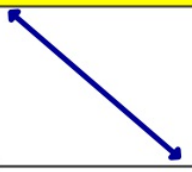
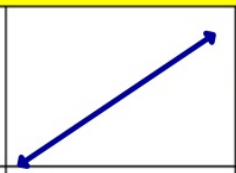
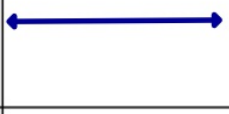
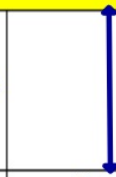
up or down
left or right

WHAT IS SLOPE?

rise
run

Main Ideas/Questions	Notes/Examples
Rate of Change	a rate that describes how one quantity changes in relation to another quantity. On a linear graph, this is called the slope of the line!
Slope 	• Slope is written as a ratio of the **vertical change** (rise) to the **horizontal change** (run) between any two points on a line. • This remains constant for any two points on the same line. • Slope is written as a fraction in simplified form. • Variable for slope: m

Types of Slope				
	negative	positive	zero	undefined

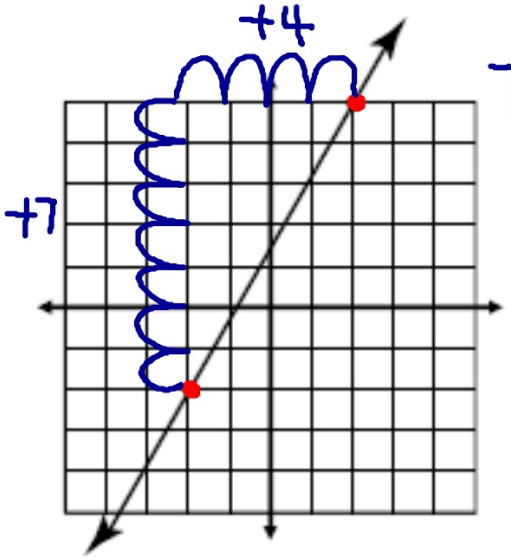
HORIZONTAL
m = 0

VERTICAL
m = undefined

FINDING SLOPE GIVEN A GRAPH

$m = \frac{\text{rise (vertical change } \updownarrow)}{\text{run (horizontal change } \leftrightarrow)}$

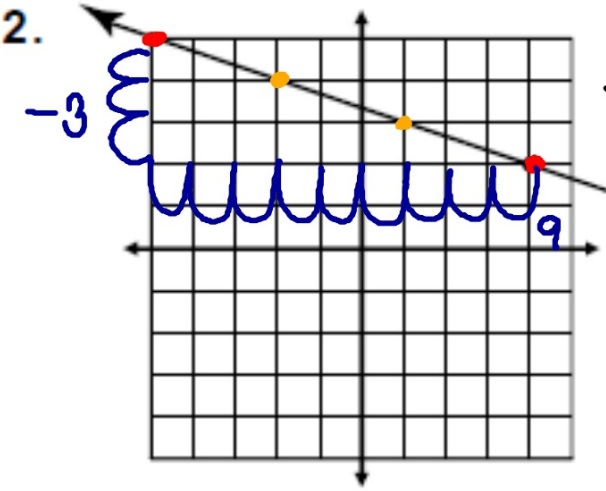
1.



$m = \frac{7}{4}$

You always move up or down first!

2.

