

Do Now

Evaluate the following:

1) $\frac{1}{3}$ $\frac{1}{3} \div \frac{3}{1}$
 $\frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$ Craig

2) $\frac{2}{5} \div \frac{1}{4}$
 $\frac{2}{5} \cdot \frac{4}{1} = \frac{8}{5} = 1\frac{3}{5}$

3) A crew of highway workers paved $\frac{2}{15}$ of a mile in 20 minutes. What is their work rate in miles per minute?

$\frac{\text{miles}}{\text{min.}} = \frac{\frac{2}{15} \text{ mi}}{20 \text{ min}} = \frac{2}{15} \div \frac{20}{1} = \frac{2}{15} \cdot \frac{1}{20} =$

$\frac{1}{150}$ miles per minute

4) Solve algebraically: $6x = 294$
 $x = 49$

Lesson #24 - Solving Proportions

A **proportion** is an equation that shows that two ratios are equal.

Ex: $\frac{1}{2} = \frac{5}{10}$ $\frac{6}{3} = \frac{7}{7}$

To solve a proportion, you can use **cross multiplication** to solve for the unknown quantity. To use cross multiplication, multiply the numerator of one ration with the denominator of the other.

Example 1) Solve the following proportions:

a) $\frac{8}{12} = \frac{6}{x}$
 $12 \cdot 6 = 8x$
 $\frac{72}{8} = \frac{8x}{8}$ $x = 9$

b) $\frac{0.4}{y} = \frac{3.4}{10.2}$
 $\frac{4.08}{3.4} = \frac{3.4y}{3.4}$ $y = 1.2$

Try it! Solve the following proportions

<p>2) $\frac{72}{90} = \frac{x}{25}$</p> <p style="color: red;">$75 \cdot 25 = 90x$</p> <p style="color: red;">$\frac{1800}{90} = \frac{90x}{90}$ $x = 20$</p>	<p>3) $\frac{2.1}{y} = \frac{1.5}{1.4}$</p> <p style="color: blue;">$2.1 \cdot 1.4 = 1.5y$</p> <p style="color: blue;">$\frac{2.94}{1.5} = \frac{1.5y}{1.5}$</p> <p style="border: 2px solid blue; border-radius: 50%; padding: 5px;">$1.96 = y$</p>
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Example 4) Derek counted 24 marshmallows in 3 servings of Marshy Morsels. At this rate, how many marshmallows are in 12 servings?

Steps:

<p>1) Create a word ratio</p> <p style="color: red;">$\frac{\text{marshmallows}}{\text{servings}}$</p>	<p>2) Write a proportion</p> <p style="color: green;">$\frac{24}{3} = \frac{x}{12}$</p>	<p>3) Solve</p> <p style="color: blue;">$\frac{288}{3} = \frac{3x}{3}$</p> <p style="border: 2px solid blue; border-radius: 50%; padding: 5px;">$x = 96$ marshmallows</p>
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Example 5) A train travels 120 miles in 1.5 hours. At this rate, how many miles can it travel in 5 hours?

$\frac{\text{miles}}{\text{hours}}$

~~$\frac{120}{1.5} = \frac{x}{5}$~~

$120 \cdot 5 = 1.5x$

$\frac{600}{1.5} = \frac{1.5x}{1.5}$

$x = 400$ miles

Try it!

6) A computer downloads a 48 kilobyte file in 5 seconds. At this rate, how long will it take the computer to download a file that is 120 kilobytes?

$48 \overline{) 120} \quad 2.5$

$5 \times 2.5 = 12.5$ seconds

Ryan

Now, You Try!

Solve the following proportions. Round to the nearest hundredth if necessary.

<p>7) $\frac{6}{2} = \frac{4}{p} = 8$ 1.33</p> <p>$6p = 8$ $6 \cdot 8$</p> <p>$6 \cdot 6$ $p = 1.33$</p>	<p>8) $\frac{4}{k} = \frac{8}{2}$</p> <p>$8k = 8$</p> <p>$8 \cdot 8$</p> <p>$k = 1$</p>	<p>9) $\frac{n}{4} = \frac{8}{7}$ $n = 4.57$</p> <p>$4 \cdot 8 = 7n$</p> <p>$\frac{32}{7} = \frac{7n}{7}$</p>
<p>10) $\frac{7.7}{3.6} = \frac{2.3}{b}$</p> <p>$7.7b = 3.6 \cdot 2.3$</p> <p>$7.7b = 8.28$</p> <p>$7.7 \cdot 7.7$</p> <p>$b = 1.08$</p>	<p>11) $\frac{6.3}{x} = \frac{2.56}{9.3}$</p> <p>$\frac{58.59}{2.56} = \frac{2.56x}{2.56}$</p> <p>$x = 22.89$</p>	<p>12) $\frac{v}{4.9} = \frac{5.4}{6.1}$</p> <p>$6.1v = 5.4 \cdot 4.9$</p> <p>$6.1v = 26.46$</p> <p>$6.1 \cdot 6.1$</p> <p>$v = 4.34$</p>

13) At Stop-N-Shop, two cans of pineapple chunks cost \$4. How many cans of pineapple chunks can you buy for \$18?

~~$\frac{2}{4} = \frac{x}{18}$~~

9 cans $\frac{2}{4} = \frac{x}{18} = 36$ $36 \cdot 4 = 144$

$36 = 4x$ $x = 9$

14) Molly bought two heads of cabbage for \$1.80. How many heads of cabbage can she buy if she has \$28.80?

$\frac{\$}{\text{Cabbage}}$ ~~$\frac{\$1.80}{2} = \frac{28.80}{x}$~~ $28.80 \cdot 2 = 1.80x$

$\frac{57.6}{1.80} = \frac{1.80x}{1.80}$

$x = 32$ heads

16) Sean took a trip to Mexico. Upon leaving, he decided to convert all of his Pesos back into US Dollars. How many US dollars did he receive if he exchanged 42.7 Pesos at a rate of \$5.30 = 11.1 Pesos?

$\frac{\text{USD}}{\text{Pesos}}$ ~~$\frac{5.30}{11.1} = \frac{x}{42.7}$~~

$\frac{226.31}{11.1} = \frac{11.1x}{11.1}$

$x = 20.39$