

Warm Up:

Solve:

$$3x + 4 = 2x - 9$$

$$\begin{array}{r} 3x + 4 = 2x - 9 \\ -4 \quad -4 \\ \hline 3x = 2x - 13 \\ -2x \quad -2x \\ \hline x = -13 \end{array}$$

$$x = -13$$

$$4(3x + 9) = 11x + 36 + x$$
$$12x + 36 = 12x + 36$$

infinite  
solutions

# Ratios and Proportions

Ratio - Compares two quantities

example: You need 3 cups of flour for 2 servings of cookies. You would write this as.... 3:2

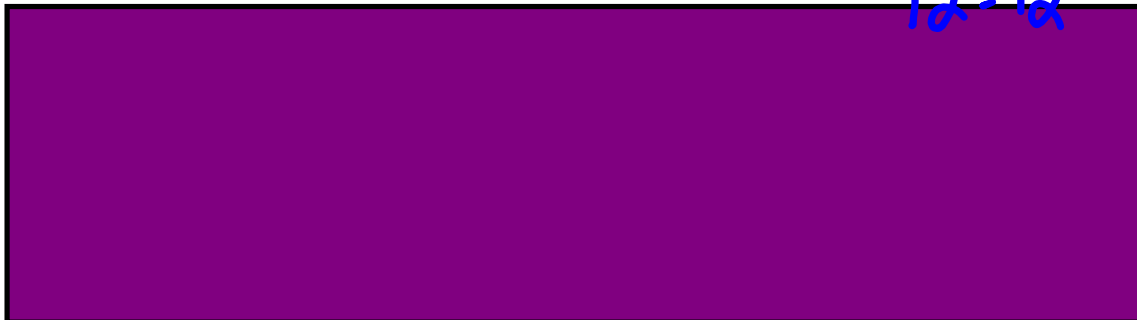
$$\frac{3}{2}$$

Proportion - Compares two ratios

Example: If you wanted to make 4 servings of cookies, you would need 6 cups of flour. You would write this as....

$$\frac{3}{2} = \frac{6}{4}$$

Handwritten annotations: A blue '12' is written above the 3, a blue '12' is written above the 6, and a blue 'X' with arrows is drawn between the 2 and the 4, indicating cross-multiplication.



Are the following proportions?

1:5 and 3:15

$$\frac{1}{5} \neq \frac{3}{15}$$

Handwritten in red: 15 above 1, 15 above 3, and a large red X over the entire fraction comparison.

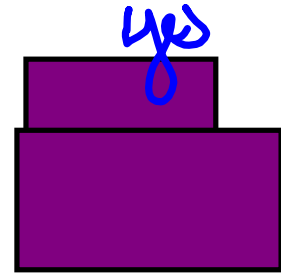
61 96

$$\frac{16}{8} \neq \frac{12}{4}$$

Handwritten in green: "not" below the equation.

60 60

$$\frac{-12}{15} = \frac{4}{-5}$$



Now, let's SOLVE some proportions.

$$\frac{x}{10} = \frac{3}{15}$$

$$15x = 30$$

$$x = 2$$

$$\frac{1}{5} = \frac{x}{105}$$

$$x = 21$$

$$\frac{12}{6} = \frac{y}{4}$$

$$48 = 6y$$

$$8 = y$$

$$\frac{x}{21} = \frac{2}{3}$$

$$x = 14$$

$$\frac{18}{x} = \frac{36}{6}$$

$$36x = 108$$

$$18:x \text{ and } 36:6$$

$$x = 3$$

$$20:x \text{ and } 4:1$$

$$x = 5$$



If Geoff can eat 13 chicken nuggets every 2 minutes, how many can he eat in half an hour?

First write it in words:

13n : 2 min  
? : 30 min

Now write a proportion:

$$\frac{13}{2} = \frac{n}{30}$$

Solve:

$$2n = 390$$

$$n = 195 \text{ nuggets}$$

4. Kyle can drive to New Jersey 286 miles away in exactly 4 hours. How far will he have driven in 2 and a half hours?

First write it in words:

286 mi : 4 hrs  
x : 2.5

Now write a proportion:

$$\frac{286}{x} = \frac{4}{2.5}$$

Solve:

$$x = 178.75$$



The Philadelphia Phillies can hit the ball 33 times for every 3 games they play. How many games will they have played when they have hit 528 balls?



$$\frac{33}{3g} = \frac{528}{g}$$

$$33g = 3 \cdot 528$$

$$g = 48 \text{ games}$$

A map has a scale factor comparing inches to miles of 1:30. If two locations are 195 miles apart, how far apart are they on the map?

$$\frac{1}{30} = \frac{x}{195}$$



$$x = 6.5 \text{ in}$$

Write a word problem based on the following proportion:

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

Write a word problem using any proportion.



A gardener is transplanting flowers into a flowerbed. She has been working for an hour and has transplanted 14 flowers. She has 35 more flowers to transplant. If she works at the same rate, how many more hours will it take her?

$$\frac{14}{1} = \frac{35}{x}$$
$$\frac{14x}{14} = \frac{35}{14}$$
$$x = 2.5 \text{ hrs}$$

$$14 \overline{) 35.0}$$
$$\underline{28} \phantom{0}$$
$$70$$