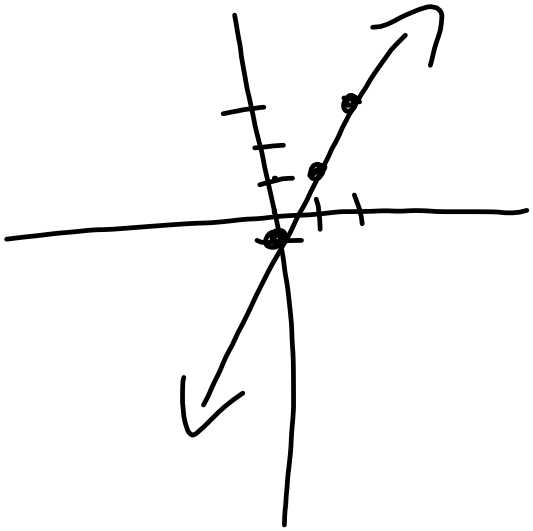
Bellwork: Graph the following function

$$y = \frac{2}{1}x - 1$$

$y = mx + b$

slope: rise / run

y-int



Lesson 2.1 Objectives:

I can identify linear, quadratic, absolute value, or exponential functions in graph, table, or equation form.

Four types of functions:

1. Linear
2. Quadratic
3. Absolute Value
4. Exponential

Linear Equations have a degree of 1

Y-intercept Form:

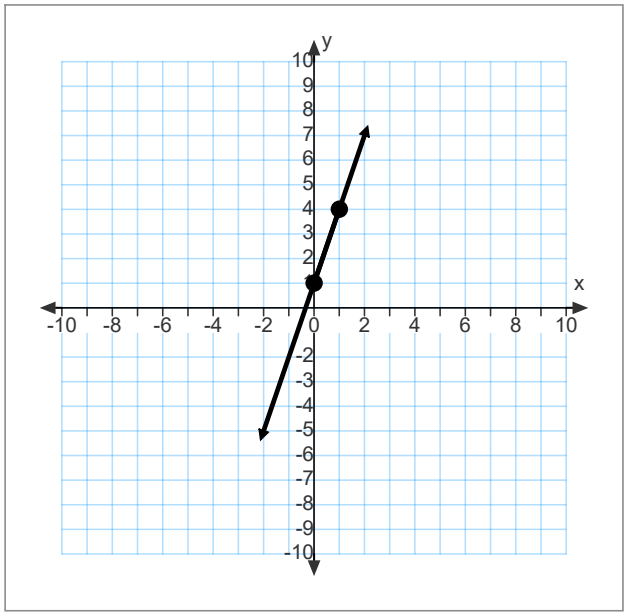
$y = mx + b$ where m is the slope and b is the y-intercept

Standard Form:

$Ax + By = C$ where A, B, and C are integers

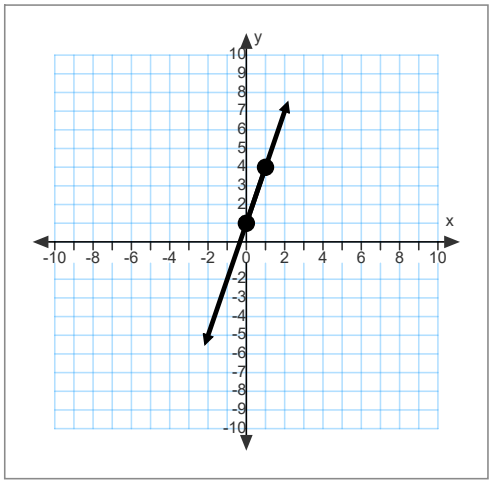
# Linear Graphs are straight lines

$$y = 3x + 1$$




# Linear Tables add a constant each step

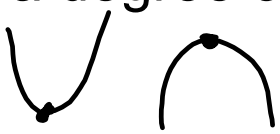
$$y = 3x + 1$$




| x | y | difference |
|---|---|---|
| -2 | -5 | |
| -1 | -2 | 3 |
| 0 | 1 | 3 |
| 1 | 4 | 3 |
| 2 | 7 | 3 |

# Quadratic Equations have a degree of 2

## Vertex Form:



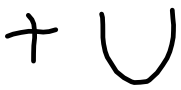
$y = a(x-h)^2 + k$ where (h,k) is the vertex; a determines steepness and direction

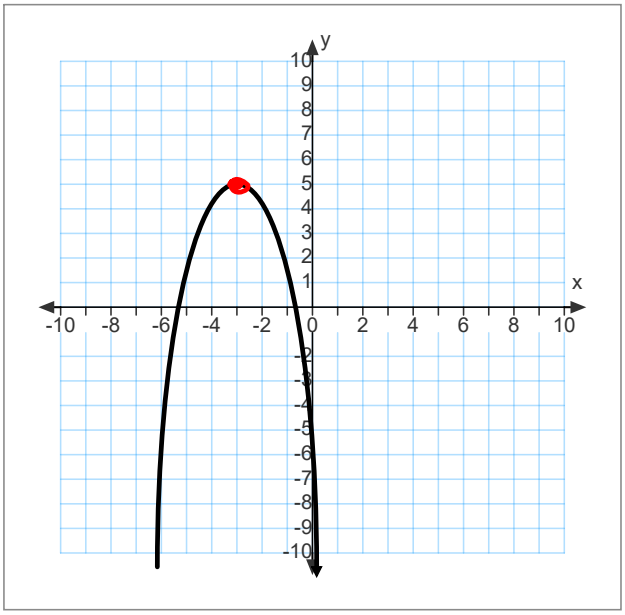
## Standard Form:

