Warm-up 3-26

1. Write about some things that you did on break.

2. Evaluate $x^2 + 5x$ for $x = 4$ and $x = -3$

3. Generate ordered pairs for the function $y = x^2 + 2$ with the given domain.

D: { -2, -1, 0, 1, 2}

Warm-up 3-26

1. Write about some things that you did on break.

2. Evaluate $x^2 + 5x$ for $x = 4$ and $x = -3$

$(-3)^2 = (-3)(-3)$

$(4)^2 + 5(4)$

$16 + 20 = 36$

$(-3)^2 + 5(-3)$

$9 - 15 = -6$

3. Generate ordered pairs for the function $y = x^2 + 2$ with the given domain. (x, y)

D: { -2, -1, 0, 1, 2}

$(-2, 6)$ $(-1, 3)$ $(0, 2)$ $(1, 3)$ $(2, 6)$

$y = (-2)^2 + 2$

$= 6$

$y = (-1)^2 + 2$

$= 3$

$y = (0)^2 + 2$

$= 2$

$y = (1)^2 + 2$

$= 3$

$y = (2)^2 + 2$

$= 6$

Today's Goals

I can

- identify Quadratic functions
- graph a quadratic function
- determine if a quadratic opens upward or downward
- find the minimum and maximum of quadratic functions
- find the domain and range of a quadratic function

Section 10.1: Identify Quadratic Functions

Quadratic function: an expression or equation with a degree of 2.

- $y = ax^2 + bx + c$ where $a \neq 0$ $y = 2x^2 + 3x$
- graph is always a parabola
- has a constant 2nd difference (for y)

Determine if the function is Quadratic

From a Table:

yes

x	y
-4	8
2	2
4	8

-6, -2, +2, +6

+4, +4, +4

From an Equation:

$y + x = 20$ NO

$-x \quad -x$

$y = -x + 20$

$y - 10x^2 = 9$ yes

$+10x^2 \quad +10x^2$

$y = 10x^2 + 9$

Examples

Determine if the following functions are quadratic.

$\{(-2, 9), (-1, -2), (0, 1), (0, -1), (1, 0), (2, 7)\}$

NO

x	y		
-2	9	-11	+14
-1	-2	+3	-5
0	1	-2	
0	-1	+1	
1	0	+7	
2	7		

$y = 7x + 3$

NO

$2y + 2x^2 = 6x + 5$

yes

$-2x^2 \quad -2x^2$

$\frac{2y}{2} = \frac{-2x^2 + 6x + 5}{2}$

$y = -x^2 + 3x + 2.5$

Try These!

1. $\{(-2, 4), (-1, 1), (0, 0), (1, 1), (2, 4)\}$

2. $y + x = 2x^2$

Try These!

1. $\{(-2, 4), (-1, 1), (0, 0), (1, 1), (2, 4)\}$

Yes

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

2. $y + x = 2x^2$

$-x \quad -x$

Yes

$y = 2x^2 - x$

Graphing Quadratic Functions using a table

Use a table of values to graph each quadratic function.

