

## Wednesday's Do Now

Josh opened up a savings account last year. He put an initial amount of \$100 and saves \$30 per week. This relationship can be represented by  $A(w) = 30w + 100$ , where  $w$  is the number of weeks. What does  $A(w)$  represent?

The total amount of money Josh has after  $w$  weeks.

Find the amount of money Josh has saved after 20 weeks.

$$\begin{aligned} &30(20) + 100 \\ &= 600 + 100 \\ &= \boxed{700} \end{aligned}$$

*Problem 1*

7	0	0			
-	/	/	/	/	
.	.	.	.	.	
0	●	●	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
●	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

## Lesson 2.1 - Finding Slope, Rate of Change, & Direct Variation

- A linear function is a function that forms a straight line when graphed.
- Linear functions have a constant rate of change also known as slope.
- Linear functions have an initial value called the y-intercept, and it is where the graph crosses the y-axis. y-int : (0, y)

### EXAMPLE #1

Given the following relation:  $\{(-2,4),(-1,1),(0,0),(1,1),(2,4)\}$

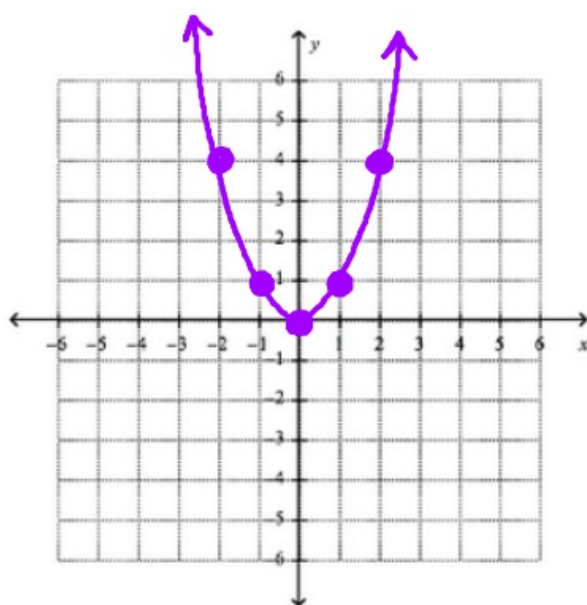
A. Is this a function? How do you know?

Yes, because the x-values do not repeat.

B. Make a table demonstrating the domain and range.

Domain (x)	-2	-1	0	1	2
Range (y)	4	1	0	1	4

C. Graph the relation in the coordinate plane.



D. Is this relation linear? Explain.

No; because it is not a straight line.

### YOU TRY #1

Put the equations into  $Y=$  and get the points.

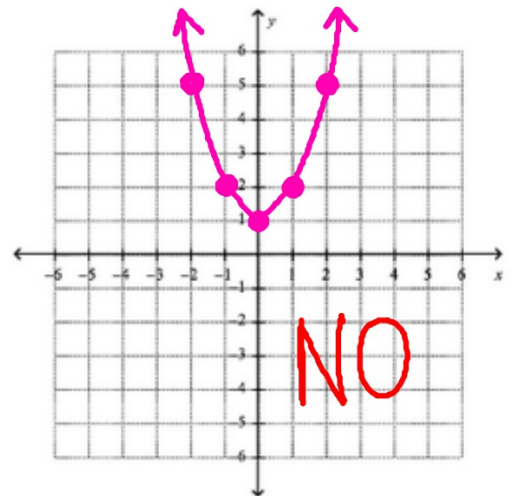
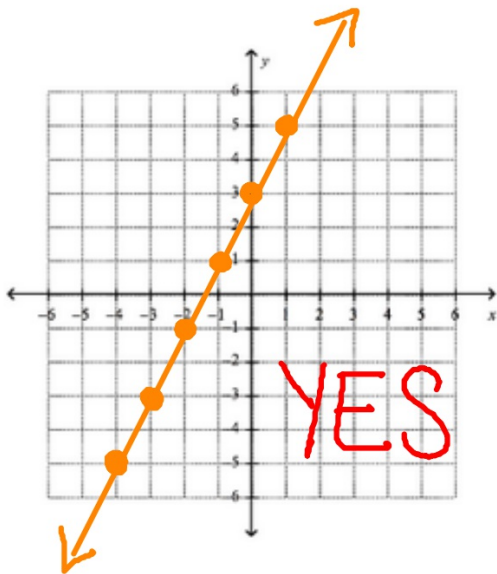
Determine whether the given equation is a linear function.

