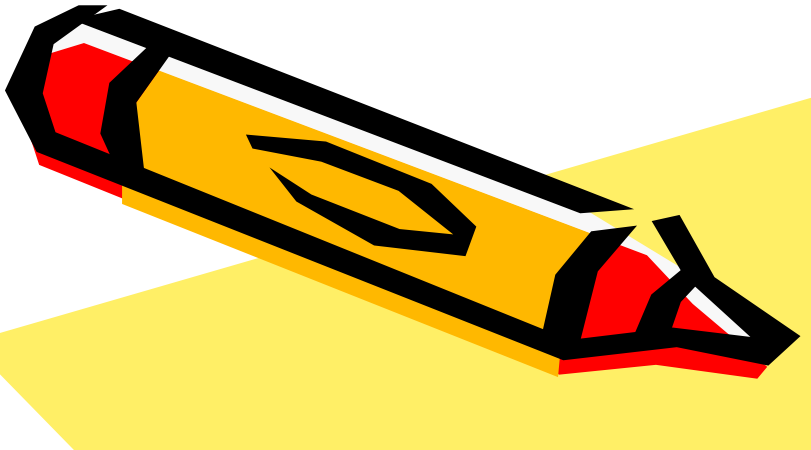
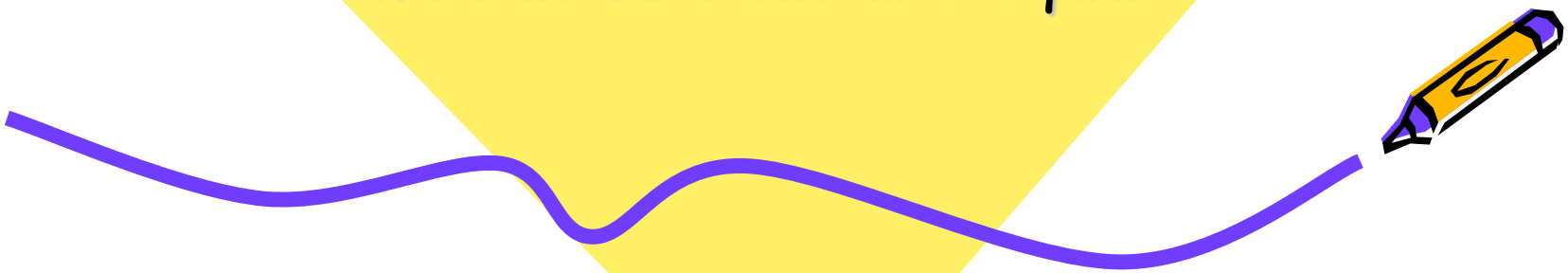


Proportions

Two ratios that are equal



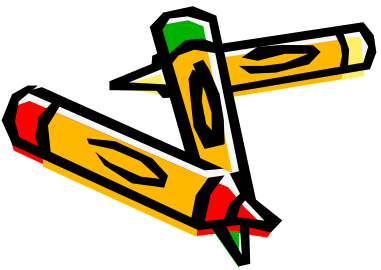
A proportion is an equation that states that two ratios are equal, such as:

$$\frac{2}{3} = \frac{x}{9}$$

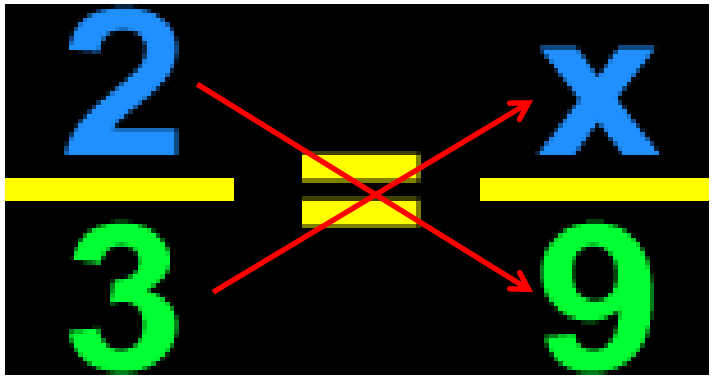
In simple proportions, all you need to do is examine the fractions. If the fractions both reduce to the same value, the proportion is true.

This is a true proportion, since both fractions reduce to 1/3.

$$\frac{5}{15} = \frac{2}{6}$$



In simple proportions, you can use this same approach when solving for a missing part of a proportion. Remember that both fractions must reduce to the same value.



To determine the unknown value you must cross multiply.

