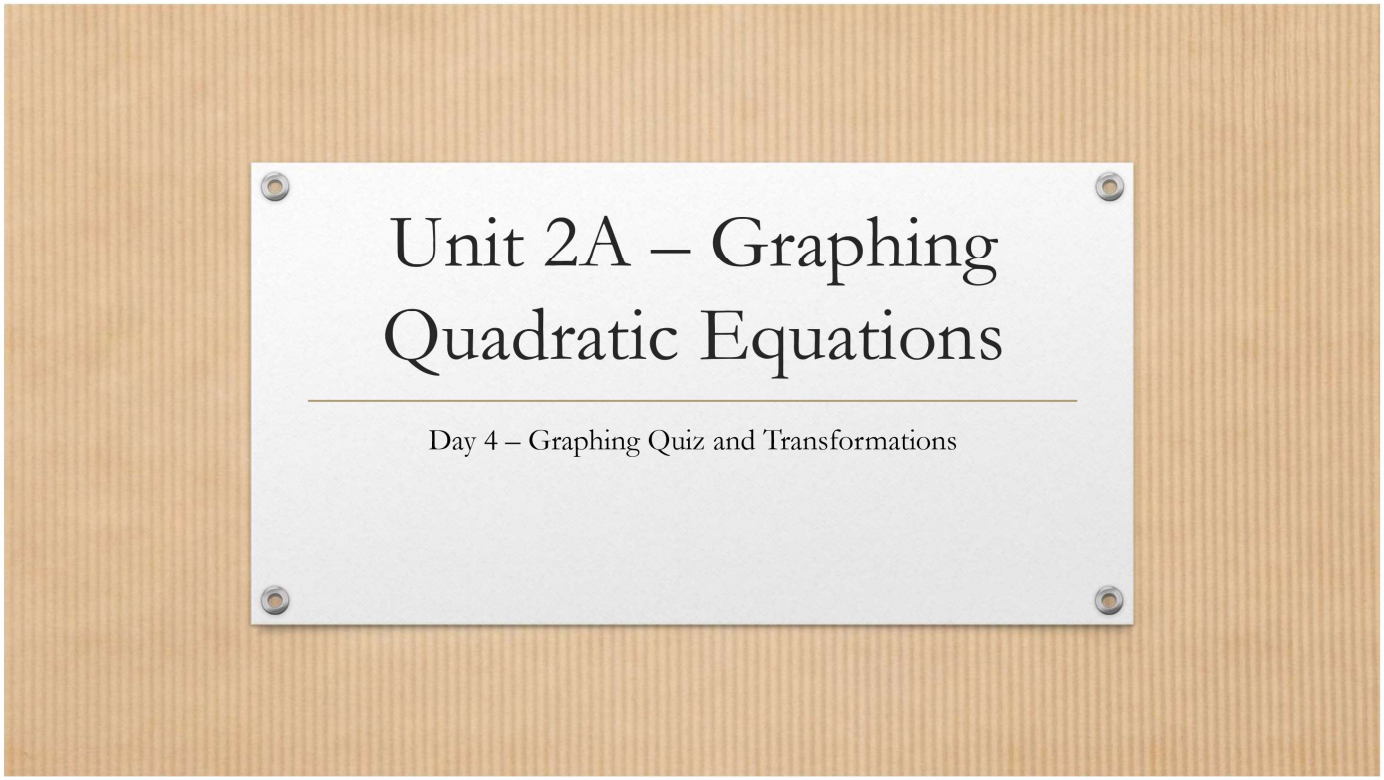
Notes

Thursday, February 14, 2019 10:36 AM

Day 3 - Transformations and parent graphs



Agenda

- *HW Review*
- *Warm Up*
- Graphing quiz!
- Transformations of Parent Functions Notes
- Applications of Graphing Quadratic Equations
- *HW:* Finish Quadratic Applications WKS

Objective: I can graph quadratic equations in standard, vertex and intercept form. I can identify and describe transformations of the parent graph.