A.  $y = 2x + 3$

B.  $y = x^2 + 1$

x	-4	-3	-2	-1	0	1
y	-5	-3	-1	1	3	5

x	-2	-1	0	1	2
y	5	2	1	2	5

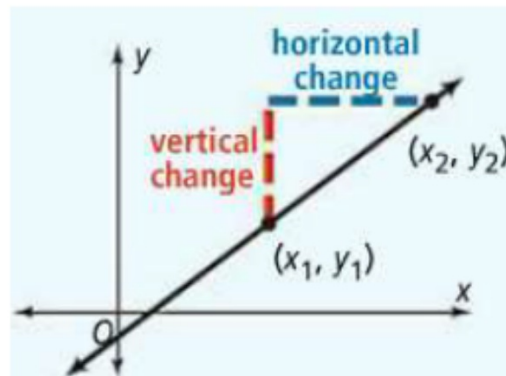


## WHAT IS SLOPE?

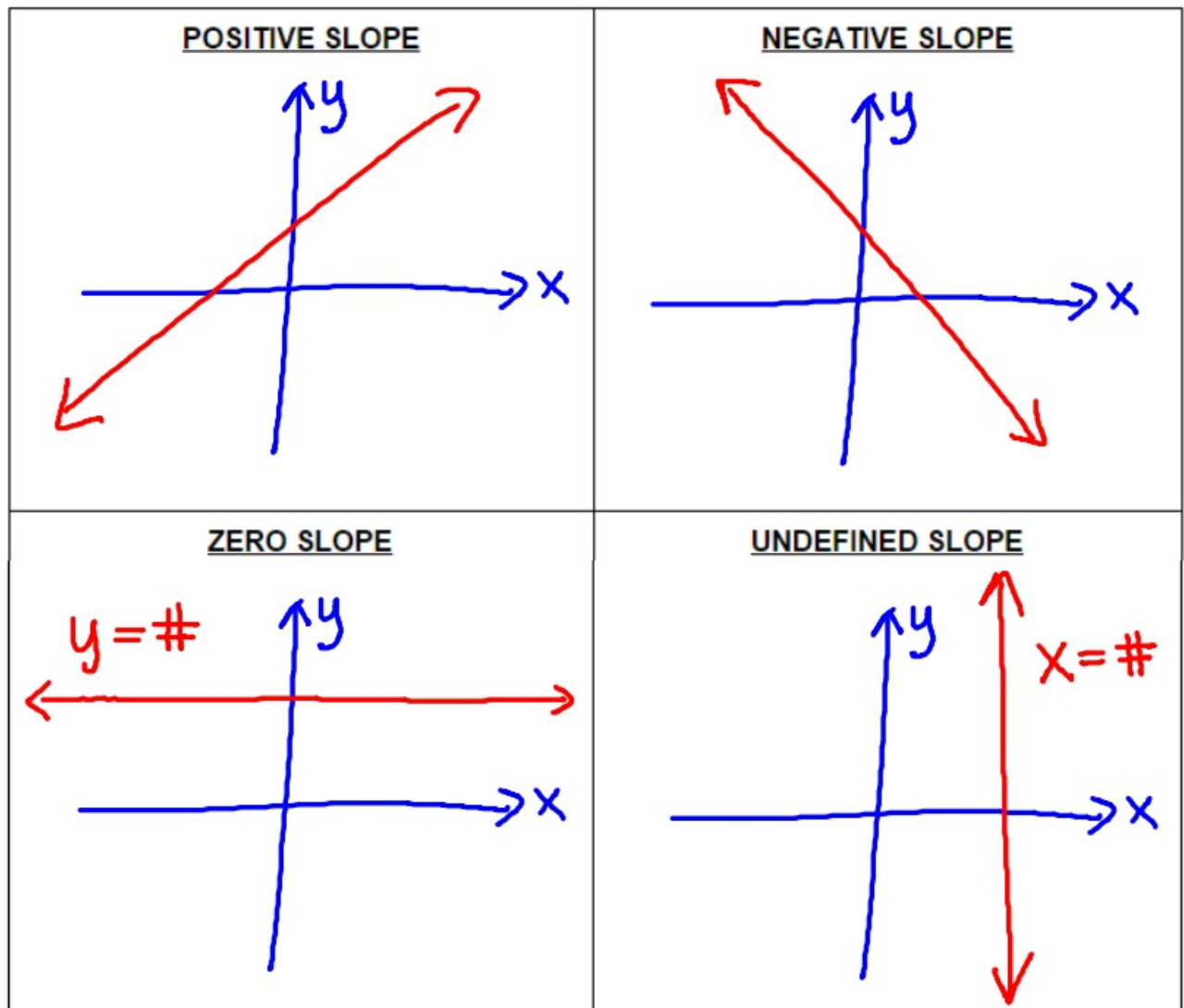
The slope of a line through points  $(x_1, y_1)$  and  $(x_2, y_2)$  is the ratio of the vertical change to the corresponding horizontal change.

