

## Warmup 2/10/20

Rachael's teacher asked her to write a transformation of a quadratic function reflected across the x axis, vertically stretched by 2, horizontally shifted 8 units to the right, and vertically shift down 3 units. Her answer is below. Did she write the transformations correctly? If not, explain and correct the error in the column provided.

Rachael's work	Your work
<p data-bbox="342 256 837 319"><i>inside has to be opposite</i></p> <p data-bbox="154 352 492 438">My answer is <math>f(x) = -2(x + 8)^2 - 3</math></p>	<p data-bbox="634 256 1102 438"><math>y = -2(x - 8)^2 - 3</math></p>

**Vertex vs. Standard vs. Intercept forms**

Vertex form

$$y = \underline{a}(x-h)^2 + k$$

Standard form

$$y = \underline{a}x^2 + bx + c$$

Intercept form

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

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

Given the following scenario, create the equation in **vertex** form.

- You are ordering a quilt for a family member. The length of the square is reduced by 3 and then you add a little piece of fabric at the end that is 4 square meters.

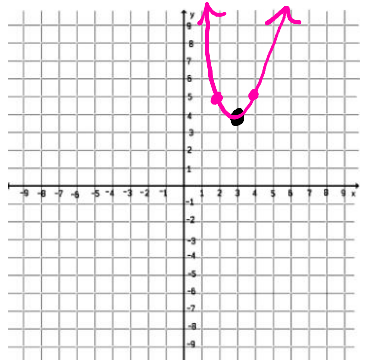
$$\boxed{x-3} \quad x-3 \quad (x-3)^2 + 4$$

Describe the shifts that have happened to this equation.

Vertex (3, 4)  
Right 3 Up 4

Graph it.

x	y
2	5
3	4
4	5



Now let's look at this equation.  $y = x^2 - 6x + 9$  What form is this?

Standard

Let's convert it to vertex form using  $x = -\frac{b}{2a}$

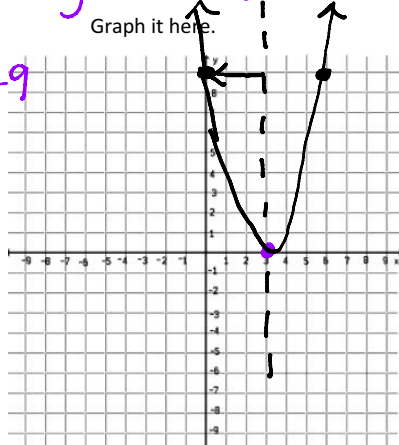
$$a=1 \quad b=-6 \quad c=9$$

$$\frac{-(-6)}{2(1)} = 3 \quad (3)^2 - 6(3) + 9$$

$h$                        $k$

$$y = 1(x-3)^2$$

Graph it here.



Convert the following into **vertex** form.

$$y = x^2 + 4x + 2$$

$$a=1 \quad b=4 \quad c=2$$

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

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

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

Convert the following into **standard** form.

$$y = 3(x-3)^2 - 7$$

$$3(x-3)(x-3) - 7$$

$$(3x-9)(x-3) - 7$$

$$3x^2 - 18x + 27 - 7$$

$$3x^2 - 18x + 20$$

	$3x$	$-9$
$x$	$3x^2$	$-9x$
$-3$	$-9x$	$27$

What form is the equation below in?

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

Intercept

X-ints

$$(1,0) \quad (-3,0)$$

Convert it to standard form.

$$x^2 + 2x - 3$$

	$x$	$-1$
$x$	$x^2$	$-1x$
$3$	$3x$	$-3$

Then convert it to vertex form.

$$a=1 \quad b=2 \quad c=-3$$

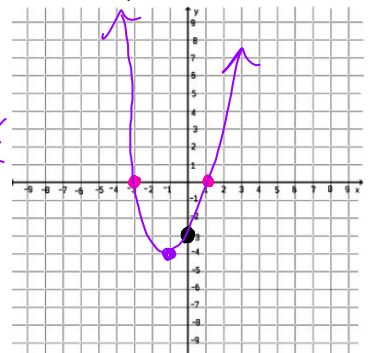
$$\frac{-b}{2a} = \frac{-2}{2(1)} = -1$$

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

Vertex  
 $(-1, -4)$

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

Graph it here.



Try this one.

What form is this one in?

$$y = 2(x-2)(x-6)$$

Intercept

Convert it to **standard** form.

$$2x^2 - 16x + 24$$

Then convert it to **vertex** form.

$$a=2$$

$$b=-16$$

$$c=24$$

$$\frac{-(-16)}{2(2)} = 4$$

$$2(4)^2 - 16(4) + 24 = -8$$

Write out **vertex** form.

