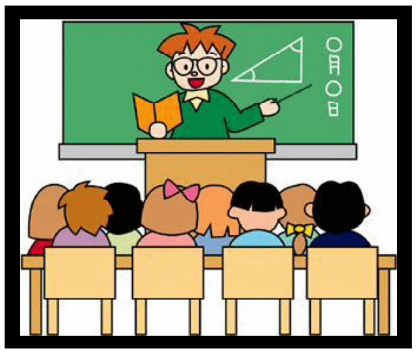
PRINCIPLES - LESSON 5A
RATIOS & PROPORTIONS



In a certain math class, there are 17 girls and 13 boys. We can say that this class has a 17 to 13 ratio of girls to boys.

This ratio can be expressed in a few different ways.

17 to 13 **17:13** $\frac{17}{13}$

Ratios should always be reduced to simplest form.

ex1) What is the ratio of boys to girls in this class?

13 to 17 13:17 $\frac{13}{17}$

RATIOS

Let's now say that the ratio of girls to boys at SMS is 2:1.

ex2) Judging by this ratio, how many students go to SMS?

We cannot tell how many from a ratio alone.
We would need more information.

RATIOS

Express each ratio in simplest form. Just reduce.

ex3) $15 : 24$

$\div 3 \quad \div 3$

$= \boxed{5 : 8}$

ex4) 3 to 12

$\div 3 \quad \div 3$

$= \boxed{1 \text{ to } 4}$

ex5) $\dfrac{2.4}{2.2}$ $\cdot 10$ $\cdot 10$ $= \dfrac{24}{22}$

$= \boxed{\dfrac{12}{11}}$

ex6) $1\frac{1}{2}$ to 5

$= \dfrac{3}{2} \cdot 2 \text{ to } 5 \cdot 2 = \boxed{3 \text{ to } 10}$

PROPORTIONS

PROPORTION: two ratios separated by an equal sign (2 equal ratios)

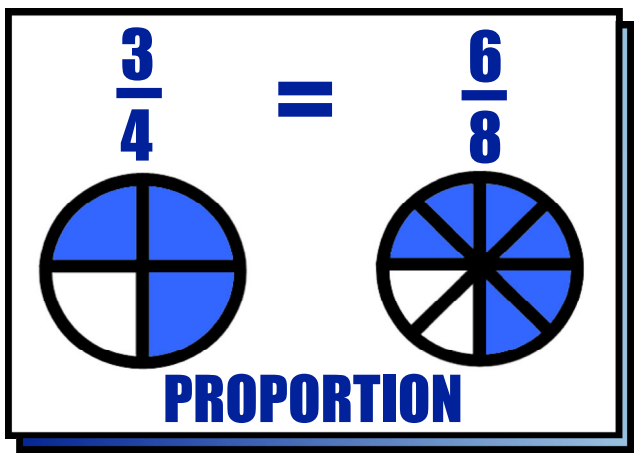
Cross Products of Proportions

In any proportion, the cross products are equal.

That is, if $\frac{a}{b} = \frac{c}{d}$ then $ad = bc$.

This is called cross-multiplying and is really just using the multiplication property of equality twice.

This is a useful technique to check to see if two ratios are equal.



PROPORTIONS

Are the two ratios equal? Use cross products.

ex7) $\frac{3}{8} \not\& \frac{27}{72}$

$3 \cdot 72 \stackrel{?}{=} 8 \cdot 27$

$216 = 216$ ✓

These ratios are equal.

ex8) $\frac{3}{7} \not\& \frac{10}{24}$

$3 \cdot 24 \stackrel{?}{=} 7 \cdot 10$

$72 \neq 70$

These ratios are not equal.

ex9) $\frac{440}{8} \not\& \frac{274}{5}$

$440 \cdot 5 \stackrel{?}{=} 8 \cdot 274$

$2200 \neq 2192$

These ratios are not equal.

SOLVING PROPORTIONS

Solve each equation.

ex10) $\frac{2}{x} = \frac{6}{15}$

$6x = 2 \cdot 15$

$\frac{6x}{6} = \frac{30}{6}$

$\boxed{x = 5}$

ex11) $\frac{6}{7} = \frac{10}{x}$

$6x = 7 \cdot 10$

$\frac{6x}{6} = \frac{70}{6}$

$x = \frac{70}{6} \Rightarrow \boxed{x = \frac{35}{3}}$

always reduce fractions!

SOLVING PROPORTIONS

Solve each equation.

ex12) $\frac{2r-10}{3} = \frac{r}{5}$

$3r = 5(2r-10)$

$3r = 10r - 50$

$-10r \quad -10r$

$\frac{-7r}{-7} = \frac{-50}{7}$

$r = \frac{50}{7}$

ex13) $\frac{y+3}{2} = \frac{2y-5}{6}$

$6(y+3) = 2(2y-5)$

$6y + 18 = 4y - 10$

$-4y \qquad -4y$

$2y + 18 = -10$

$-18 \quad -18$

$\frac{2y}{2} = \frac{-28}{2}$

$y = -14$