

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>My answer is</p> $f(x) = -2(x + 8)^2 - 3$	<p>* +8 when it should be -8</p> $-2(x - 8)^2 - 3$ <p>opposite sign</p>

Vertex vs. Standard vs. Intercept forms

Vertex form

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

Standard form

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

Intercept form

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

X-intercepts
↑
X-p=0 X-q=0

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.

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

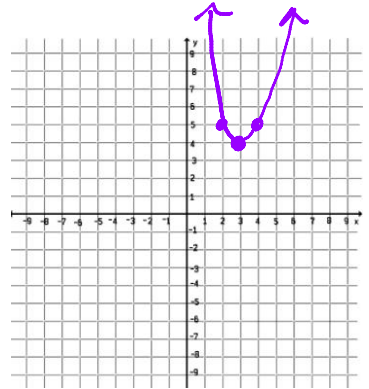
Vertex (3, 4)

Describe the shifts that have happened to this equation.

- * 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 form

Let's convert it to vertex form using

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

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

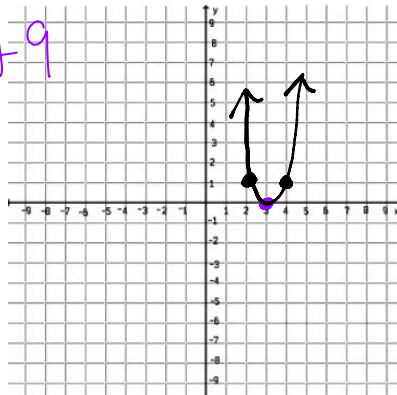
Vertex (3, 0)

Graph it here.

$$\frac{-(-b)}{2(1)} = 3 \quad (3)^2 - 6(3) + 9 = 0$$

h k

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



x	y
2	1
3	0
4	1

Convert the following into **vertex** form.

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

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

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

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

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

Convert the following into **standard** form.

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

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

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

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

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

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

What form is the equation below in?

Intercept

Convert it to standard form.

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

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

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

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

$$x-1=0 \quad x+3=0$$

$$+1 \quad +1 \quad -3 \quad -3$$

$$x=1 \quad x=-3$$

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

Then convert it to vertex form.

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

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

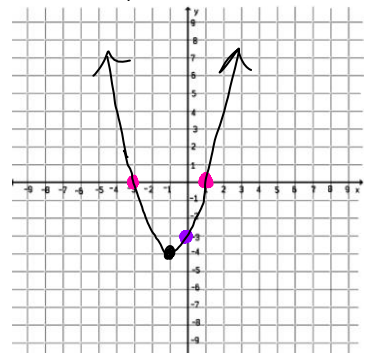
$$(-1)^2 + 2(-1) - 3 = -4$$

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

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

Vertex $(-1, -4)$

Graph it here.



Try this one.

What form is this one in?

Intercept

Convert it to **standard** form.

$$(2x-4)(x-6)$$

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

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

$$y = 2(x-4)^2 - 8$$

Then convert it to **vertex** form.

$$a=2 \quad b=-16 \quad c=24$$

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

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

$2x^2$	$-4x$
$-12x$	$+24$

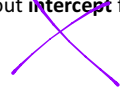
Write out **vertex** form.



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
(x-ints)

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

standard
(y-int)

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

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

*Multiply

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

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

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

	-x	+1
4x	-4x ²	4x
-4	4x	-4

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

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

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

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

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

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

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

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

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

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

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

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

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

	-x	-2
x	-x ²	-2x
3	-3x	-6

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

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

H. stretch
V. Compress

Right
1

Down
3

Vertex (1, -3)

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

Reflect

V. stretch
H. Compress

Left 2

Vertex
(-2, 0)

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

Reflect

Right
10

UP
3

Vertex (10, 3)

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

Down 4

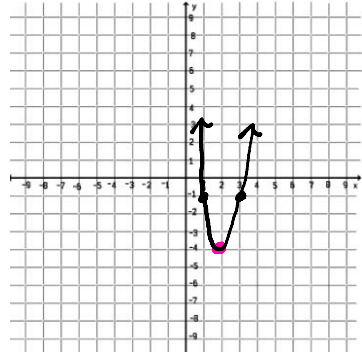
Vertex
(0, -4)

Let's graph some.

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

Vertex
(2, -4)

X	Y
1	-1
2	-4
3	-1



$$18) y = -(x+1)(x-3) \text{ Intercept}$$

$$x+1=0 \rightarrow x=-1$$

$$x-3=0 \rightarrow x=3$$

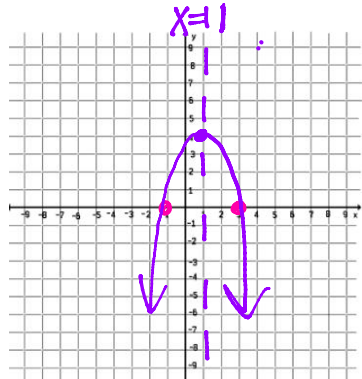
$$x=-1$$

$$x=3$$

Vertex $x=1$

$$-(1+1)(1-3)$$

$$(1, 4) \quad y=4$$



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

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

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

$$\frac{1}{2}(4)^2 - 4(4) + 3 = -5 \quad k$$

