Name: _____ Date: _____ Hour: _____

Ratio and Proportion Review

When you say "I got 21 out of 24 questions correct on the last quiz," you are comparing two numbers. The **ratio** of your correct questions to the total number of questions is 21 to 24. You can write the ratio as 21:24, as a fraction ($^{21}/_{24}$), or as a decimal (0.875).

1. Use the information below about students in one of Mrs. Pearl's classes

Eye Color

	Brown eyes	Blue Eyes	Hazel Eyes	Total:
Males	9	3	2	14
Females	11	4	1	16
Total:	20	7	3	30

Write these ratios as fractions.

a.) Males with brown eyes to males. $\dfrac{9}{14}$ *or 9:14*

b.) Females with brown eyes to students with brown eyes. $\dfrac{11}{20}$ *or 11:20*

c.) Females with blue eyes to males with blue eyes. $\dfrac{4}{3}$ *or 4:3*

d.) All students with hazel eyes to all students. $\dfrac{3}{30}$ *or 3:30*

A **proportion** is an **equation** stating that two **ratios** are equal. For example, $\dfrac{2}{3} = \dfrac{8}{12}$ is a proportion.

One way to check that a proportion is true is by finding the decimal equivalents of each side.

$$\frac{2}{3} = \frac{8}{12} \quad \Rightarrow \quad .\overline{6} = .\overline{6}$$

but…

$$\frac{3}{8} \neq \frac{2}{12} \quad \Rightarrow \quad 0.375 \neq .1\overline{6}$$

2. Check each proportion by converting each ratio into a decimal.

a. $\dfrac{3}{5} = \dfrac{21}{35}$ $\Rightarrow$ $.6 = .6$ are they equal? **yes**

b. $\dfrac{5}{15} = \dfrac{2}{6}$ $\Rightarrow$ $.\overline{3} = .\overline{3}$ are they equal? **yes**

c. $\dfrac{1}{4} = \dfrac{24}{100}$ $\Rightarrow$ $.25 \neq .24$ are they equal? **no**

d. $\dfrac{6}{1} = \dfrac{1}{6}$ $\Rightarrow$ $6 \neq .1\overline{6}$ are they equal? **no**

e. $\dfrac{1}{4} = \dfrac{4}{16}$ $\Rightarrow$ $.25 = .25$ are they equal? **yes**

In algebra, a **variable** can stand for an unknown number. In the proportion $\dfrac{2}{3} = \dfrac{x}{6}$, the letter x can only be replaced by one unique number in order for the proportion to be true. That number is unknown until the proportion is solved.

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3. Solve each equation. Make sure to show your work!

a. $\dfrac{21}{35} = \dfrac{x}{20}$ $35x = (21)(20)$ $35x = 420$
$$\boxed{x = 12}$$

b. $\dfrac{35}{21} = \dfrac{20}{x}$ $(21)(20) = 35x$ $420 = 35x$
$$\boxed{x = 12}$$

c. $\dfrac{x}{30} = \dfrac{30}{200}$ $(30)(30) = 200x$ $900 = 200x$
$$\boxed{x = 4.5}$$

d. $\dfrac{30}{x} = \dfrac{200}{30}$ $200x = (30)(30)$ $200x = 900$
$$\boxed{x = 4.5}$$

Use what you did in #3 to answer #4-8.

4.   What do you notice about questions a and b? ___the numerators &___
___denominators were flipped___

5.   Did you get the same answer? ___yes___

6.   How about questions c and d? ___the numerators & denominators___
___were flipped___

7.   Did you get the same answer? ___yes___

8.   Why do you think this is? ___when you cross multiply, you get___
___the same equation both times___

Solve the following equations.

9. $\dfrac{x}{25} = \dfrac{2x+4}{70}$
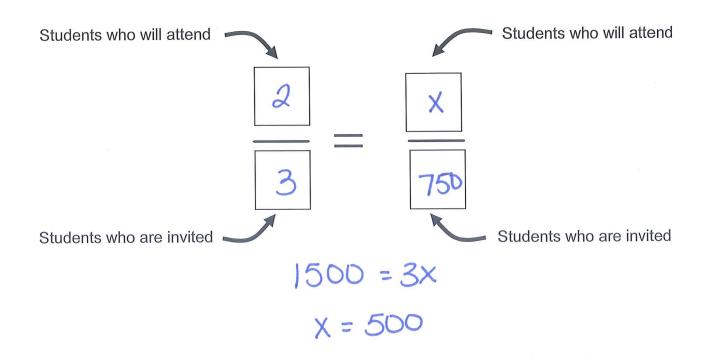
$25(2x+4) = 70x$

$50x + 100 = 70x$

$100 = 20x$

$\boxed{x = 5}$

10. $\dfrac{x+3}{3} = \dfrac{8}{x-2}$

$(3)(8) = (x+3)(x-2)$

$24 = x^2 + 3x - 2x - 6$

$24 = x^2 + x - 6$

$0 = x^2 + x - 30$

$0 = (x-5)(x+6)$

$X - 5 = 0$ $X + 6 = 0$
$\boxed{X = 5}$ $\boxed{X = -6}$

$\{5, -6\}$

"a" times "c" adds to "b".

$ax^2 + bx + c = 0$

$1 \cdot -30 = -30$

$\boxed{-5}\,\boxed{6} = -30 \quad a \cdot c$

$\downarrow \quad \downarrow$

$\boxed{-5} + \boxed{6} = 1 \quad b$

$6 \diagtimes \dfrac{-30}{-5}$
$\qquad 1$

$(x \quad -5)$

$\times$	x	-5
x	x^2	$-5x$
6	$6x$	-30

In order to solve word problems, you must first *identify the ratio.*

11. Jennifer estimates that two out of every three students will attend the Snow Ball. She knows there are 750 students in her class. Set up and solve a proportion to help her estimate how many people will attend.

Fill in the blanks. Be sure both ratios make the same comparison.

Students who will attend

Students who will attend

$$\frac{2}{3} = \frac{x}{750}$$

Students who are invited

Students who are invited

$$1500 = 3x$$

$$x = 500$$

How many students should Jennifer expect? $\underline{500}$ people

12. Mrs. Pearl bought 3 apples for $2.40. At the same price, how much would 10 apples cost?