$(3)(x) = (2)(9)$

$3x = 18$

$x = 6$

Check your proportion

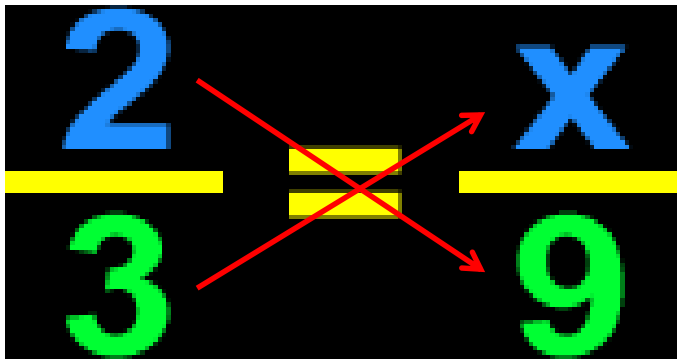
$(3)(x) = (2)(9)$

$(3)(6) = (2)(9)$

$18 = 18$ True!

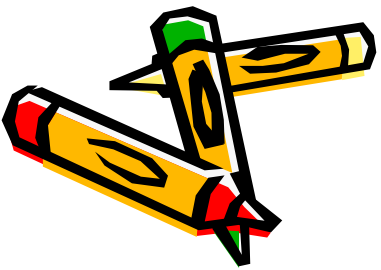
So, ratios that are equivalent are said to be proportional. Cross Multiply makes solving or proving proportions much easier. In this example $3x = 18$, $x = 6$.

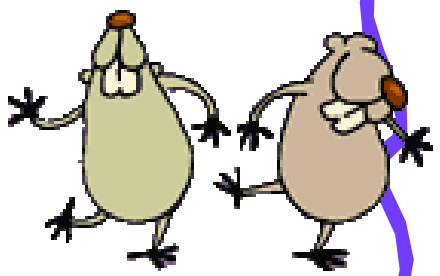
If you remember, this is like finding equivalent fractions when you are adding or subtracting fractions.



1) Are the following true proportions?

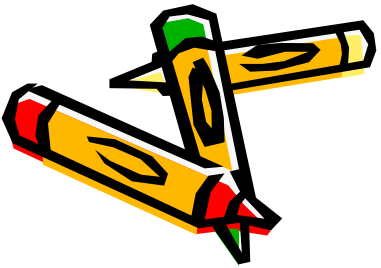
$$\frac{2}{3} = \frac{10}{5} \qquad \frac{2}{3} = \frac{10}{15}$$





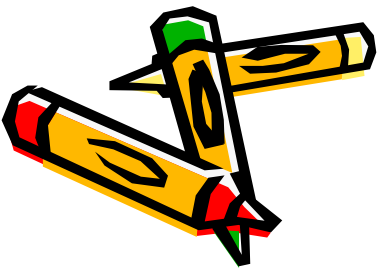
2) Solve for x:

$$\frac{4}{6} = \frac{x}{42}$$



3) Solve for x:

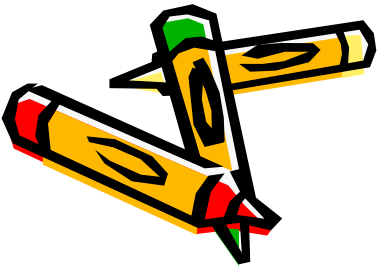
$$\frac{25}{x} = \frac{5}{2}$$



Solve the following problems.

4) If 4 tickets to a show cost $9.00, find the cost of 14 tickets.

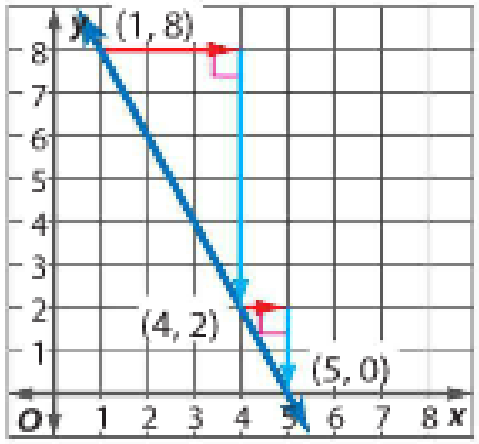
5) A house which is appraised for $10,000 pays $300 in taxes. What should the tax be on a house appraised at $15,000.



Similar Triangles and Slope

Words The ratio of the rise to the run of two slope triangles formed by a line is equal to the slope of the line.

Example



Larger Triangle

$\frac{\text{rise}}{\text{run}} = \frac{6}{-3}$, or -2

Smaller Triangle

$\frac{\text{rise}}{\text{run}} = \frac{2}{-1}$, or -2

$\text{slope} = \frac{-2}{1}$, or -2

The ratios of the rise to the run of the two similar slope triangles are the same as the slope of the line. Since the ratios are equal, the slope of m of a line is the same between any two distinct points on a non-vertical line in the coordinate plane.

