

Bellwork: Algebra 1

1. Happy Thursday, please take out your homework :)
2. You will need a calculator and composition book.
2. Answer the following question on your THURSDAY

Bellwork: Identify the following
from the graph:

Vertex: $(-2, -1)$

Axis of Symmetry: $x = -2$

Y-intercept: $(0, -5)$

Zeros: None

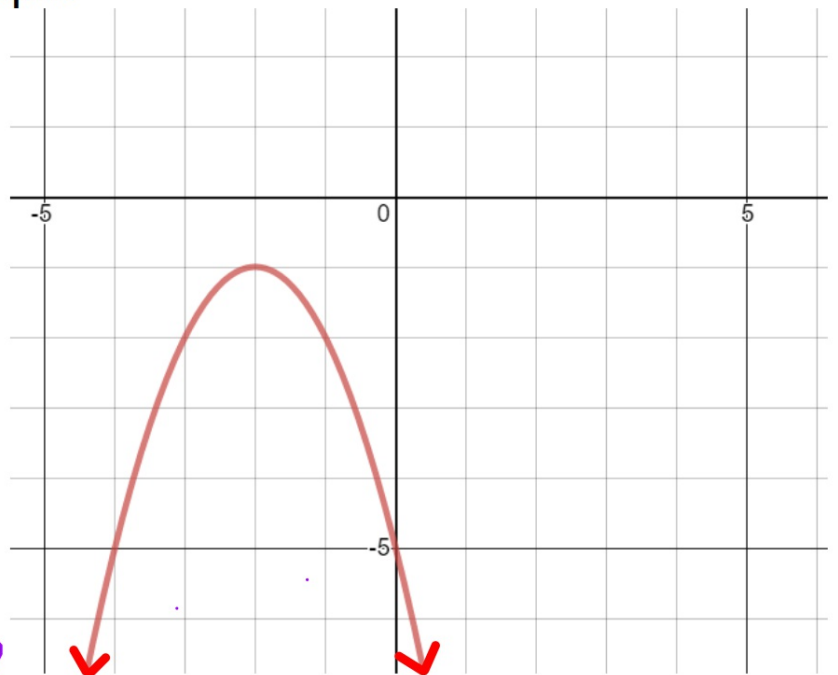
Domain: $-\infty < x < \infty$

Range: $y \leq -1$

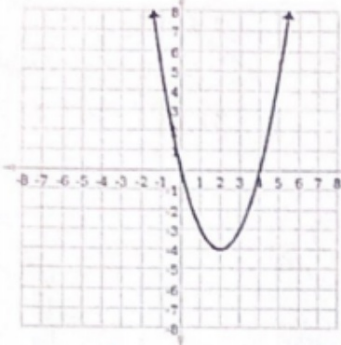
Increasing Interval:

$x < -2$

Decreasing Interval: $x > -2$



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



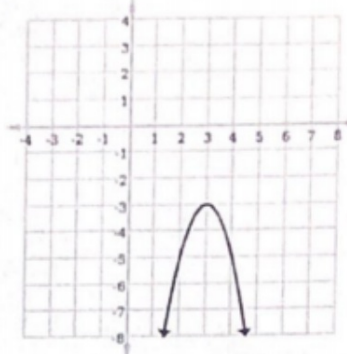
$$a = 1$$

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

$$k = (2)^2 - 4(2) = 4 - 8 = -4$$

$$f(x) = (x-2)^2 - 4$$

2. $f(x) = -2x^2 + 12x - 21$



$$a = -2$$

$$h = \frac{-12}{2(-2)} = 3$$

$$k = -2(3)^2 + 12(3) - 21 = -18 + 36 - 21 = -3$$

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

3. $y = x^2 + 6x + 5$

$$a = 1$$

$$h = \frac{-6}{2(1)} = -3$$

$$k = (-3)^2 + 6(-3) + 5 = 9 - 18 + 5 = -4$$

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

4. $x^2 - 12x + y + 40 = 0$

$$y = -x^2 + 12x - 40$$

$$a = -1$$

$$h = \frac{-12}{2(-1)} = 6$$

$$k = -(6)^2 + 12(6) - 40 = -36 + 72 - 40 = -4$$

$$f(x) = -(x-6)^2 - 4$$

5. $6x^2 + 12x + y + 13 = 0 \quad y = -6x^2 - 12x - 13$

$$a = -6$$

$$h = \frac{12}{2(-6)} = -1$$

$$k = -6(-1)^2 - 12(-1) - 13 \\ = -7$$

$$f(x) = -6(x+1)^2 - 7$$

6. $y = 3x^2 + 15x - 2$

$$a = 3$$

$$h = \frac{-15}{2(3)} = \frac{-15}{6} = \frac{-5}{2}$$

$$k = 3\left(\frac{-5}{2}\right)^2 + 15\left(\frac{-5}{2}\right) - 2 \\ = \frac{-83}{4}$$