- It measures the steepness of a line
- The larger the absolute value of the slope, the steeper the line

$$\text{Slope } (m) = \frac{\text{vertical change (rise)}}{\text{horizontal change (run)}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$



## 4 TYPES OF SLOPE



### EXAMPLE #2

Use the slope formula to find the slope of the line between  $(-3, 7)$  and  $(-2, 4)$ .

$$m = \frac{4-7}{-2-(-3)} = \frac{-3}{1} = \boxed{-3}$$

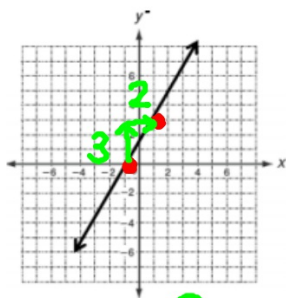
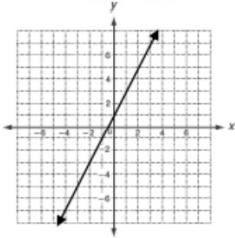
### YOU TRY #2

Use the slope formula to find the slope of the line between  $(2, 5)$  and  $(1, 8)$ .

$$m = \frac{8-5}{1-2} = \frac{3}{-1} = \boxed{-3}$$

## SLOPE (m)

$$m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$$



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

## SLOPE (m)

$$m = \frac{\Delta y}{\Delta x} = \frac{\text{change in } y}{\text{change in } x}$$

**RATIO - Division!**

x	f(x)
-1	-2
2	4
4	8
5	10
8	16

$\Delta x$	x	f(x)	$\Delta y$
+3	-1	-2	+6
+2	2	4	4
+1	4	8	2
+3	5	10	6
	8	16	6

$$m = \frac{\Delta y}{\Delta x} = \boxed{2}$$

## SLOPE (m)

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Remember, y goes **first** (on top)!

This is **opposite** of graphing ordered pairs, where is x first then y (x, y).

**Ex:** Find the slope of the line that passes through the points (2, -3) (5, -6)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - (-3)}{5 - 2} = \frac{-6 + 3}{3} = \frac{-3}{3} = \boxed{-1}$$

## SLOPE (m)

**Equation of a Line!**  
**Slope-Intercept Form**

$$y = mx + b$$

slope y-intercept

**m = slope**

**b = y-intercept**

**Ex:** Find the slope and y-intercept

- $y = -2x + 5$   
 $m = -2, b = 5$
- $y = \frac{1}{4}x + 3$   
 $m = \frac{1}{4}, b = 3$

## GRAPHING EQUATIONS IN SLOPE-INTERCEPT FORM

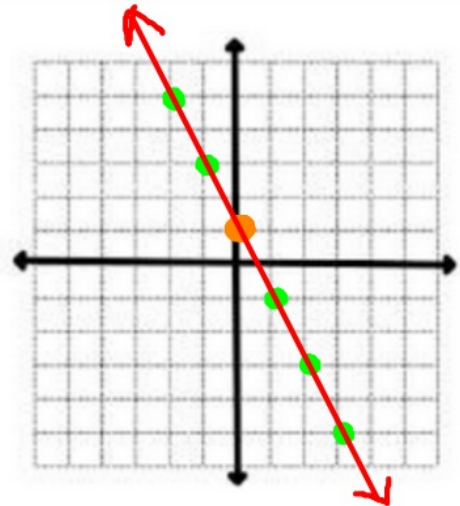
### Slope-Intercept Form

The **Slope-Intercept Form** of an equation of a line is  $y = mx + b$ , where  $m$  is the slope of the line and  $(0, b)$  is the y-intercept.

**Example 3:** Graph  $y = -2x + 1$

Steps:

1. Plot the y-intercept  $(0, 1)$
2. Use the slope (rise/run)  $m = -\frac{2}{1}$
3. Draw a line through the two points

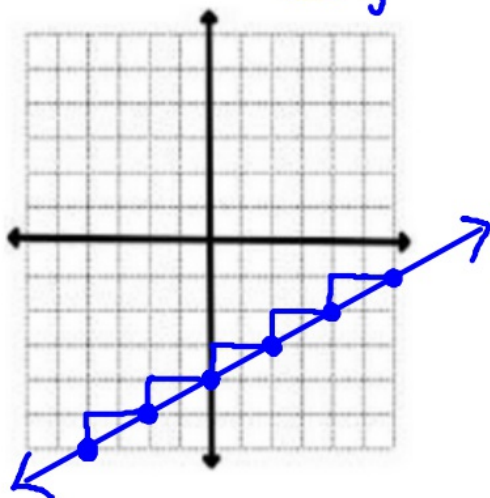


slope

### YOU TRY #3

x	0	1	2	3
y	5	2	-1	-4

A. Graph  $y = \frac{1}{5}x - 4$



B. Graph  $y = -3x + 5$