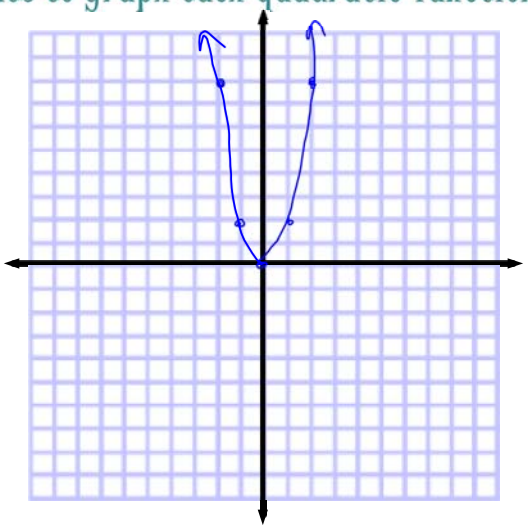
x	y
-2	8
-1	2
0	0
1	2
2	8

$y = 2x^2$

$y = 2(-2)^2$

$= 2(4)$

$= 8$



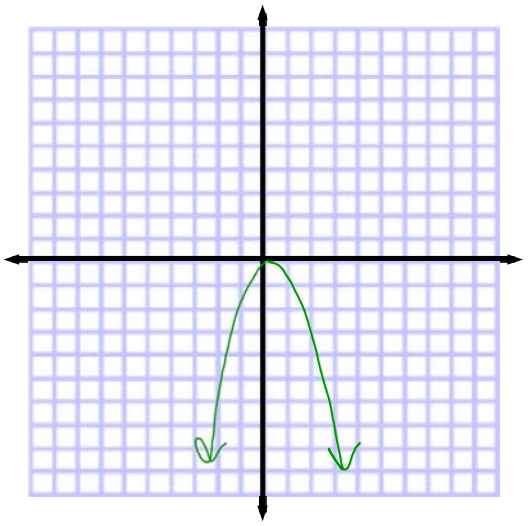
$y = -4x^2$

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

$y = -4(-2)^2$

$= -4(4)$

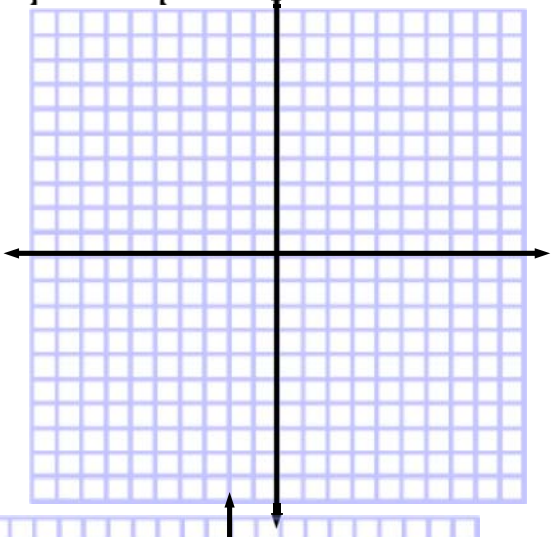
$= -16$



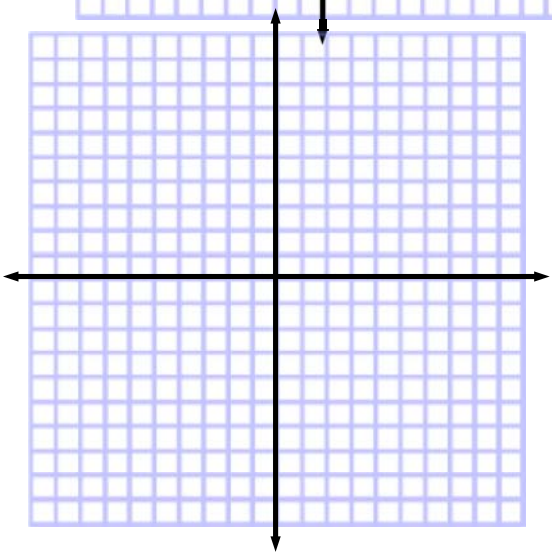
Try These!!

Use a table of values to graph each quadratic function.

$y = \frac{1}{3}x^2$



$y = -2x^2$

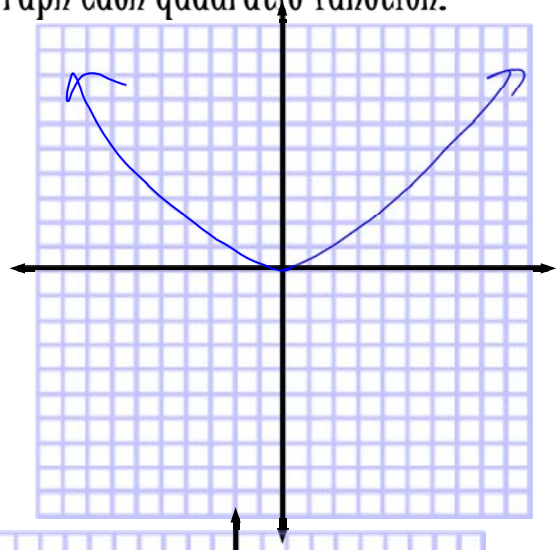


Try These!!

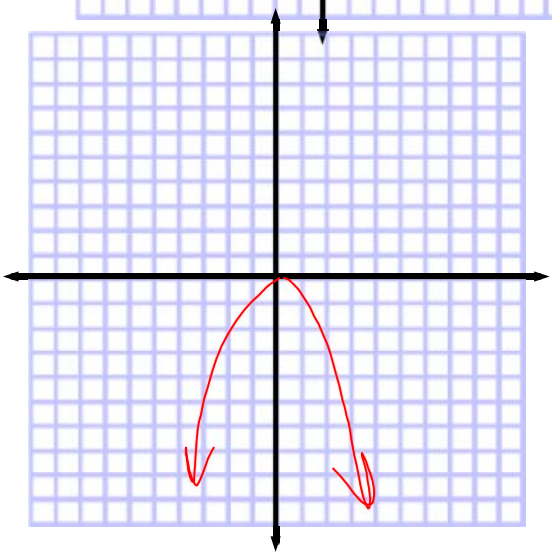
Use a table of values to graph each quadratic function.