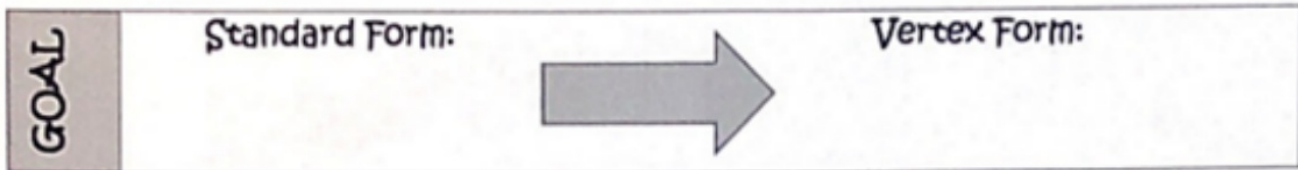
$$f(x) = 3\left(x + \frac{5}{2}\right)^2 - \frac{83}{4}$$

or

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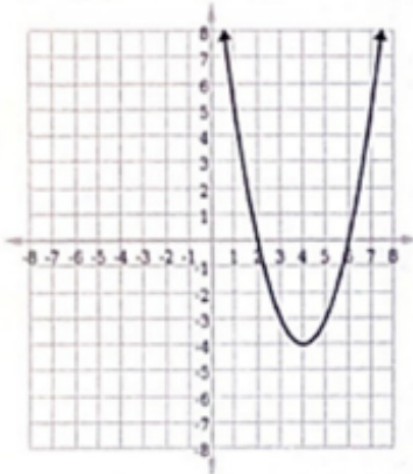
$$f(x) = 3(x + 2.5)^2 - 20.75$$

Convert from STANDARD Form to VERTEX Form



Write the function in vertex form by identifying a from the standard form and h and k from the graph

A) $f(x) = x^2 - 8x + 12$



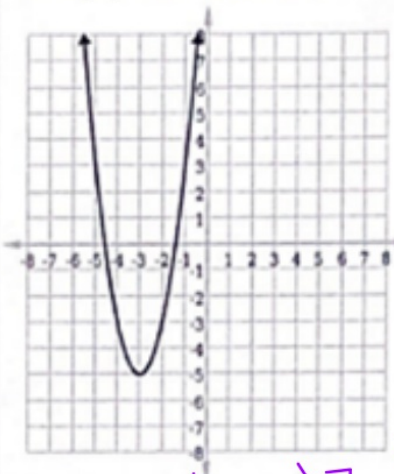
$a =$ _____

$h =$ _____

$k =$ _____

$f(x) =$ _____

B) $f(x) = 2x^2 + 12x + 13$



$a = 2$

$h = \frac{-12}{2(2)} = -3$

$k =$ _____

$f(x) = 2(x+3)^2 - 5$

$2(-3)^2 + 12(-3) + 13 = -5$

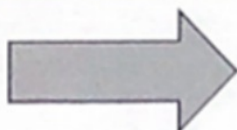
$18 - 36 + 13 = -5$

Convert from VERTEX Form to STANDARD Form

GOAL

Vertex Form:

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



Standard Form:

$$ax^2+bx+c$$

Write the function in standard form by squaring the binomial, rewrite the equation by replacing the binomial with the trinomial, distribute a, then combine like terms.

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

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

	x	3
x	x^2	$3x$
3	$3x$	9

$$2(x^2+6x+9)$$

$$y = 2x^2 + 12x + 18$$

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

$$-(x+4)(x+4) + 1$$

	x	4
x	x^2	$4x$
4	$4x$	16

$$-(x^2+8x+16) + 1$$

$$y = -x^2 - 8x - 16 + 1$$

$$y = -x^2 - 8x - 15$$

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

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

$$y = \frac{1}{2}(x^2 - 8x + 16) - 2$$

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

$$y = \frac{1}{2}x^2 - 4x + 6$$

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

Write the function in factored form by first writing in standards form, then factoring.

$$5. y = -3(x-1)^2 + 27$$

$$6. y = (x-1)^2 - 9$$

$$(x+1)(x+1) - 9$$

	x	-1
x	x ²	-1x
-1	-1x	1

$$x^2 - 2x + 1 - 9$$

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

$$y = (2x+6)(x+4)$$

	x	-4
x	x ²	-4x
2	2x	-8

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