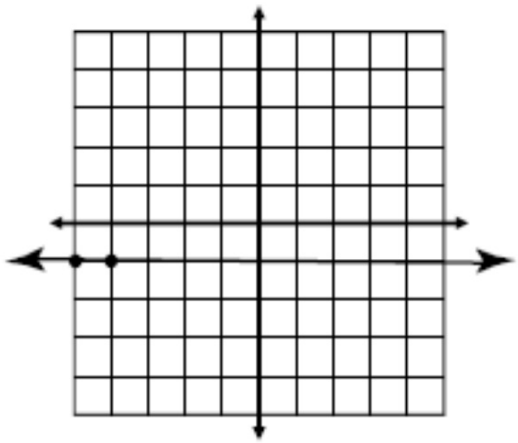


$m = -\frac{3}{9}$

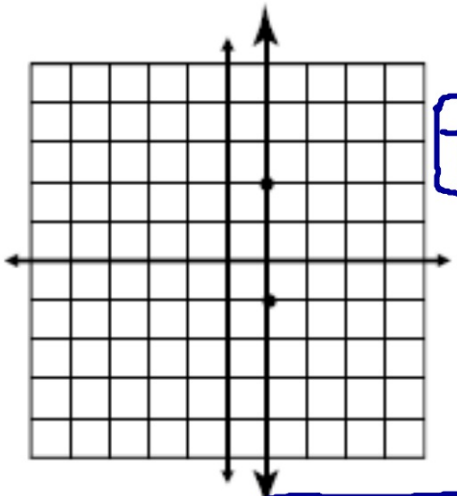
$m = \frac{-1}{3}$

3.

$m = 0$

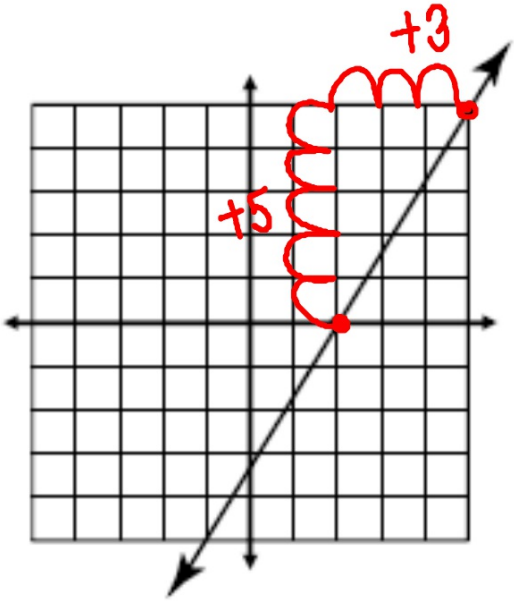


4.



m = undef.

5.



$m = \frac{5}{3}$

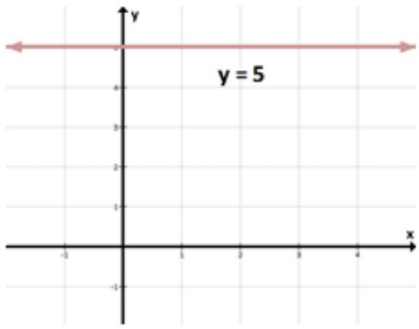
SPECIAL CASES

Y=#

X=#

HOY

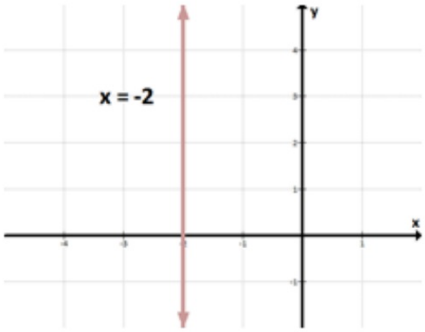
VUX



"0" Slope

There is no "x" in the equation, since it doesn't matter what x is (y always stays the same).

Example: The age of your little sister (5), based on the ages of all your friends. Your sister's ages stays at 5.



Undefined Slope

There is no "y" in the equation, since it doesn't matter what y is (x always stays the same).

Example: Think of an elevator going up and down where $x = -2$. This really doesn't make sense, since every x should really only have one y.