$y = \frac{1}{3}x^2$

$(1/3)x^2$



$y = -2x^2$



Discuss with your neighbor:

Do you notice a pattern forming with the functions and their graphs?

If yes, Explain. If no, Explain.

Identifying the direction of a Parabola

$y = 4x^2$

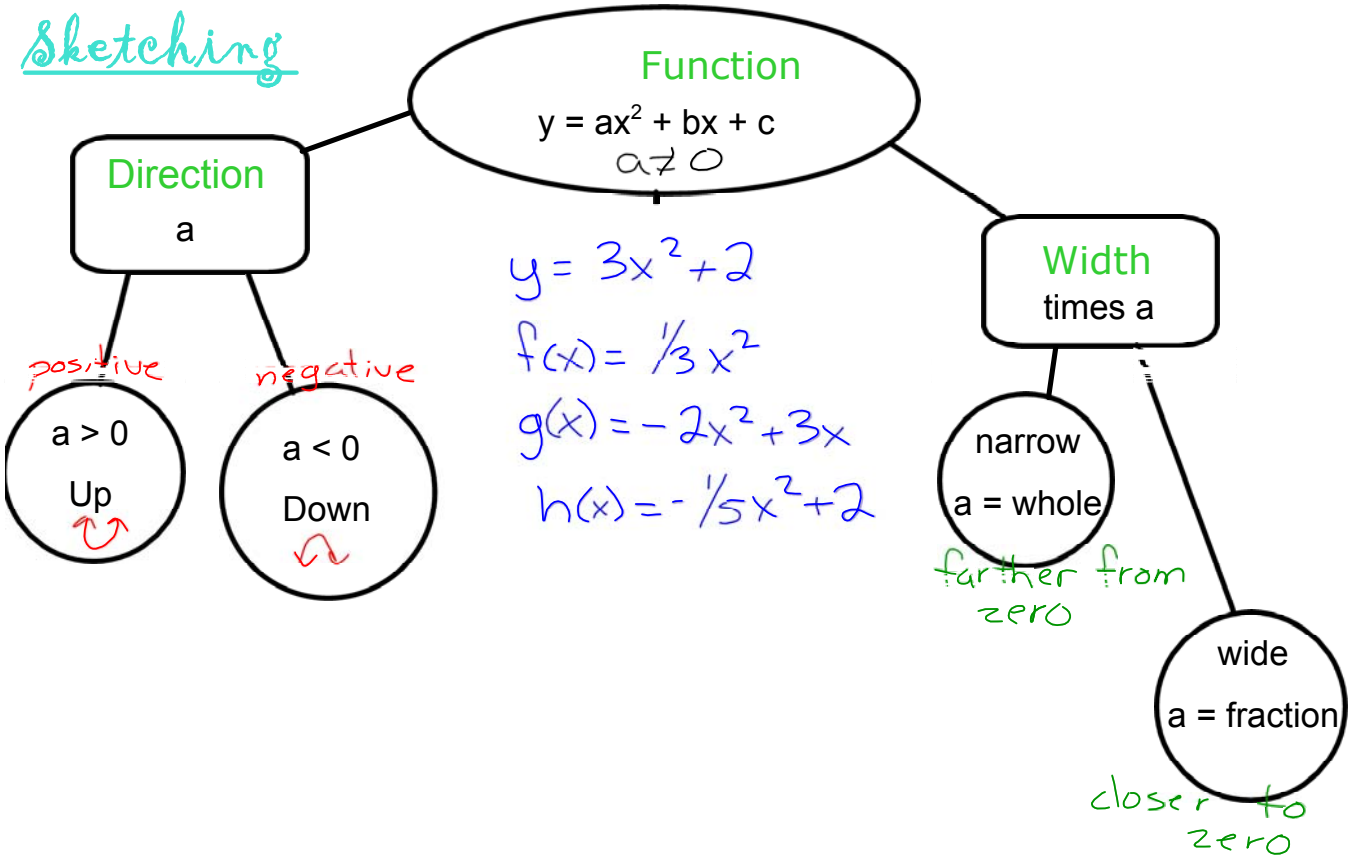
up (narrow)

