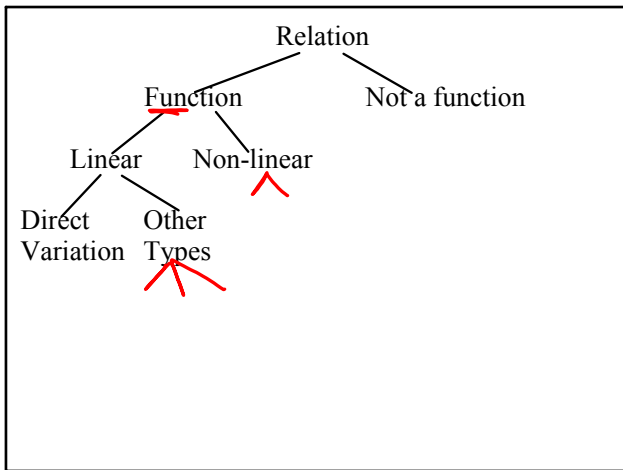


Problem of the Day: Find the slope of the line through the points (-3, 8) and (5, 4).

Plan for the Day: Collect Homework Week 8 and unused restroom passes
 Notes on direct variation - with colored pencils
 More practice with slope
 Objective: We will be able to work with direct variation.
 Good luck volleyball and football at home!!

One type of linear function is a direct variation.

Direct variation represents a proportional relationship.



The following are all equations of direct proportions. Graph the equations on the graphing calculator. Sketch and label the graphs below. Describe the characteristics of the graphs.

- $y = 3x$ blue
- $y = 0.5x$ red
- $y = x$ black
- $y = -0.3x$ purple
- $y = 1.75x$ green
- $y = -3.25x$ orange

What are the characteristics of a proportional relationship?
Pass through origin
none were vertical or horizontal
linear
functions
continuous
all were slanted

Give three examples of non-proportional relationships (equations).

$y = 3x^2$
 $y = 2x + 5$
 $y = \frac{3}{x}$

A direct variation is a relationship that can be written in the form $y = kx$.

k is the constant of proportionality (or variation).

The constant of proportionality acts the same as the slope. It represents the scale factor of a proportion.

If a direct variation exists, it is worded as "y varies directly with x", which means as one value increases, so does the other value.

To find your k, divide the y value by the x value.

Once you have your k, you can write an equation in direct variation by plugging it into $y = kx$.

We can use an equation of a direct variation to help us predict or find given values.

To find a given value, write the equation and then plug the given values in for the appropriate variables.

You can also use a proportion to find the given values.

Example: For the following examples, y varies directly as x. Write a direct variation equation that relates x and y. Then solve.

a. If $y = 6$ when $x = 10$, find x when $y = 18$.

d. If $y = 12$ when $x = \frac{6}{7}$, find x when $y = 16$.

Example: For the following examples, y varies directly as x. Write a direct variation equation that relates x and y. Then solve.

b. If $y = 22$ when $x = 8$, find y when $x = -16$.

Example: The mass of a substance varies directly with the volume of the substance. The volume of 50 kilograms is 40 liters. What is the volume, in liters, of 6.5 kilograms?

Example: The value of y varies directly with x. Write a function that represents the relationship between x and y if $y = \frac{20}{3}$ when $x = 30$.