Slope from a Table

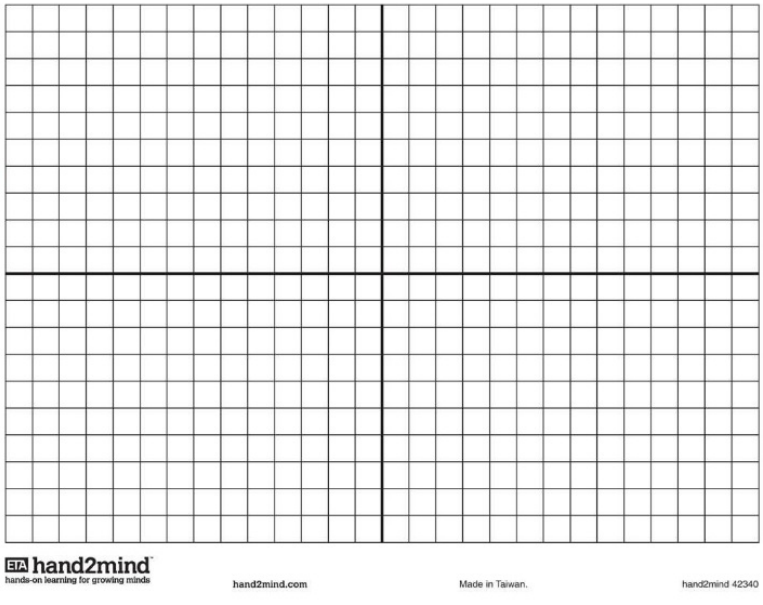
CHANGE IN Y
CHANGE IN X

X (run)	Y (rise)
1	-1
2	3
3	7
4	11

+1 +4 +1 +4 +1 +4

$\frac{4}{1}=4$ $\frac{4}{1}=4$ $\frac{4}{1}=4$

$m=4$



X	Y
-4	-10
-2	-4
-1	-1
1	5
4	14

+2, +1, +2, +3 / +6, +3, +6, +9

$m = 3$

X	Y
-2	3
-1	6
0	9
1	12
2	15

+1, +1, +1, +1 / +3, +3, +3, +3

For each graph, identify the change in y and the change in x.

X (run)	Y (rise)
2	2
4	5
6	8
8	11

+2, +2, +2 / +3, +3, +3

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = \frac{3}{2}$

X (run)	Y (rise)
2	3
2	6
2	9
2	12

+0, +0, +0 / +3, +3, +3

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = \frac{3}{0}$

$m = undef.$

X (run)	Y (rise)
-1	6
-3	6
-5	6
-7	6

-2, -2, -2 / +0, +0, +0

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = \frac{0}{-2}$

$m = 0$

Practice Problems

Ex. 1)

x	y
0	5
1	10
2	15
3	20
4	25
5	30

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = 5$

Ex. 2)

x	y
-2	10
-4	4
-6	-2
-8	-8
-10	-14
-12	-20

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = 3$

Ex. 3)

x	*y*
2	14
5	35
7	49
10	70

+3, +2, +3 / +21, +14, +21

$slope = \frac{change\ in\ y}{change\ in\ x}$

$m = 7$

SPECIAL CASES

Y=#

Slope = 0

HOY

X	Y
−4	5
−6	5
−8	5
−10	5
−12	5

X=#

Slope =Undef.

VUX

X	Y
−2	4
−2	6
−2	8
−2	10
−2	12

SLOPE FORMULA	The **slope formula** is used to find the slope between two points (x_1, y_1) and (x_2, y_2).
	If you're given two points (x_1, y_1) **and** (x_2, y_2)
	Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$
	It is important to remember to simplify your answer!

Examples: Find the slope between the two points provided.

$x_1\ y_1 \qquad x_2\ y_2$

1.) (1, 1) and (4, 3)

$m = \frac{3-1}{4-1}$

$m = \frac{2}{3}$

$x_1\ y_1 \qquad x_2\ y_2$

2.) (-2, 4) and (10, -2)

$m = \frac{-2-4}{10-(-2)} = \frac{-6}{12}$

$m = -\frac{1}{2}$

$x_1\ y_1 \qquad x_2\ y_2$

3.) (-4, 5) and (-8, -5)

$$m = \frac{-5-5}{-8-(-4)}$$

$$m = \frac{-10}{-4}$$

$$m = \frac{5}{2}$$

$x_1\ y_1 \qquad x_2\ y_2$

4.) (10, 0) and (-2, 4)

$$m = \frac{4-0}{-2-10}$$

$$m = \frac{4}{-12}$$

$$m = -\frac{1}{3}$$

5.) (5, 9) and (3, 9)

$$m = \frac{9-9}{3-5}$$

$$m = \frac{0}{-2}$$

$$m = 0$$

6.) (-7, 8) and (-7, 5)

$$m = \frac{5-8}{-7-(-7)} = \frac{-3}{0}$$

m = undef.