

## Lesson 2-3

# INTERCEPT FORM QUADRATIC FUNCTIONS

Your Name

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Notes

## Vertex Form

$$f(x) = a(x-h)^2 + k$$

**Vertex: (h,k)**

h- horizontal shift

k- vertical shift

**Dilation: a**

a is negative:  
Reflection

$0 < a < 1$  : shrink

$a > 1$  : stretch

**Axis of Symmetry:**

$$x = h$$

Easily Translatable

## Intercept Form

$$f(x) = a(x-p)(x-q)$$

**X intercepts/**

**Solutions/Roots/Zeros:**

$$x = p \text{ and } x = q$$

Dilation: a

**Axis of Symmetry:**

Half way between the roots

$$x = h = \frac{p+q}{2}$$

To find Vertex: input the axis of symmetry x value, h, in the function, the y value will be the k

## 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, h, in the function the y value will be the k

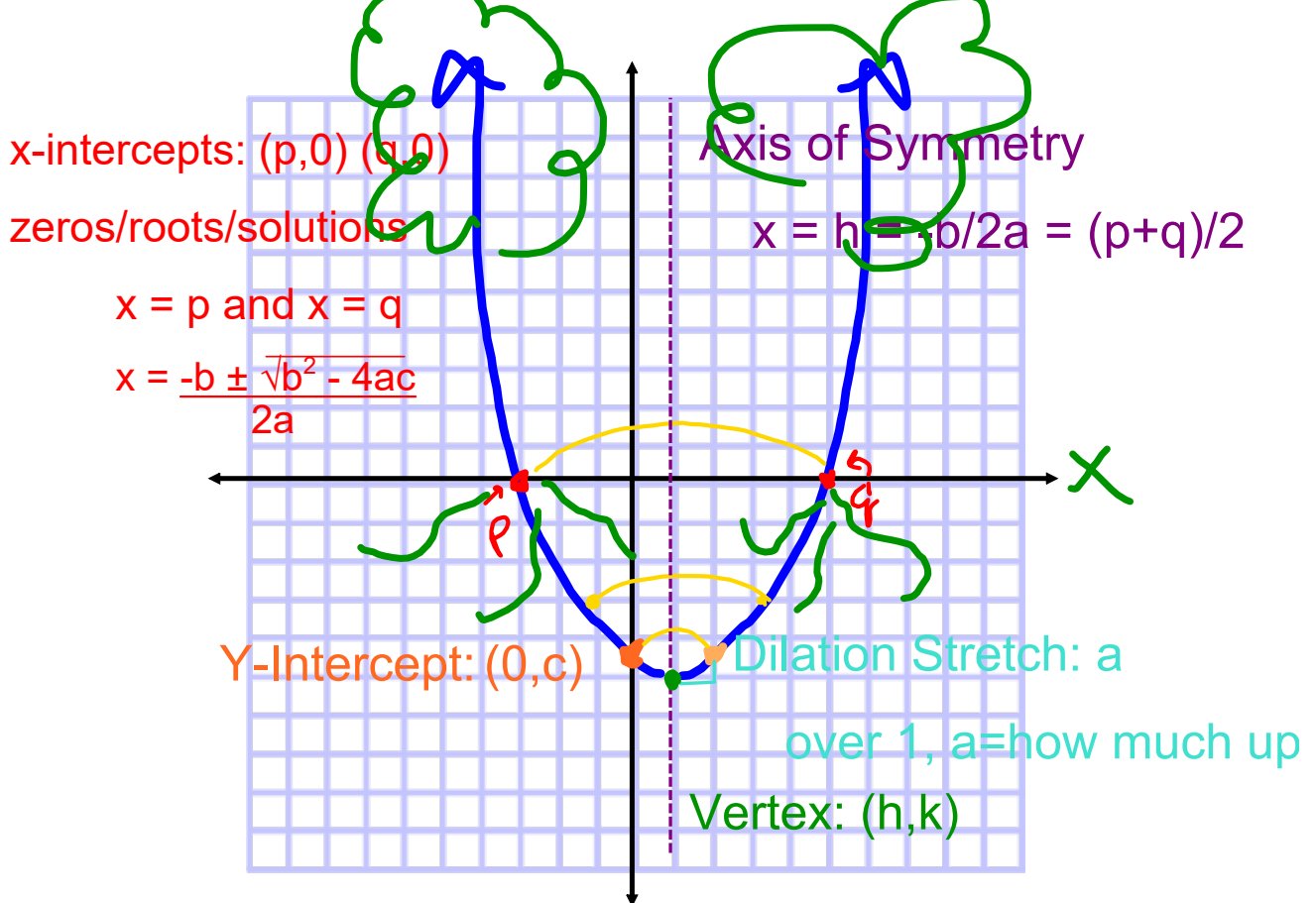
Dilation: a

**Y Intercept: (0,c)**

**X intercepts/Roots**

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

## All the Pieces of the function from each Form



Intercept Form  
Features to graph:

$$f(x) = (x - 3)(x + 1) = 0$$

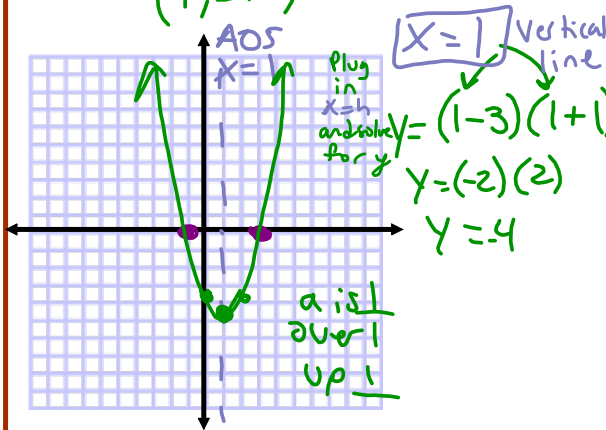
X-Intercepts:  
 $x - 3 = 0$  or  $x + 1 = 0$   
 $x = 3$  or  $x = -1$

Stretch:  $a = 1$  No stretch  $(3, 0)$   $(-1, 0)$

Reflection/Opens: up or down  $a$  is positive

Axis of Symmetry:  $x = \frac{3 + (-1)}{2} = 1$

Vertex:  $(1, -4)$



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

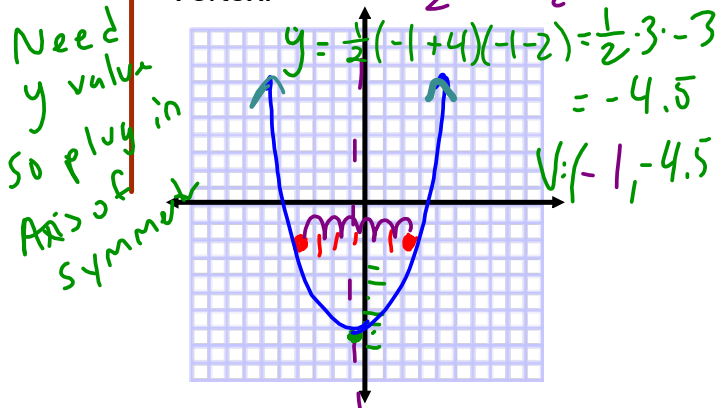
X-Intercepts:  $x + 4 = 0$   $x - 2 = 0$   
 $x = -4$   $x = 2$   
 $(-4, 0)$   $(2, 0)$

Stretch:  $\frac{1}{2} < 1$  shrink by  $\frac{1}{2}$

Reflection/Opens: up or down

Axis of Symmetry:  $x = -1$

Vertex:  $x = h = \frac{-4 + 2}{2} = \frac{-2}{2} = -1$



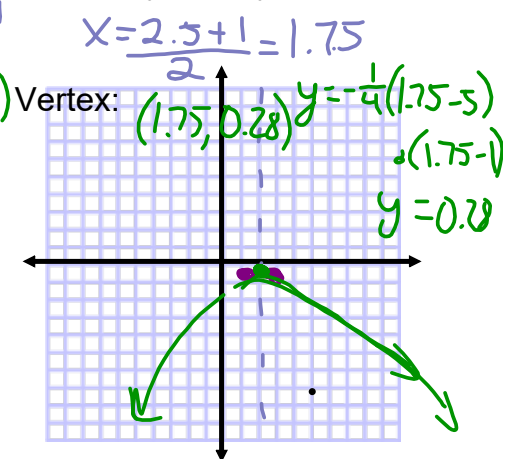
$$f(x) = -\frac{1}{4}(2x - 5)(x - 1)$$

X-Intercepts:  
 $2x - 5 = 0$  or  $x - 1 = 0$   
 $x = \frac{5}{2} = 2.5$  or  $x = 1$

