

1-30-18

Aim: SWBAT solve proportions algebraically and use proportions to solve word problems.

HW: Packet Page 39

Do Now: Quiz

HOMEWORK - Proportions

Solve each proportion ALGEBRAICALLY for the variable.

1)
$$\frac{5}{x} = \frac{7}{(x+4)}$$

$$\begin{aligned} 5(x+4) &= 7x \\ 5x + 20 &= 7x \\ \cancel{5x} \quad \quad \quad & \quad \quad \quad \cancel{-5x} \\ \hline 20 &= \frac{2x}{2} \\ 10 &= x \end{aligned}$$

2)
$$\frac{a}{\frac{5}{8}} = \frac{\frac{3}{2}}{\frac{5}{3}}$$

$$\begin{aligned} \frac{3}{2} \cdot \frac{2}{5} a &= \frac{3}{8} \cdot \frac{3}{2} \\ a &= \frac{9}{16} \end{aligned}$$

3)
$$\frac{712}{4.4} = \frac{2x}{18.7}$$

$$\begin{aligned} \cancel{8.8} x &= \frac{13314.4}{8.8} \\ x &= 1513 \end{aligned}$$

4)
$$\frac{2}{3} = \frac{18}{(x+5)}$$

$$\begin{aligned} 2(x+5) &= 54 \\ 2x + 10 &= 54 \\ \cancel{-10} \quad \quad \quad & \quad \quad \quad \cancel{-10} \\ \hline 2x &= 44 \\ x &= 22 \end{aligned}$$

5)
$$\frac{2}{w} = \frac{\frac{5}{7}}{\frac{10}{2}}$$

$$\begin{aligned} \frac{2}{2} \cdot \frac{2}{5} w &= \frac{7}{5} \cdot \frac{5}{2} \\ w &= \frac{7}{2} \end{aligned}$$

6)
$$\frac{4.5}{(17-x)} = \frac{3}{8}$$

$$\begin{aligned} 3(17-x) &= 36 \\ 51 - 3x &= 36 \\ \cancel{-51} \quad \quad \quad & \quad \quad \quad \cancel{-51} \\ \hline -3x &= -15 \\ x &= 5 \end{aligned}$$

<p>7) $\frac{10}{p} = \frac{3}{6}$</p> $\frac{2}{p} \cdot \frac{3}{2} P = 60 \cdot \frac{2}{3}$ $P = 40$	<p>8) $\frac{3-5x}{4} = \frac{x+5}{9}$</p> $9(3-5x) = 4(x+5)$ $27 - 45x = 4x + 20$ $+45x \quad +45x$ <hr/> $27 = 49x + 20$ $-20 \quad -20$ <hr/> $7 = 49x$ $\frac{7}{49} = \frac{49x}{49}$
---	---

$$\frac{1}{7} = x$$

Solve each of the following word problems by writing a proportion. Then solve your proportion algebraically to get your answer. Be sure your answer includes a label.

- 1) If 2 liters of fruit juice costs \$3.98. How much does 5 liters cost?
- 2) If 64 feet of rope weighs 20 pounds, how much will 80 feet of the same rope weigh?
- 3) If a 10-pound turkey takes 4 hours to cook, how long will it take a 14-pound turkey to cook?

Ratios and Proportions

Solve algebraically using a proportion. Write your answer in a complete sentence.

1. If 2 liters of fruit juice cost \$3.98, how much do 5 liters of the fruit juice cost?

$$\frac{\$3.98}{2L} = \frac{\$x}{5L} \quad \frac{2x = 19.9}{2} \quad \text{It will cost } \$9.95 \text{ for 5 Liters,}$$

$$x = 9.95$$

2. If 64 feet of rope weighs 20 pounds, how much will 80 feet of the same rope weigh?

$$\frac{64 \text{ feet}}{20 \text{ pounds}} = \frac{80 \text{ feet}}{x \text{ pounds}} \quad \frac{64x = 1600}{64} \quad \text{Eighty feet of rope}$$

$$x = 25 \quad \text{weighs 25 pounds.}$$

3. If a 10-pound turkey takes 4 hours to cook, how long will it take a 14-pound turkey to cook?

$$\frac{10 \text{ lbs}}{4 \text{ hrs}} = \frac{14 \text{ lbs}}{x \text{ hrs}} \quad \frac{10x = 56}{10} \quad \text{A 14-lb turkey will cook}$$

$$x = 5.6 \quad \text{in 5 hours 36 minutes.}$$

4. In 5 hours of driving, Julie traveled 235 kilometers. If she travels at the same rate, how far will she drive in 11 hours?

