

## Grab a Week #10 Packet

Find and sit in new seat!



### Bell Ringer

Monday 10/21

Watch the following video: <https://www.youcubed.org/resources/the-importance-of-struggle/>

Video



1. Reflect on your own schooling and how struggle has helped you to learn:

## Week #9 Packet due tomorrow

3.4 Day 2 online hw due today!

Vertex Form Using Completing the Square ws due tomorrow!  
(we'll correct it in class)

All Ch 2 HW due tomorrow 2A and 2B retakes due Wednesday
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Convert from standard form to vertex form by completing the square :)

Steps to Complete the Square:

- ~~X~~ Put in standard form, then factor out the GCF
- ~~X~~ Rewrite the equation with a space after bx and after c
- ~~X~~ Divide the middle term (b) by 2, then square it **9**
- ~~X~~ Write the number from (3) in the spaces created from (2), positive in the first blank, negative in the second
- ~~X~~ Put in Vertex Form
  - a. Factor the perfect square and combine left over constant terms
- ~~X~~ Distribute the GCF back in

$$* y = 2x^2 + 12x + 20$$

$$y = 2[x^2 + 6x + 10]$$

$$y = 2[x^2 + 6x + 9 + 10 - 9]$$

$$y = 2[(x + 3)^2 + 1]$$

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

$$V = (-3, 2)$$

There's another way to go from standard form to vertex form...  
What do both equations have in common?

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

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

Can we find the vertex  $(h, k)$  from standard form?

$$\left( -\frac{b}{2a}, f\left(-\frac{b}{2a}\right) \right)$$
$$(h, k)$$

Find the following for the quadratic function  $f(x)$

$$\begin{aligned} a &= 1 \\ b &= 4 \\ c &= -3 \end{aligned}$$

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

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

Vertex Form:

$$f(x) = (x + 2)^2 - 7 \quad \frac{-(4)}{2(1)} = -\frac{4}{2} = (-2, -7)$$

Vertex:

$$(-2, -7)$$

Axis of Symmetry:

$$x = -2$$

Y - Intercept:

$$(0, -3)$$

$$f(2) = 5 \quad (2, 5)$$

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

$$\begin{aligned} 4 + 4 - 3 \\ 8 - 3 \\ = 5 \end{aligned}$$

$$\begin{aligned} f(-2) &= (-2)^2 + 4(-2) - 3 \\ &= 4 - 8 - 3 \\ &= -4 - 3 \\ &= -7 \end{aligned}$$

$a = a$

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

$$k = f\left(\frac{-b}{2a}\right) = -7$$

$=$

Find the following for the quadratic function  $f(x)$

$$a = -1$$

$$f(x) = -x^2 - 3x + 9$$

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

Vertex Form:

$$F(x) = -\left(x + \frac{3}{2}\right)^2 + \frac{45}{4}$$

Vertex:

$$\left(-\frac{3}{2}, \frac{45}{4}\right)$$

Axis of Symmetry:

$$x = -\frac{3}{2}$$

Y - Intercept:

$$(0, 9)$$

$$f(3) = -9$$

$$\begin{aligned} f(3) &= -(3)^2 - 3(3) + 9 \\ &= -9 - 9 + 9 \\ &= -18 + 9 \\ &= -9 \end{aligned}$$

$$a = a$$

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

$$k = f\left(\frac{-b}{2a}\right)$$

Find the following for the quadratic function  $f(x)$

$$\begin{aligned} a &= -3 \\ b &= 6 \\ c &= -1 \end{aligned}$$

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

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

$$a = a$$

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

$$k = f\left(\frac{-b}{2a}\right)$$

Vertex Form:

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

Vertex:

$$(1, 2)$$

Axis of Symmetry:

$$x = 1$$

Y - Intercept:

$$(0, -1)$$

$$f(-1): -10$$

Find the following for the quadratic function  $f(x)$

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

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

Vertex Form:  $1 - 4 + 1 = -2$   
 $4 - 8 + 1 = -3$

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

$$a = a$$

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

$$k = f\left(\frac{-b}{2a}\right)$$

Vertex:

$$(4, -3) \quad \frac{-(-2)}{2\left(\frac{1}{4}\right)} = \frac{2}{\frac{1}{2}} = 4$$