$y = ax^2 + bx + c$ where a, b, and c are integers; a determines steepness and direction

# Quadratic graphs are parabolas (U-shaped)

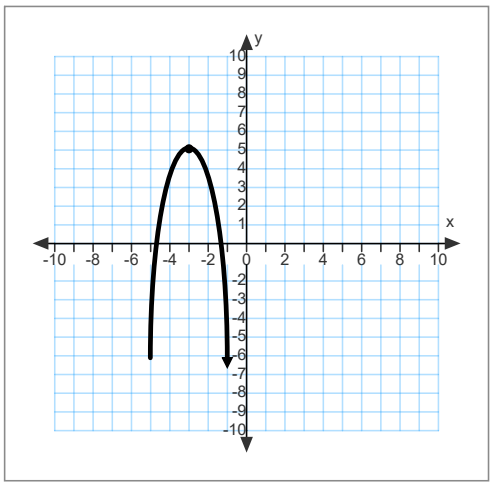
$y = -(x+3)^2 + 5$





# Quadratic Tables' first list of differences is linear

$$y = -(x+3)^2 + 5$$




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

-2
-2
-2

# Absolute Value Equations have x within absolute value symbols: |x|

$|4| = 4$

$|-20| = 20$

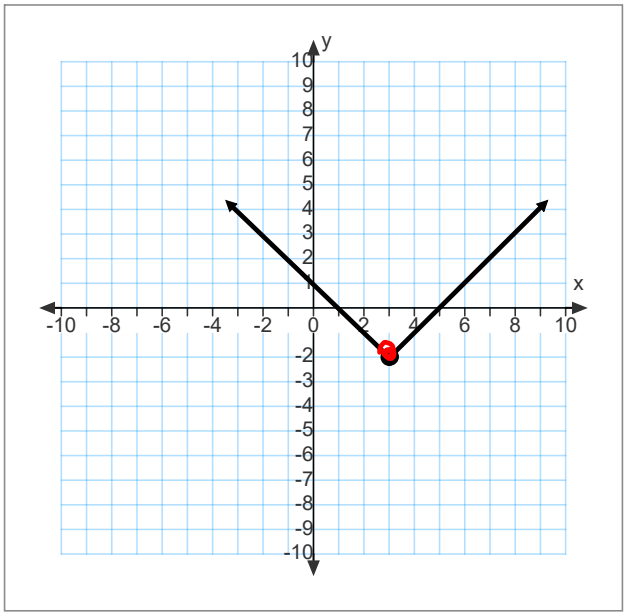
$$y = m|x-h|+k$$

where (h,k) is the vertex;
m determines slope

.

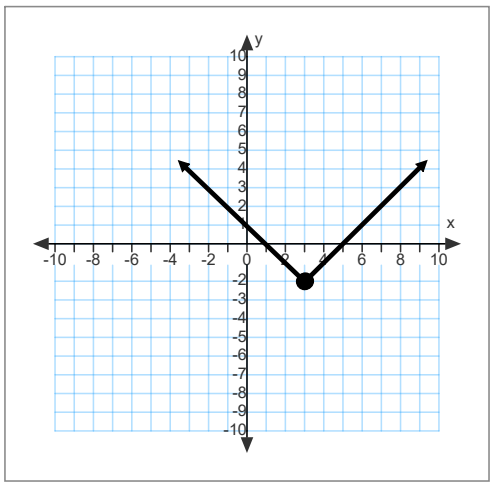
# Absolute Value graphs are V-shaped

$y = |x - 3| - 2$




In Absolute Value Tables each step adds a constant, but then changes it to the opposite constant

$y = |x - 3| - 2$



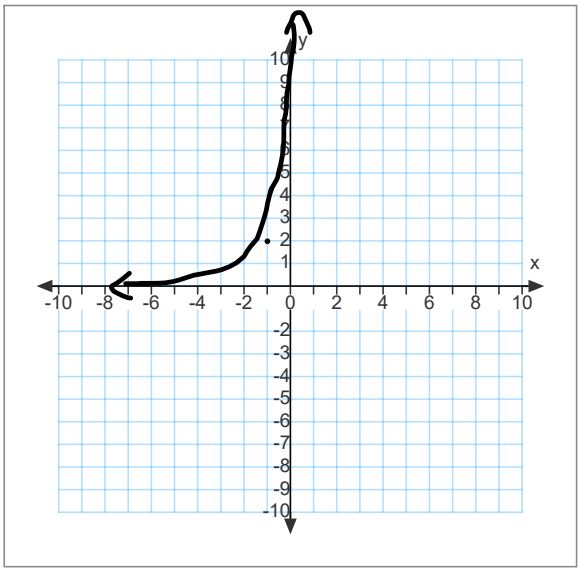

| x | y | difference |
|---|---|---|
| 1 | 0 | |
| 2 | -1 | -1 |
| 3 | -2 | -1 |
| 4 | -1 | 1 |
| 5 | 0 | 1 |