Transformations Warm Up --- Spot the Difference

What differences are happening from the parent graph $y = x^2$

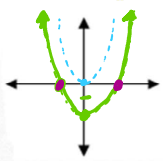
1. $x^2 - 8$
2. $2x^2$
3. $(x - 3)^2$
4. $-x^2 + 3$
5. $-\frac{1}{2}x^2$
6. $-3(x + 1)^2 - 2$
7. $(2x)^2 - 5$

V: (-2, 5)

x

Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

1. $f(x) = x^2 - 2$



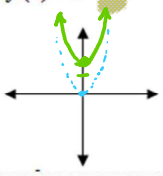
DOWN 2 units

$a = 1$!

x-ints: 2 real 'roots'

V: (0, -2)

2. $f(x) = x^2 + 2$



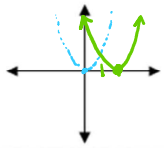
UP 2 UNITS

$a = 1$!

x-ints: 2 imaginary roots

V: (0, 2)

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



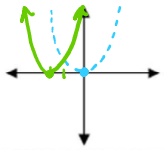
RIGHT 2 UNITS

$a = 1$!

x-ints: 1 double "root"

(2, 0)

4. $f(x) = (x + 2)^2$



LEFT 2 UNITS

$a = 1$

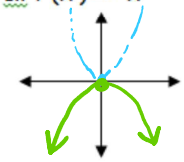
x-int: 1 double root

(-2, 0)

Reflections: A $-x^2$ vs. B $(-x)^2$ x^2

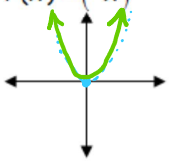
Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

1. $f(x) = -x^2$



reflects x-axis (reflection over the x-axis)

2. $f(x) = (-x)^2$



reflects Y-axis

Vertical Stretch: cx^2, $c > 1$

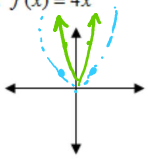
Vertical Shrink: cx^2, $c < 1$

Horizontal Stretch: $(cx)^2$, $c < 1$

Horizontal Shrink: $(cx)^2$, $c > 1$

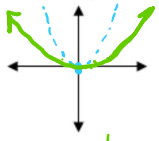
Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

1. $f(x) = 4x^2$



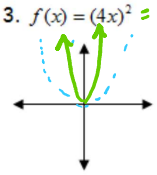
Vertical Stretch narrow by 4

2. $f(x) = \frac{1}{4}x^2$ Vertical



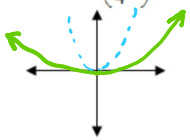
Vertical shrink wider by 1/4

3. $f(x) = (4x)^2 = 16x^2$



horizontal shrink narrow by 16

4. $f(x) = \left(\frac{1}{4}x\right)^2 = \frac{1}{16}x^2$



horizontal stretch wider by 1/16

Vertical Stretch: cx^2, c > 1

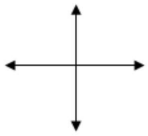
Vertical Shrink: cx^2, c <1

Horizontal Stretch: $(cx)^2$, c < 1

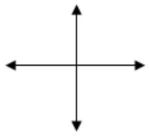
Horizontal Shrink: $(cx)^2$, c > 1

Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

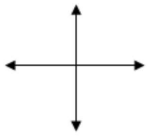
1. $f(x) = 4x^2$



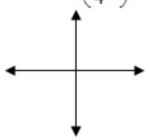
2. $f(x) = \frac{1}{4}x^2$



3. $f(x) = (4x)^2$



4. $f(x) = \left(\frac{1}{4}x\right)^2$



Single Transformations Review

$x^2 \pm c$	$(x \pm c)^2$	$-x^2$ vs. $(-x)^2$	cx^2 vs. $(cx)^2$
up/down c-units	left/right c-units	reflections: about x-axis; about y-axis	vertical stretch or shrink; horizontal stretch or shrink

Quadratics

3 Forms

- Opens up if a is positive
- Opens down if a is negative

Standard Form

$$y = ax^2 + bx + c$$

To Find the Vertex:

1. $x = \frac{-b}{2a}$
   - This is the axis of symmetry and the x-coordinate of the vertex
2. Take that x-value and plug it back in to the original equation to get the y-value of the vertex
3. $V: (x, y)$

Find 2 Other Points:

1. Add and subtract 1 from the x-value of the vertex
2. Add or subtract a from the y-value of the vertex.
3. Plot 2 other points (should be symmetric
4. Draw parabola and done!

