

Your Name

Mrs. Theo

12/15/2020

Notes

# Lesson 8.3

## STANDARD FORM QUADRATIC FUNCTIONS

### FINDING THE VERTEX

Standard Form

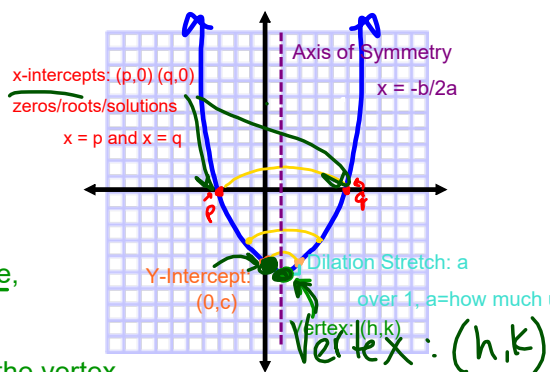
$$f(x) = ax^2 + bx + c$$

Axis of Symmetry:

$$x = h = \frac{-b}{2a}$$

To find Vertex:

input the axis of symmetry x value,  
which is the h, into the function,  
the output y value will be the k of the vertex



Dilation:  
 Vertex  
 Max or Min?

a if a > 0 (positive) Vertex is a minimum value ☺  
 if a < 0 (negative) Vertex is a maximum value ☹

Y Intercept:

(0,c) crossing y axis plug in 0 for x

X intercepts

Roots: crossing x axis

Factor or use  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Standard Form Features to graph:

$$f(x) = 2x^2 + 8x + 6$$

Y-Intercept  $(0, 6)$

Axis of Symmetry:

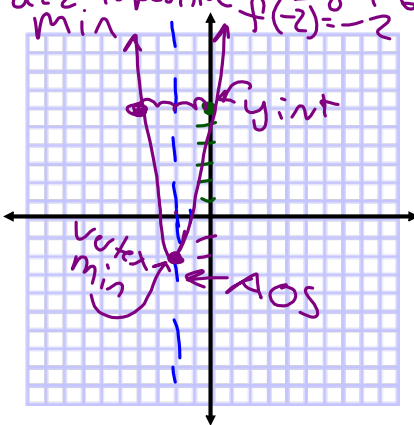
$$x = \frac{-b}{2a} = \frac{-8}{2(2)} = -2$$

Vertex:

$$f(-2) = 2(-2)^2 + 8(-2) + 6 = 8 - 16 + 6 = -2$$

Maximum/Minimum  $(-2, -2)$

$a=2$  is positive min



$$h(x) = -x^2 - 11x - 4$$

Y-Intercept  $(0, -4)$

Axis of Symmetry:

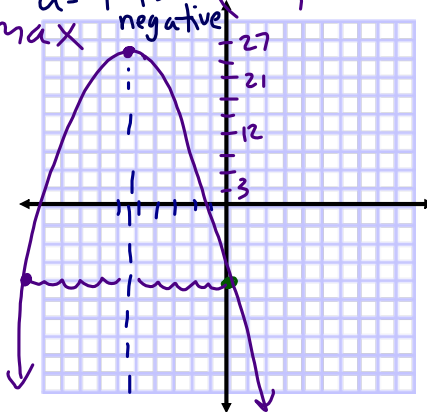
$$x = \frac{-b}{2a} = \frac{-(-11)}{2(-1)} = -5.5$$

Vertex:

$$f(-5.5) = -(-5.5)^2 - 11(-5.5) - 4 = -30.25 + 60.5 - 4 = 26.25$$

Maximum/Minimum  $(-5.5, 26.25)$

$a=-1$  is negative max



Standard Form Features to graph:

$$f(x) = 0.5x^2 - 8x + 6$$

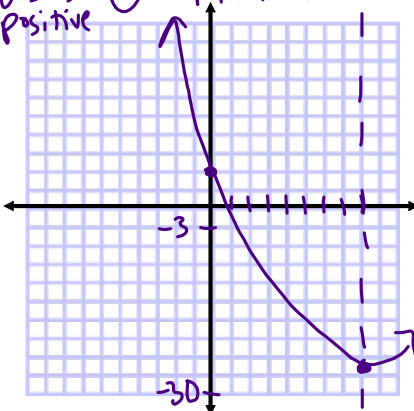
Y-Intercept  $(0, 6)$

Axis of Symmetry:  $x = \frac{-b}{2a} = \frac{-(-8)}{2(0.5)} = 8$

Vertex:  $f(8) = 0.5(8)^2 - 8(8) + 6 = 0.5(64) - 64 + 6 = -26$

Maximum/Minimum  $(8, -26)$

$0.5$  is positive minimum



$$h(x) = -2x^2 - 12x - 1$$

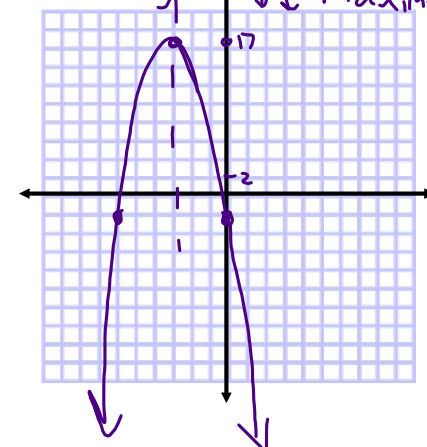
Y-Intercept  $(0, -1)$

Axis of Symmetry:  $x = \frac{-b}{2a} = \frac{-(-12)}{2(-2)} = -3$

Vertex:  $f(-3) = -2(-3)^2 - 12(-3) - 1 = -18 + 36 - 1 = 17$

Maximum/Minimum  $(-3, 17)$

$-2$  is negative maximum



**Vertex and Line of Symmetry**  
Graphing Standard Form Functions Homework

Name \_\_\_\_\_ Date \_\_\_\_\_

Fill in the table and then graph the function.

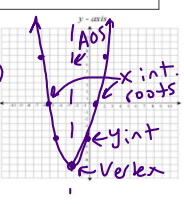
1.  $y = x^2 + 4x - 5$

$x = \frac{-4}{2(1)} = -2$

$(-2, 9)$

What is the Vertex?  $(-2, 9)$   
What is the line of symmetry?  $x = -2$   
What is the y-intercept?  $(0, -5)$

X	F(x) = ( ) <sup>2</sup> + 4( ) - 5	(x, y)
1		(1, 0)
0		(0, -5)
-1	$f(-1) = (-1)^2 + 4(-1) - 5 = -9$	(-1, -9)
-2	$f(-2) = (-2)^2 + 4(-2) - 5 = -9$	(-2, -9)
-3		(-3, -9)
-4		(-4, -5)
-5		(-5, 0)
-6		(-6, 7)



2.  $y = x^2 + 6x + 1$

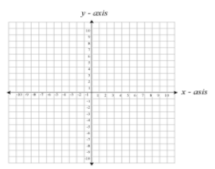
$x = \frac{-6}{2(1)} = -3$

$f(-3) = (-3)^2 + 6(-3) + 1 = -8$

$(-3, -8)$

What is the Vertex?  $(-3, -8)$   
What is the line of symmetry?  $x = -3$   
What is the y-intercept?  $(0, 1)$

x	y
1	
0	
-1	
-2	
-3	-8
-4	
-5	
-6	



3.  $y = x^2 - 4x + 3$

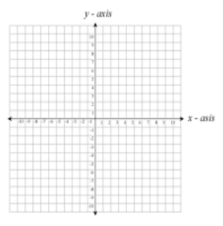
$x = \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$

$f(2) = (2)^2 - 4(2) + 3 = -1$

$(2, -1)$

What is the Vertex?  $(2, -1)$   
What is the line of symmetry?  $x = 2$   
What is the y-intercept?  $(0, 3)$

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



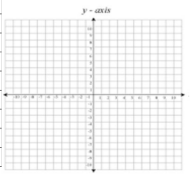
4.  $y = -x^2 - 6x$

$x = \frac{-(-6)}{2(-1)} = \frac{6}{-2} = -3$

$(-3, 9)$

What is the Vertex?  $(-3, 9)$   
What is the line of symmetry?  $x = -3$   
What is the y-intercept?  $(0, 0)$

X	F(x) = -( ) <sup>2</sup> - 6( )	(x, y)
1		
0		
-1		
-2		
-3	$f(-3) = -(-3)^2 - 6(-3) = 9$	
-4		
-5		
-6		



5.  $y = 2x^2 + 8x - 1$

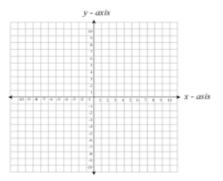
$x = \frac{-8}{2(2)} = \frac{-8}{4} = -2$

$f(-2) = 2(-2)^2 + 8(-2) - 1 = -9$

$(-2, -9)$

What is the Vertex?  $(-2, -9)$   
What is the line of symmetry?  $x = -2$   
What is the y-intercept?  $(0, -1)$

x	y
1	
0	
-1	
-2	-9
-3	
-4	
-5	



6.  $y = -3x^2 - 6x + 7$

$x = \frac{-(-6)}{2(-3)} = \frac{6}{-6} = -1$

$f(-1) = -3(-1)^2 - 6(-1) + 7 = 10$

$(-1, 10)$

What is the Vertex?  $(-1, 10)$   
What is the line of symmetry?  $x = -1$   
What is the y-intercept?  $(0, 7)$

X	F(x) = -3( ) <sup>2</sup> - 6( ) + 7	(x, y)
1		
0		
-1	$f(-1) = -3(-1)^2 - 6(-1) + 7 = 10$	(-1, 10)
-2		
-3		
-4		
-5		
-6		