# Exponential Equations have x in an exponent

$$y = n \cdot m^{ax+b} + c$$

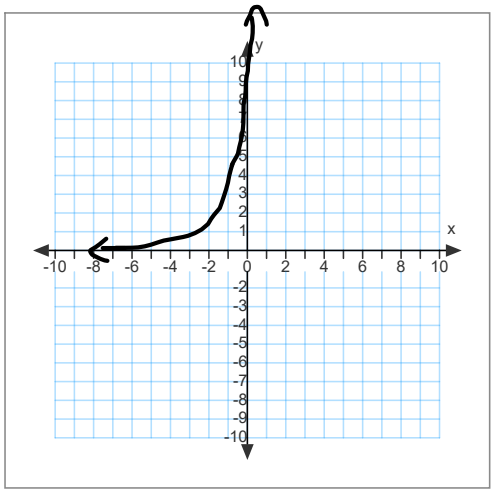
## Exponential Graphs are almost horizontal on one side and almost vertical on the other

$$y = 3^{x+2}$$



# In Exponential Tables each step multiplies a constant

$$y = 3^{x+2}$$

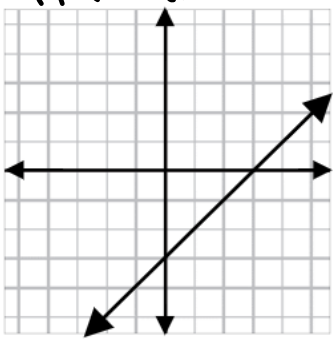



| x | y | quotient |
|---|---|---|
| -3 | 1/3 | |
| -2 | 1 | 3 |
| -1 | 3 | 3 |
| 0 | 9 | 3 |
| 1 | 27 | 3 |

For each of the following, determine the type of function.

A

linear



B

quadratic

| x | y | |
|---|---|---|
| -2 | -3 | -1 |
| -1 | -4 | 1 2 |
| 0 | -3 | 3 2 |
| 1 | 0 | 5 2 |
| 2 | 5 | 7 2 |
| 3 | 12 | |

C

$y = (x+1)^2$

quadratic

For each of the following, determine the type of function.

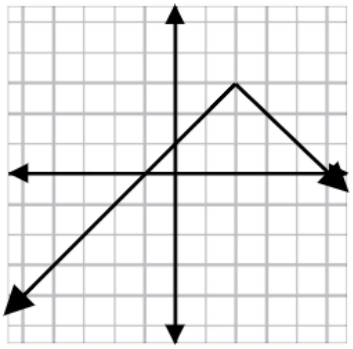
D $y = \frac{x}{2} - 3$

linear

E Exponential

| x | y | |
|---|---|---|
| -2 | 1 | 1 |
| -1 | 2 | 2 |
| 0 | 4 | 4 |
| 1 | 8 | 8 |
| 2 | 16 | |

F absolute value

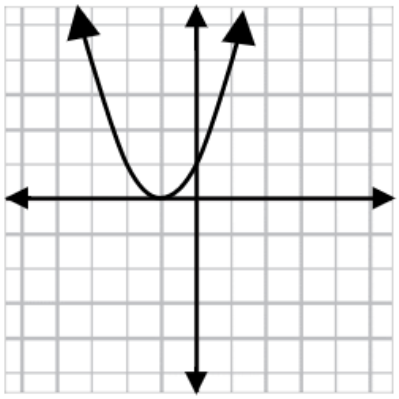


The following six functions are the same six that were used in EXAMPLE **1**. Can you fill in the ☐ to correspond with the matching function above?

B $y = (x+1)^2 - 4$

quadratic

C



D $x - 2y = 6$

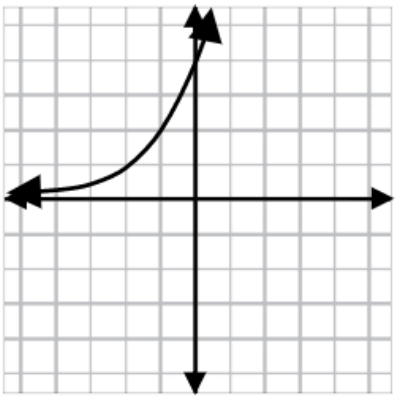
linear

$\frac{-2y}{-2} = \frac{-x}{-2} + \frac{6}{-2}$

$y = \frac{x}{2} - 3$

The following six functions are the same six that were used in EXAMPLE **1**. Can you fill in the ⌴ to correspond with the matching function above?

E



F abs value

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

A linear

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

17) $y = |1 - x| + 1$

$|1 - (-1)| + 1 = 3$

$|1 - 2| + 1$

$|-1| + 1 = 1 + 1$

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