Write a proportion to compare the rise to the run for each of the similar slope triangles

Triangle # 1

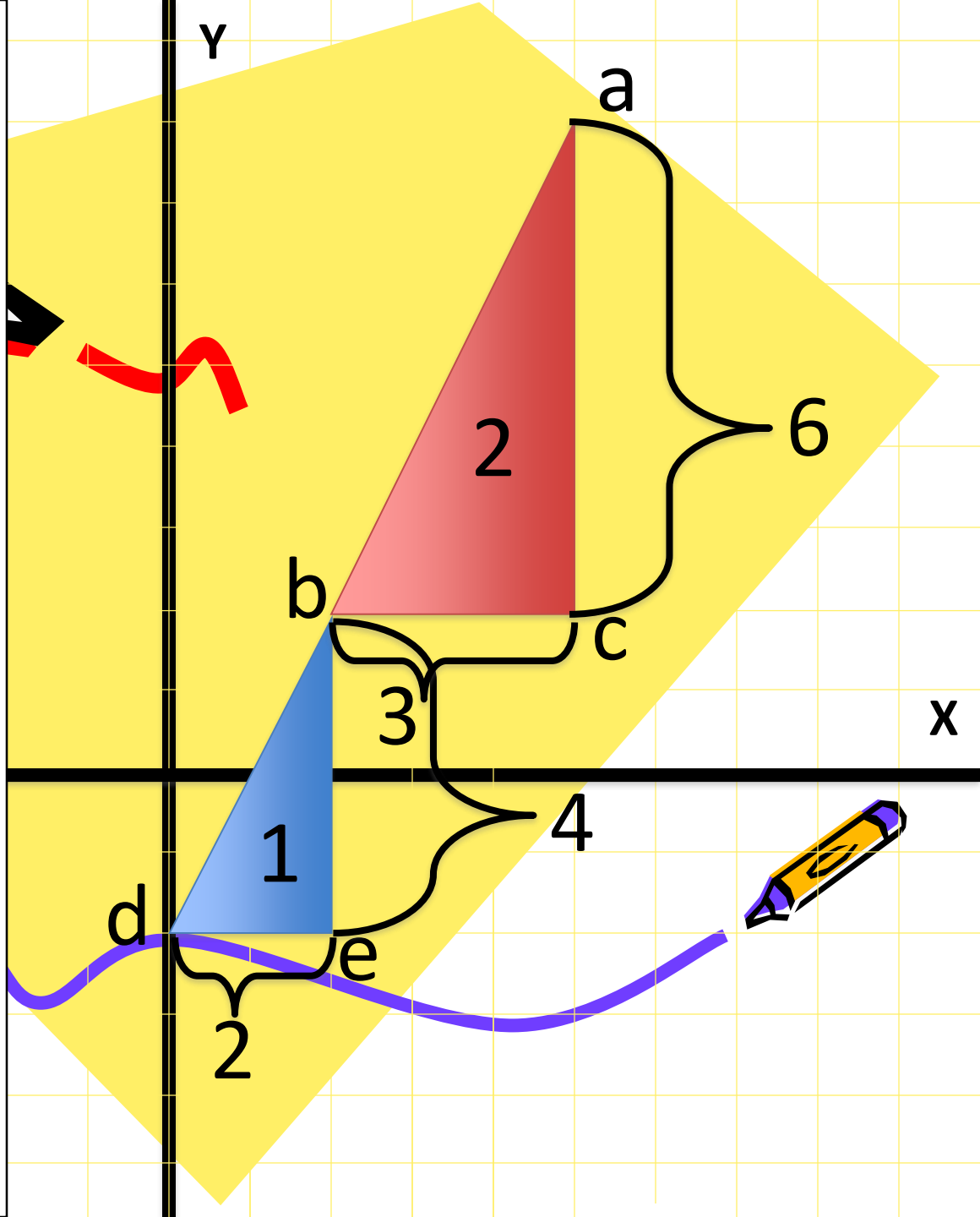
$\frac{\text{rise}}{\text{run}} \quad \frac{4}{2} \quad \frac{2}{1}$

