we'll set up a unit multiplier with feet on top and yards on bottom.

$$8 \text{ yards} \cdot \frac{3 \text{ feet}}{1 \text{ yard}}$$

This will convert yards into feet, but then we'll need to convert those feet into inches. There are 12 inches in 1 foot. The units we want to keep are inches, and the units we want to get rid of are feet, so we'll set up a unit multiplier with inches on top and feet on bottom.

$$8 \text{ yards} \cdot \frac{3 \text{ feet}}{1 \text{ yard}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

$$8(3) \text{ feet} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

$$8(3)(12) \text{ inches}$$

$$288 \text{ inches}$$

■ 4. Convert 4 square feet to square inches.

Solution:

There are 144 square inches in 1 square foot. The units we want to keep are square inches, and the units we want to get rid of are square feet, so we'll set up a unit multiplier with square inches on top and square feet on bottom.

$$4 \text{ square feet} \cdot \frac{144 \text{ square inches}}{1 \text{ square foot}}$$

$$4(144) \text{ square inches}$$

$$576 \text{ square inches}$$

■ 5. Convert 144 square inches to square feet.

Solution:

There are 144 square inches in 1 square foot. The units we want to keep are square feet, and the units we want to get rid of are square inches, so we'll set up a unit multiplier with square feet on top and square inches on bottom.

$$144 \text{ square inches} \cdot \frac{1 \text{ square foot}}{144 \text{ square inches}}$$

$$1 \text{ square foot}$$

■ 6. Convert $4{,}320$ cubic inches to cubic feet.

Solution:

There are 12 inches in 1 foot. The units we want to keep are feet, and the units we want to get rid of are inches, so we'll set up a unit multiplier with feet on top and inches on bottom.

$$4{,}320 \text{ inches}^3 \cdot \frac{1 \text{ foot}}{12 \text{ inches}} \cdot \frac{1 \text{ foot}}{12 \text{ inches}} \cdot \frac{1 \text{ foot}}{12 \text{ inches}}$$

$$\frac{4{,}320(1)(1)(1)}{(12)(12)(12)} \text{ feet}^3$$

2.5 cubic feet

■ 7. Jason is converting $4{,}536$ cubic feet to cubic yards. His work is shown below. Did he solve the problem correctly? Why or why not?

$$4{,}536 \text{ cubic feet} \cdot \frac{3 \text{ feet}}{1 \text{ yard}} \cdot \frac{3 \text{ feet}}{1 \text{ yard}} \cdot \frac{3 \text{ feet}}{1 \text{ yard}} = 122{,}472 \text{ cubic yards}$$

Solution:

He solved it incorrectly. He did not place the yards on the top of the fraction and the feet on the bottom of the fraction so that the feet would cancel out and leave just cubic yards as units. He should have set it up as

$$4{,}536 \text{ cubic feet} \cdot \frac{1 \text{ yard}}{3 \text{ feet}} \cdot \frac{1 \text{ yard}}{3 \text{ feet}} \cdot \frac{1 \text{ yard}}{3 \text{ feet}} = 168 \text{ cubic yards}$$

FOR THE LOVE OF MATH

WWW.KRISTAKINGMATH.COM