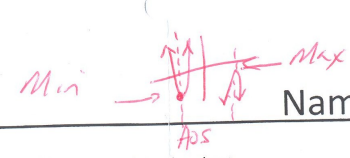


Quadratic Functions

Name: _____

Answer Key



1. The following equations are in Standard Form. Please complete the chart.

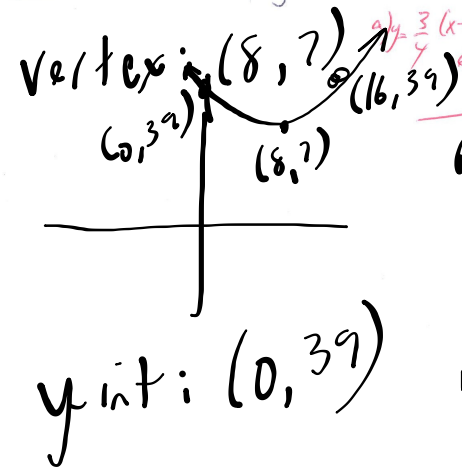
Function Remember: $y = a(x-h)^2 + k$	a	h think opposite	k	Vertex (h,k)	Axis of symmetry $X=h$	Range - opens? - k value	Standard form $y = ax^2 + bx + c$	y-intercept	Max/Min y-value (k)
$y = \frac{3}{4}(x-2)^2 + 6$	$\frac{3}{4} \uparrow$	2	6	(2,6)	$X=2$	$y \geq 6$	$y = \frac{3}{4}x^2 - 3x + 9$	(0,9)	Min 6
$y = -(x-5)^2 - 3$	-1 \downarrow	5	-3	(5,-3)	$X=5$	$y \leq -3$	$y = -x^2 + 10x - 28$	(0,-28)	Max -3
$y = 9(x-\frac{1}{2})^2 + 10$	9 \uparrow	$\frac{1}{2}$	10	($\frac{1}{2}$, 10)	$X = \frac{1}{2}$	$y \geq 10$	$y = 9x^2 - 9x + 10.25$	(0, 10.25)	Min 10
$y = -2(x+3)^2 + 4$	-2 \downarrow	-3	4	(-3,4)	$X = -3$	$y \leq 4$	$y = -2x^2 - 12x - 14$	(0, -14)	Max 4
$y = 5(x-1)^2$	5 \uparrow	1	0	(1,0)	$X=1$	$y \geq 0$	$y = 5x^2 - 10x + 5$	(0,5)	Min 0
$y = 4x^2 + 6$	4 \uparrow	0	6	(0,6)	$X=0$	$y \geq 6$	$y = 4x^2 + 6$	(0,6)	Min 6
$y = (x-3)^2 - 17$	1 \uparrow	3	-17	(3,-17)	$X=3$	$y \geq -17$	$y = x^2 - 6x - 8$	(0,-8)	Min -17
$y = x^2 - 5$	1 \uparrow	0	-5	(0,-5)	$X=0$	$y \geq -5$	$y = x^2 - 5$	(0,-5)	Min -5
$y = \frac{3}{4}(x+2)^2 + 1$	$\frac{3}{4} \uparrow$	-2	1	(-2,1)	$X = -2$	$y \geq 1$	$y = \frac{3}{4}x^2 + 3x + 4$	(0,4)	Min 1
$y = -4.9(x-1.5)^2 + 40.2$	-4.9 \downarrow	1.5	40.2	(1.5, 40.2)	$X = 1.5$	$y \leq 40.2$	$y = -4.9x^2 + 14.7x + 29.175$	(0, 29.175)	Max 40.2
$y = x^2$	1 \uparrow	0	0	(0,0)	$X=0$	$y \geq 0$	$y = x^2$	(0,0)	Min 0
$y = (x-2)^2$	1 \uparrow	2	0	(2,0)	$X=2$	$y \geq 0$	$y = x^2 - 4x + 4$	(0,4)	Min 0
$y = -3(x+5)^2 - 4$	-3 \downarrow	-5	-4	(-5,-4)	$X = -5$	$y \leq -4$	$y = -3x^2 - 30x - 79$	(0, -79)	Max -4
$y = \frac{1}{2}(x-8)^2 + 7$	$\frac{1}{2} \uparrow$	8	7	(8,7)	$X=8$	$y \geq 7$	$y = \frac{1}{2}x^2 - 8x + 39$	(0,39)	Min 7