Vertex Form

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

To Find the Vertex (no work!):

1. $V: (h, k)$
   - Switch h's sign, leave k the same

Find 2 Other Points

- Same directions as Standard Form

Intercept Form

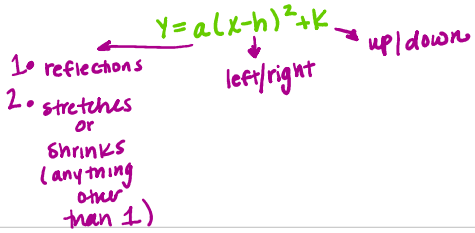
$$y = a(x - p)(x - q)$$

To Find the Vertex:

1. $x = \frac{p+q}{2}$ (switch sign on p & q)
   - This is the axis of symmetry and the x-coordinate of the vertex
2. Take that x-value and plug it back in to the original equation to get the y-value of the vertex
3. $V: (x, y)$

Find 2 Other Points (no work!):

1. p & q (switch sign on both) are the x-intercepts (where the graph hits the x-axis)
2. Plot these 2 points as $(p, 0)$ and $(q, 0)$ right on the x-axis and you have your 3 total points. OR do the same as standard form.
3. Draw parabola and done



Algebra 2/Trig: Unit 2 Quiz 1 – Graphing Quadratic Equations

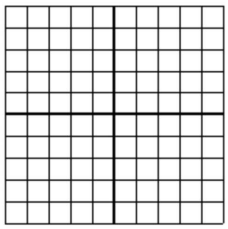
Graph the following quadratic equations. Be sure to fill in all the necessary information and to show all of your work.

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

x = _____

Vertex: _____

Points: _____

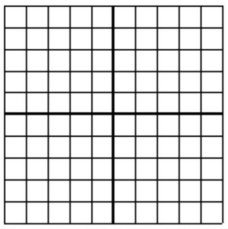


2. $y = 3(x + 3)^2 + 2$

x = _____

Vertex: _____

Points: _____

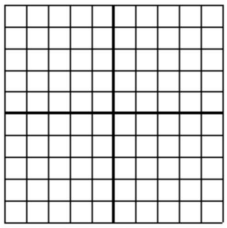


3. $y = 4(x + 1)(x - 1)$

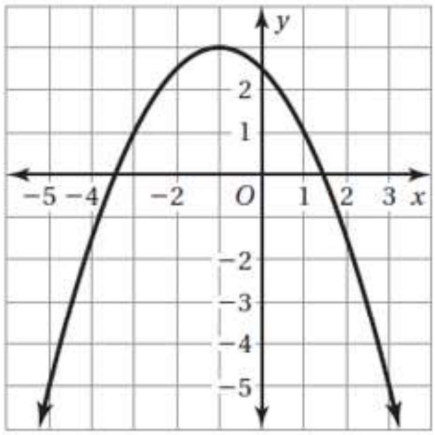
x = _____

Vertex: _____

Points: _____

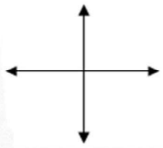


**Bonus – 1 point – Write the equation of the graphed parabola in vertex form.

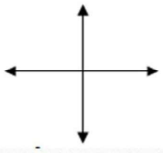


Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

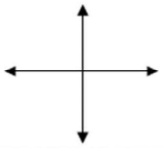
1. $f(x) = x^2 - 2$



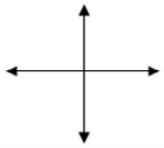
2. $f(x) = x^2 + 2$



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



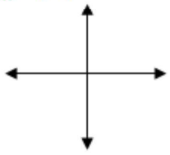
4. $f(x) = (x+2)^2$



Reflections: $-x^2$ vs. $(-x)^2$

Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

1.. $f(x) = -x^2$



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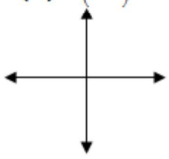

Vertical Stretch: cx^2, c > 1

Vertical Shrink: cx^2, c <1

Horizontal Stretch: $(cx)^2$, c < 1

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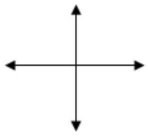
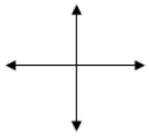
Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

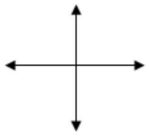
1. $f(x) = 4x^2$



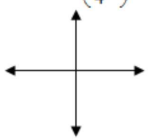
2. $f(x) = \frac{1}{4}x^2$



3. $f(x) = (4x)^2$



4. $f(x) = \left(\frac{1}{4}x\right)^2$



Single Transformations WKS

Multiple Transformations: Describe the changes, vertex.