Write out **standard** form.

Write out **intercept** form.

Label what form each one is in.

1)  $y = -3(x - 1)^2 + 4$

Vertex

2)  $y = -(x + 3)(x - 4)$

Intercept

3)  $y = \frac{1}{2}x^2 - 4x + 3$

Standard

Convert **from vertex** form to **standard** form.

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

$2(x+3)(x+3) - 3$   
 $(2x+6)(x+3) - 3$

$2x^2 + 6x + 6x + 18$

$2x^2 + 12x + 15$

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

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

$-4x^2 + 8x - 4$

6)  $y = -(x - 7)^2 + 5$

$-(x-7)(x-7) + 5$   
 $(-x+7)(x-7) + 5$   
 $-x^2 + 7x + 7x - 49 + 5$

$-x^2 + 14x - 44$

Convert **from standard** form to **vertex** form.

7)  $y = 4x^2 - 16x - 1$

$a=4$   $b=-16$   $c=-1$

$\frac{-(-16)}{2(4)} = \frac{2}{h}$

$4(2)^2 - 16(2) - 1 = -17$   
 $k$

$y = 4(x - 2)^2 - 17$

8)  $y = -\frac{1}{2}x^2 + 4x$

$a=-\frac{1}{2}$   $b=4$   $c=0$

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

$-\frac{1}{2}(4)^2 + 4(4)$   
 $= 8k$

$y = -\frac{1}{2}(x - 4)^2 + 8$

9)  $y = x^2 - 7x + 3$

$a=1$   $b=-7$   $c=3$

$\frac{-(-7)}{2(1)} = \frac{7}{2}$  (3.5)  
 $h$

$(\frac{7}{2})^2 - 7(\frac{7}{2}) + 3$   
 $= -\frac{37}{4}$   
 $-9\frac{3}{4}$

$y = 1(x - \frac{7}{2})^2 - \frac{37}{4}$

Convert **from intercept** to **standard** form.

10)  $y = 3(x - 1)(x + 3)$

$(3x-3)(x+3)$

$3x^2 + 9x - 3x - 9$

$3x^2 + 6x - 9$

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

$(-x-2)(x+3)$

$-x^2 - 3x - 2x - 6$

$-x^2 - 5x - 6$

12)  $y = \frac{1}{3}(3x - 9)(x + 5)$

$(x-3)(x+5)$

$x^2 + 2x - 15$

Where has each graph moved? List out all the transformations.

13)  $y = \frac{1}{3}(x-1)^2 - 3$

H. stretch  
v. compress  
Right  
Down 3

14)  $y = -4(x+2)^2$

Reflect  
V. stretch  
left 2

15)  $y = -(x-10)^2 + 3$

Right 10  
Reflect  
up 3

16)  $y = x^2 - 4$

Down 4

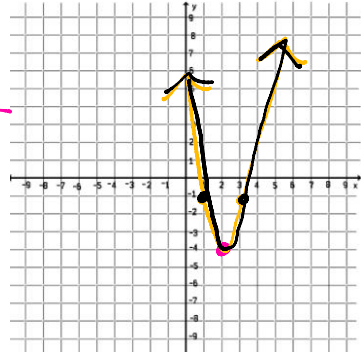
Let's graph some.

17)  $y = 3(x-2)^2 - 4$

(2, -4) vertex

$3(1-2)^2 - 4$

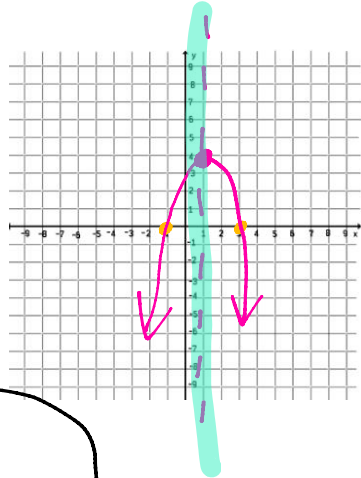
x	y
1	-1
2	-4
3	-1



18)  $y = -(x+1)(x-3)$

$x = -1$   
 $x = 3$

$x = 1$   
 $(1, 4)$  vertex  
 $-(1+1)(1-3) = 4$



19)  $y = \frac{1}{2}x^2 - 4x + 3$

$a = \frac{1}{2}$   $b = -4$   $c = 3$

$-\frac{(-4)}{2(\frac{1}{2})} = 4$        $\frac{1}{2}(4)^2 - 4(4) + 3$   
 $\frac{1}{2}(3)^2 - 4(3) + 3 = -4.5$

x	y
3	-4.5
4	-5
5	-4.5