$$y = \frac{1}{2}(x-8)^2 + 7$$

$$y = \frac{1}{2}(x^2 - 16x + 64) + 7$$

$$y = \frac{1}{2}x^2 - 8x + 32 + 7$$

$$y = \frac{1}{2}x^2 - 8x + 39$$



$D: \{x \in \mathbb{R}\}$
 $R: \{y \geq 7\}$
 Aos $x = 8$
 Min y-value 7

Mr. Hallihan in St. Louis???



S --> V by completing the square

STEPS:

- 1) Factor out the 'a' value from both the x and x² terms [GCF].
- 2) Complete the square on the x term...
 - take half and square it!
 - add this constant within bracket
 - subtract constant outside bracket multiplied by the 'a' value in front.
- 3) **FACTOR** the perfect square trinomial

Note: $\sqrt{\text{First}}$ & $\sqrt{\text{Last}}$ with sign from middle

VERTEX FORM!!!

EXAMPLE #1...

y into x
 $y = x^2 - 6x + 4$ ← Perfect Square Trinomial

$$y = (x^2 - 6x + 9) - 9 + 4$$

$$y = (x - 3)^2 - 5$$

$\sqrt{\text{first}}$ ↑
 middle ↑
 $\sqrt{\text{last}}$ ↑
 vertex (3, -5)
 Factor A
 Perfect Square Trinomial

Simple Trinomial multiply

$$x^2 - 6x + 9$$

add

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

$$(x - 3)^2$$

$$\left. \begin{array}{l} x \rightarrow 9 \\ + \rightarrow -6 \end{array} \right\} -3, -3$$

↑
Same
Perfect
Square
Trinomial

More Examples: S → V : Complete the square with "a=1"

#2. $y = x^2 + 14x$

Standard
 $y = (x^2 + \underline{14}x + \underline{49}) - 49$

y-int (0,0)

Vertex Form
 $y = (x + 7)^2 - 49$

vertex (-7, -49)

#3. $y = x^2 - 8x - 15$

$y = (x^2 - \underline{8}x + \underline{16}) - 16 - 15$

y-int (0, -15)

$y = (x - 4)^2 - 31$

vertex (4, -31)

#4. $y = x^2 + 9x + 2$

$y = (x^2 + \underline{9}x + \frac{81}{4}) - \frac{81}{4} + \frac{2 \cdot 4}{4}$

$y = (x + \frac{9}{2})^2 - \frac{73}{4}$

y-int (0, 2)

$(\frac{9}{2})^2 = \frac{81}{4}$

vertex $(-\frac{9}{2}, -\frac{73}{4})$

Your Turn ...

$$5) \quad y = x^2 - 10x - 7 \quad y\text{-int } (0, -7)$$

$$y = (x^2 - 10x + 25) - 25 - 7$$


$$y = (x - 5)^2 - 32 \quad \text{vertex } (5, -32)$$

$$6) \quad y = x^2 + 7x + 2 \quad y\text{-int } (0, 2)$$

$$y = (x^2 + 7x + \frac{49}{4}) - \frac{49}{4} + \frac{2 \cdot 4}{4} \quad \left(\frac{7}{2}\right)^2 = \frac{49}{4}$$

$$y = (x + \frac{7}{2})^2 - \frac{41}{4} \quad \text{vertex } (-\frac{7}{2}, -\frac{41}{4})$$

HOMEWORK...

 Worksheet - Standard to Vertex (a = 1).pdf

Do even #'s

Attachments

Worksheet - Standard to Vertex ($a = 1$).pdf