RATIOS, PROPORTIONS, UNIT RATES

First Last Name
Date
Period

RATIOS The comparison of two quantities (items).

They can be show in 3 different ways: x to y x:y or $\frac{x}{y}$

EX: There are 9 boys and 12 girls in my classroom.

Boys	9	Girls	12	Girls	12	Boys	9
Girls	12	Boys	9	Students	21	Students	21

Ultimately, the ratio should be reduced to simplest terms like a fraction.

B:G is 9:12 or 3:4

PROPORTIONS Proprotions are the comparison of two ratios.

** SOLVING

1) Identify your labels. These are the 2 items being compared.
This way you don't get confused where the items go in the problem.

2) Set up your problem in a proportion.

$$\frac{\text{Label A}}{\text{Label B}} \quad \frac{\text{item a}}{\text{item b}} = \frac{\text{item a}}{\text{item b}}$$

EX1 To estimate a bear population, forest rangers tagged fifteen bears. Six months later, they captured forty-seven bears and of those captured, seven were tagged. Estimate the number of bears in the forest. *Round your answer to the nearest whole number.*

The 1st sentence lets you know the subject deer and we know how many tagged.
The 2nd sentence lets you know how many deer and how many tagged.

We solve "How many deer were in the forest?" like this:

LABEL IT	HOW MANY?		HOW MANY?
Tagged	15	=	7
Bears	x (we don't know)		47

Now cross multiply what numbers you do have and then divide by the 3rd #.

15 x 47 ÷ 7 = 100.714 Round to the nearest whole number.

ANSWER: There are approximately ***101 deer***.

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EX2 Fred wants to use a cookie recipe that makes 36 cookies but he wants to increase the number of cookies to 72. If the recipe specifies using 2 1/2 cups of sugar, how much sugar should he use?

Our 2 labels are cookies and sugar. This time they combined the cookies in the first sentence, then said the sugar comes from the recipe. If you look at the recipe it is for 36 cookies, so the sugar goes with the first cookies.

Cookie	36	=	72
Sugar	2		S

ANSWER: 2 * 72 ÷ 36 = **4** **cups of sugar**

EQUATION FORMAT

Cross multiply:	36S	=	144
	÷ 36		÷ 36
ANSWER:	**S**	**=**	**4**

ANSWER: 2 * 72 ÷ 36 = **4** **cups of sugar**

EX3 On a map the scale is half an inch is equal to thirteen and one half miles. How far apart are two cities on the map if they are actually seventy-five and one half miles apart? *Round your answer to the nearest hundredth.*

inch	1/2	=	k
miles	13 1/2		75 1/2

Convert your fractions to decimals and put your whole number in front.

EQUATION STYLE				OTHER METHOD			
inch	0.5	=	k	inch	0.5	=	k
miles	13.5		75.5	miles	13.5		75.5
	13.5k	=	37.75		.5 x 75.5 ÷ 13.5 =		2.7963
	÷ 13.5	=	÷ 13.5		Nearest hundreth		**2.796**
	k	=	2.7963				
Nearest hundreth			**2.796**				

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UNIT RATE When the second quantity is one. Usually the denominator, but you can make it the numerator as well, depending on what it's asking.

EX1 If my truck gets 360 miles in 7 hours, what are my *miles per hour*?

The underlined part tells you how they want it.
The per means ONE.

$$\frac{\text{miles}}{\text{hour}} \quad \frac{360}{7} = \frac{x}{1}$$

360 x 1 ÷ 7 = 51.4286 mph

…OR since you are multiplying times one, just take 360 divided by 7.

360 ÷ 7 = 51.4286 mph

EX2 Hana paid **$**1,500 for the tile in her kitchen. The room has an area of 212.2 **square feet**. What was her unit **cost** of tile in dollars per **square foot**?
Round to the nearest cent.

$$\frac{\$}{\text{Sq Ft}} \quad \frac{1500}{212.2} = 1500 \div 212.2 = 7.0688$$

Round to Penny $ 7.07 per Sq Ft

EX3 An 8-ounce can of beans costs $1.14. A 12-ounce can costs $1.75.
Which is the better deal?

					ROUND
$ / Oz	1.14 / 8	=	1.14 ÷ 8 =	0.143	$ 0.14
$ / Oz	1.75 / 12	=	1.75 ÷ 12 =	0.146	$ 0.15

The 8 ounce is a better deal at $.14 per ounce.