Direct Variation

**Definition: *Y* varies directly as *x* means that *\_\_\_\_\_* where *k* is the constant of variation.**

**(see any similarities to y = mx + b?)**

**Based on what you know about slope intercept form, the graph of a relationship that varies directly will always go through \_\_\_\_\_\_\_\_\_\_\_.**

**In other words:**

\* As X \_\_\_\_\_\_\_\_\_\_\_\_\_ in value, Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or

\* As X \_\_\_\_\_\_\_\_\_\_\_\_\_ in value, Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**I. Find the constant of variation:**

|  |  |
| --- | --- |
| **X** | **Y** |
| 6 | 12 |
| 7 | 14 |
| 8 | 16 |
|  |  |

NOTE: As X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!

**Your Turn!**

|  |  |
| --- | --- |
| X | Y |
| 3 | 15 |
| 4 | 20 |
| 5 | 25 |
|  |  |

What is the constant of variation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**II. Is this a direct variation? If yes, give the constant of variation (k) and the equation**.

|  |  |
| --- | --- |
| X | Y |
| 4 | 6 |
| 8 | 12 |
| 12 | 18 |
| 18 | 27 |

k = \_\_\_\_\_\_\_\_\_\_\_ Equation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Direct Variation

**Direct Variation**—a function of the form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, where k ≠ 0.

* k is the “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”
	+ it is the coefficient of x
* The variables y and x are said to “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”
* When graphed, the y-intercept (b) is \_\_\_\_\_\_\_\_\_\_\_\_\_.

Example 1: Example 2:

 y = 3x y = -x

Constant of Variation: Constant of Variation:

Graph: Graph:

Tell whether the equation is direct variation. If it is, find the constant of variation.

1. y = 2x 2) 2x + 5y = 1 3) -12x = 6y

4) y + 8 = -x 5) 5x – 6y = 0 6) -x = 10y

Write an equation of direct variation that includes the given point:

1. (1, 5) 2) (-8, 10) 3) (-6, 1) 4) (3, -4)

Assume that y varies directly with x:

5) If y = 28 when x = 7, find x when y = 52

6) If y = 2.5 when x = 0.5, find x when y = 20

7) If y = 4 when x = 12, find y when x = -24

8) If y = 2 $\frac{2}{3}$ when x = ¼ , find y when x = 1 $\frac{1}{8}$

More Examples

9) If y varies directly as the square root of x, and y=10 when x=25, find y when

 x =36.

10) The length S that a spring will stretch varies directly with the weight F that is attached to the spring. If a spring stretches 20 inches with 25 pounds attached, how far will it stretch with 15 pounds attached?

11) A ball is dropped from a window of a building. The distance it falls varies directly with the square of the time it falls. If a ball can fall 8 feet in 0.5 seconds, how far will it fall if it takes 2.5 seconds for it to hit the ground?