Stretch:  $a = -\frac{1}{4}$  shrink by  $\frac{1}{4}$

Reflection/Opens: up or down  $a$  is negative

Axis of Symmetry:  $x = \frac{2.5 + 1}{2} = 1.75$



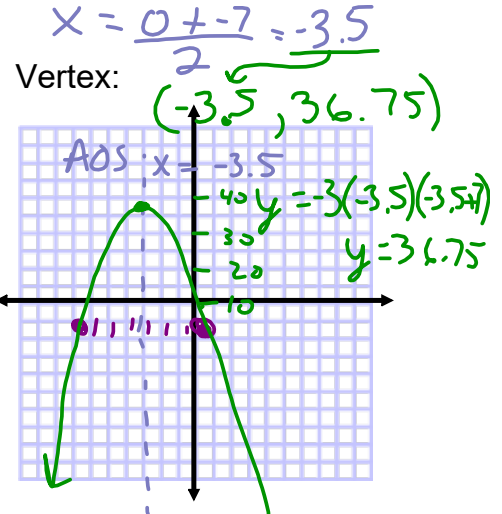
$$0 = -3x(x + 7)$$

X-Intercepts:  
 $x = 0$  or  $x + 7 = 0$   
 $x = 0$  or  $x = -7$

Stretch:  $a = -3$  stretch by 3

Reflection/Opens: up or down  $a$  is negative

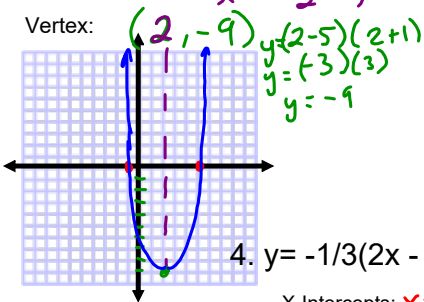
Axis of Symmetry:  $x = \frac{0 + (-7)}{2} = -3.5$



### Homework **Key**: Intercept Form Features to graph:

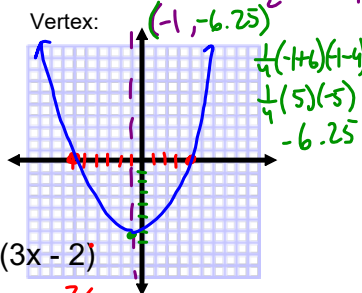
1.  $f(x) = (x - 5)(x + 1)$

X-Intercepts:  $x = 5, x = -1$   
 Stretch: **No stretch or shrink**  
 Reflection/Opens: **up** or down  
 Axis of Symmetry:  $x = \frac{5 + (-1)}{2}, x = 2$   
 Vertex:  $(2, -9)$



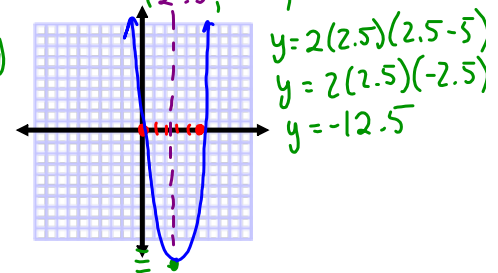
2.  $f(x) = 1/4(x + 6)(x - 4)$

X-Intercepts:  $x = -6, x = 4$   
 Stretch: **shrink by 1/4**  
 Reflection/Opens: **up** or down  
 Axis of Symmetry:  $x = \frac{-6 + 4}{2} \Rightarrow x = -1$   
 Vertex:  $(-1, -6.25)$



3.  $y = 2x(x - 5)$

X-Intercepts:  $x = 0, x = 5$   
 Stretch: **stretch by 2**  
 Reflection/Opens: **up** or down  
 Axis of Symmetry:  $x = \frac{0 + 5}{2} \Rightarrow x = 2.5$   
 Vertex:  $(2.5, -12.5)$



4.  $y = -1/3(2x - 1)(3x - 2)$

X-Intercepts:  $x = 1/2, x = 2/3$   
 Stretch: **shrink by 1/3**  
 Reflection/Opens: **up** or **down**  
 Axis of Symmetry:  $x = \frac{0.5 + 0.6}{2} = 0.58$   
 Vertex:  $(0.58, 0.014)$