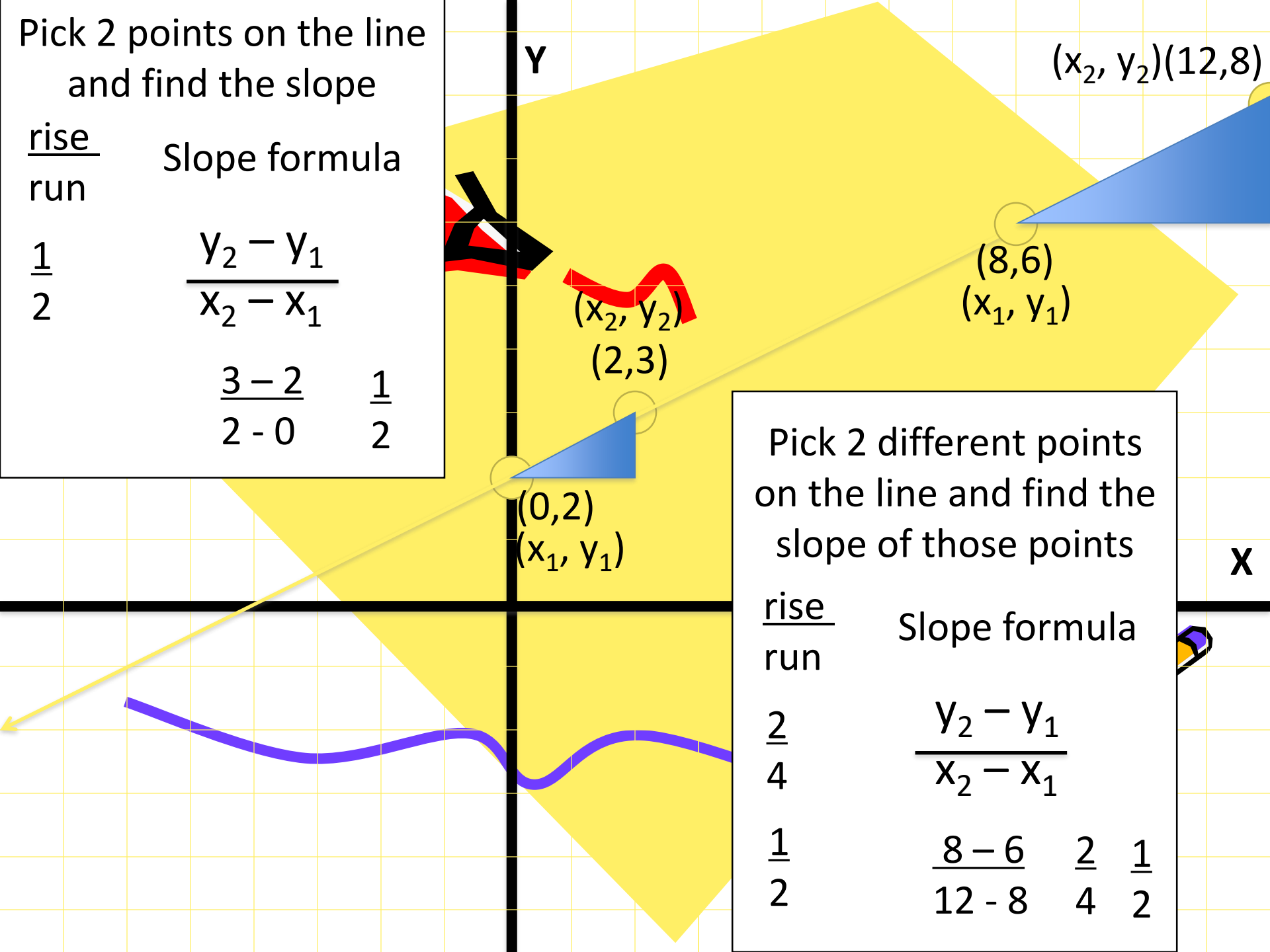
Triangle # 2

$\frac{\text{rise}}{\text{run}} \quad \frac{6}{3} \quad \frac{2}{1}$

proportion

$\frac{be}{de} = \frac{ac}{bc} \quad \frac{4}{2} = \frac{6}{3} = \frac{2}{1}$




Pick 2 points on the line and find the slope
rise / run
Slope formula
1/2
$\frac{y_2 - y_1}{x_2 - x_1}$
$\frac{3-2}{2-0}$ $\frac{1}{2}$
Y
X
(x_2, y_2) (2,3)
(x_1, y_1) (0,2)
(x_2, y_2)(12,8)
(x_1, y_1) (8,6)
Pick 2 different points on the line and find the slope of those points
rise / run
Slope formula
2/4
$\frac{y_2 - y_1}{x_2 - x_1}$
1/2
$\frac{8-6}{12-8}$ $\frac{2}{4}$ $\frac{1}{2}$

Guiding Questions

(you should be able to answer)

- What is true about corresponding sides of similar triangles?
- How does the slope of two similar triangles compare?