$2x^2 + y = 5$

$-2x^2 \quad -2x^2$

$y = -2x^2 + 5$

down (narrow)


Sketching
Function
y = ax² + bx + c
a ≠ 0
Direction
a
positive
a > 0
Up
negative
a < 0
Down
y = 3x² + 2
f(x) = ⅓x²
g(x) = −2x² + 3x
h(x) = −⅕x² + 2
Width
times a
narrow
a = whole
farther from zero
wide
a = fraction
closer to zero

$y = 3x^2 + 8x$ narrowest ⇒ widest

$f(x) = -2x^2 + 3$

$g(x) = -\frac{1}{8}x^2$

$h(x) = -\frac{1}{2}x^2 + 3x$

$y = 3x^2 + 8x$ up

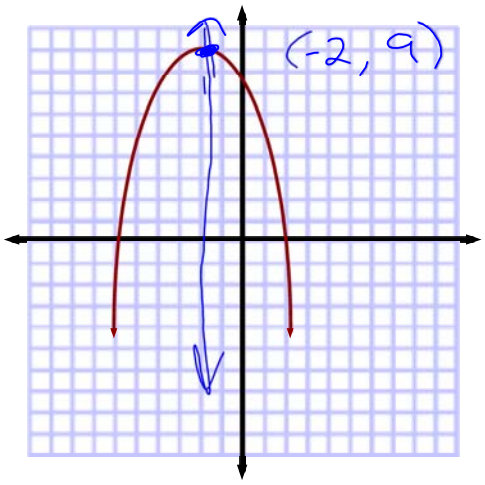
$f(x) = -2x^2 + 3$ down

$h(x) = -\frac{1}{2}x^2 + 3x$ down

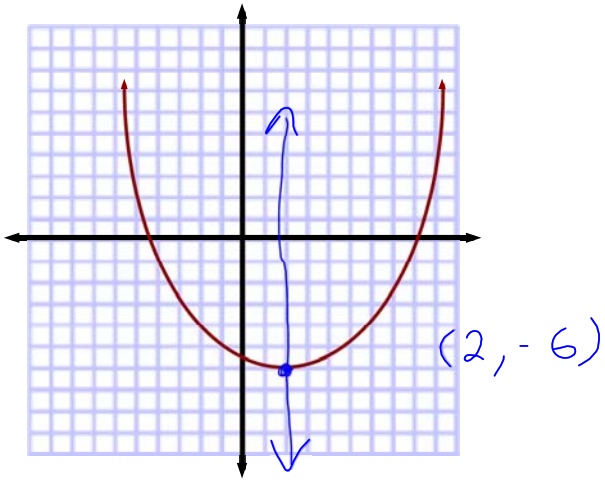
$g(x) = -\frac{1}{8}x^2$ down

Maximum and Minimum Values

Vertex-the point where the parabola crosses its axis of symmetry (max or min)

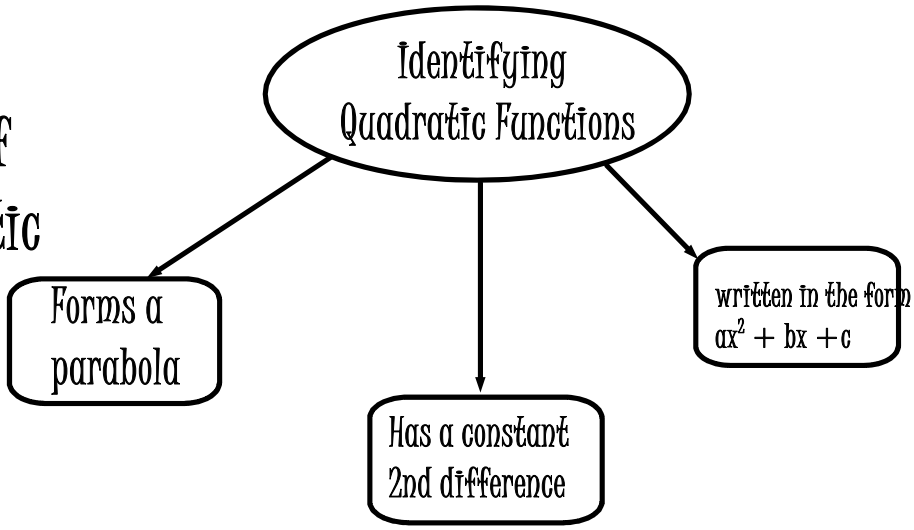


Vertex



Review

Describe the ways of identifying quadratic functions



Homework

pg. 526 #1-15 (odd)