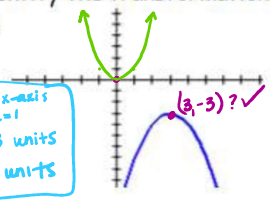
1. $y = -x^2 + 3$
   - reflects x-axis
   - up 3 units
   - V: (0, 3)

2. $f(x) = -(x + 5)^2 - 2$
   - reflects x-axis
   - left 5 units
   - down 2 units
   - V: (−5, −2)

3. $y = -2(x^2 + 4)$ → $y = -2x^2 - 8$
   - reflects x-axis
   - vertical stretch
   - down 8 units
   - V: (0, −8)

Identify the transformation(s), determine the vertex, and x-intercepts. Write an equation.

4.

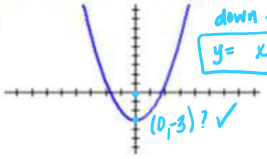


- reflects x-axis → $-a$, $a = 1$
- down 3 units
- right 3 units

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

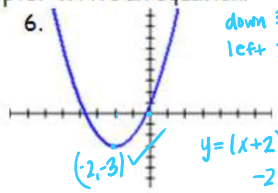
$y = -(x-3)^2 - 3$

5.



$y = x^2 - 3$

6.

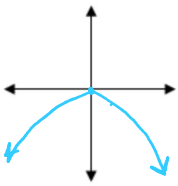


$y = (x+2)^2 - 3$

$-2, -3$

Sketch the graph. Describe the changes, vertex, and x-intercepts.

7. $y = -1/5\ x^2$

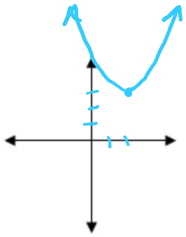


- reflect x-axis
- vertical shrink

V: (0,0)

x-int: one double root

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

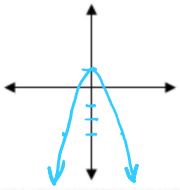


- right 2
- up 3

V: (2,3)

x-int: 2 imaginary

9. $y = -(2x)^2 + 1$

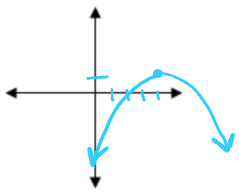


- reflect x-axis
- horizontal shrink
- up 1

V: (0,1)

x-int: 2 real roots

10. $f(x) = -\frac{1}{3}(x-4)^2 + 1$

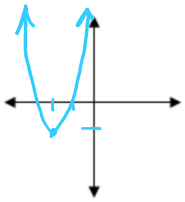


- reflect x-axis
- vertical shrink
- right 4
- up 1

V: (4, 1)

x-int: 2 real

11. $y = \left(3(x+2)\right)^2 - 1$

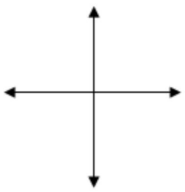


- horizontal shrink
- left 2 units
- down 1

V: (−2, −1)

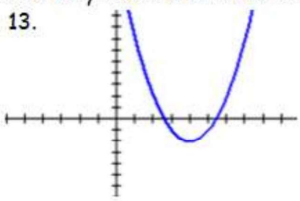
x-ints: 2 real

12. $f(x) = 4(x+3)^2$

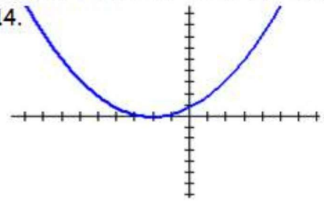


Identify the transformation(s), determine the vertex, and x-intercepts. Write an equation.

13.



14.



15.