Axis of Symmetry:

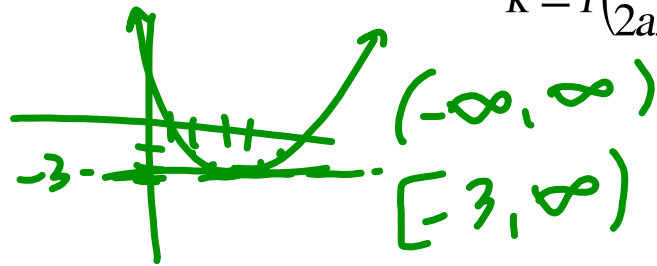
$$x = 4$$

Y - Intercept:

$$(0, 1)$$

$f(2)$ :

$$-2$$





How can a quadratic function be in standard form AND vertex form at the same time?!?!?

$$y = \underline{a} \underbrace{x^2}_{\text{circled}} + \underline{\quad} + \underline{c}$$

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

Vertex form, Standard form or both?

$$f(x) = -x^2 + 2x + 5$$

S

Vertex form, Standard form or both?

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

✓ (2, 1)

Vertex form, Standard form or both?

$$f(x) = -\frac{1}{2}(x + 3)^2 + 0$$

$$V (-3, 0)$$

Vertex form, Standard form or both?

$$f(x) = 2x^2 - 10$$

Both

$$2(x-0)^2 - 10$$

$$(0, -10)$$

Vertex form, Standard form or both?

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

S

Vertex form, Standard form or both?

$$f(x) = x^2 - 9$$

$$^a \quad ^c \\ |x^2 - 9$$

$$^a \quad ^h \quad ^k \\ | (x - 0)^2 - 9$$

$$(0, -9)$$

## due Wednesday

Vertex Form using:  $h = \frac{-b}{2a}$ ,  $k = f(h)$  Name: \_\_\_\_\_ Hr: \_\_\_\_\_

Axis of symmetry:  $x = h = \frac{-b}{2a}$      $k = f(h)$     Vertex:  $(h, k)$     Vertex form:  $y = a(x - h)^2 + k$

1-6. Use the formula  $\left(-\frac{b}{2a}, \text{---}\right)$  to find the vertex and then write the equation in vertex form.

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

2.  $y = -4x^2 + 16x - 11$

3.  $y = x^2 - 8x + 18$

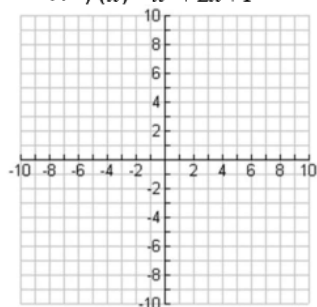
4.  $f(x) = -x^2 + 2x + 5$

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

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

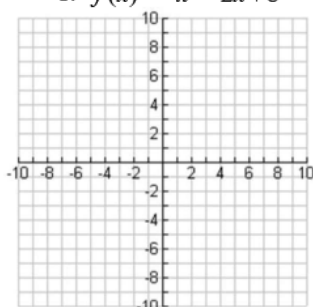
7-8. Find the following: (a) write the equation in vertex form, (b) identify vertex, (c) identify axis of symmetry, (d) state if vertex is a max or a min, (e) sketch graph, (f) x-intercepts, (g) y-intercept, (h) domain and range.

7.  $f(x) = x^2 + 2x + 1$



- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_
- g) \_\_\_\_\_
- h) \_\_\_\_\_
- i) Find  $f(0)$  \_\_\_\_\_

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



- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_
- g) \_\_\_\_\_
- h) \_\_\_\_\_
- i) Find  $f(-3)$  \_\_\_\_\_



9-14. State if the equation is in vertex form or standard form or both. Then find the vertex for each equation.

9.  $y = (x-6)^2 + 3$

10.  $y = x^2 - 25$

11.  $y = -2x^2 + 20x - 35$

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

13.  $y = 4x^2 + 24x$

14.  $f(x) = -3(x+2)^2 - 17$