$$\frac{235 \text{ km}}{5 \text{ hrs}} = \frac{x \text{ km}}{11 \text{ hrs}} \quad \frac{5x = 2585}{5} \quad \text{She will drive 517 km.}$$

$$x = 517$$

5. Martha read 12 books in the last 8 weeks. At this rate, how many books will she read in 18 weeks?

$$\frac{12 \text{ books}}{8 \text{ weeks}} = \frac{x \text{ books}}{18 \text{ weeks}} \quad \frac{8x = 216}{8} \quad \text{Martha will read}$$

$$x = 27 \quad \text{27 books in 18 weeks.}$$

6. Pablo typed 410 words in 5 minutes. How many words per minute did he type?

$$\frac{410 \text{ words}}{5 \text{ min}} = \frac{x \text{ words}}{1 \text{ min}} \quad \frac{5x = 410}{5} \quad \text{He can type 82 words per minute.}$$

$$x = 82$$

7. Evan paid \$1.12 for a dozen eggs. Determine the cost of 3 eggs.

$$\frac{\$1.12}{12 \text{ eggs}} = \frac{\$x}{3 \text{ eggs}} \quad \frac{12x = 3.36}{12} \quad \text{It will cost } \$0.28 \text{ for 3 eggs.}$$

$$x = 0.28$$

Aim: SWBAT solve proportional word problems.

More Word Problems: Let's investigate the concept of Part/ Part/ Whole . . .

The easiest way to look at this new type of word problem is to use an example. Consider the word problem below:

The ratio of sixth grade students in a local school who wear glasses to those students who do not is 2:7. If the total number of sixth grade students in the school is 180, how many students in sixth grade wear glasses?

In the diagram below, W represents Wears Glasses and N represents Does Not wear glasses. Given the ratio 2:7, that means that for every 2 students that wear glasses, there are 7 students who do not wear glasses. ($2 + 7 = 9 \rightarrow$ This means that 2 out of 9 students wear glasses and 7 out of 9 students do not wear glasses.)

W	W	N	N	N	N	N	N	N	Part Part Whole
2x		7x							
180 Total Students									

2x and 7x are the two parts and together their sum is 180.

So we can write the equation: $2x + 7x = 180$

We solve the equation and get $x = 20$

So 40 sixth grade students wear glasses and 140 do not wear glasses.

(Check $\rightarrow 40 + 140 = 180$)

$$\begin{aligned} 2x + 7x &= 180 \\ \frac{9x}{9} &= \frac{180}{9} \\ x &= 20 \end{aligned}$$

Examples:

Show algebraically. Your final answer should answer the question and be in a complete sentence.

- 2) A father is 4 times older than his son. The sum of their ages is 50. How old is each?

S	F	F	F	F
x	4x			
50 Years				

$$x + 4x = 50$$

$$\frac{5x}{5} = \frac{50}{5}$$

$$\begin{aligned} x &= 10 \\ 4x &= 40 \end{aligned}$$

- 2) For every person who has the flu, there are 6 people who have only flu-like symptoms. If a doctor sees 40 patients, determine approximately how many patients you would expect to have only flu-like symptoms.

F	L	L	L	L	L	L
x	6x					
40						

1:6
 flu: flu-like $6x = 6 \cdot 5\frac{5}{7} = 34\frac{2}{7}$

$$x + 6x = 40$$

$$\frac{7x}{7} = \frac{40}{7}$$

$$x = 5\frac{5}{7}$$

About 34 patients are flu-like.

- 3) A powdered drink mix calls for a ratio of powder to water of 1:8. If there are 32 cups of powder, how many total cups of water are needed?

You Try!

- 4) For every left-handed person, there are about 4 right-handed people. If there are 30 students in a class, predict the number of students who are right-handed.

- 5) Sheila mixed 3 ounces of blue paint with 2 ounces of yellow paint. She decided to create 20 ounces of the same mixture. How many ounces of yellow paint are in the new mixture?

11) In your gym class, the ratio of girls to boys is 2:3. If there are 65 students in your gym class, how many of them are girls?

12) The ratio of green marbles to yellow marbles is 4:7. If there are 253 marbles in the collection, how many of each color are there?

13) John found out that the ratio of green M&M's to red M&M's in a 5 pound bag is 2:5. If there are 595 M&M's in a 5 pound bag, how many of them would you expect to be green?