

Homework Solutions. *max Ancilla Key*

Quadratic Functions

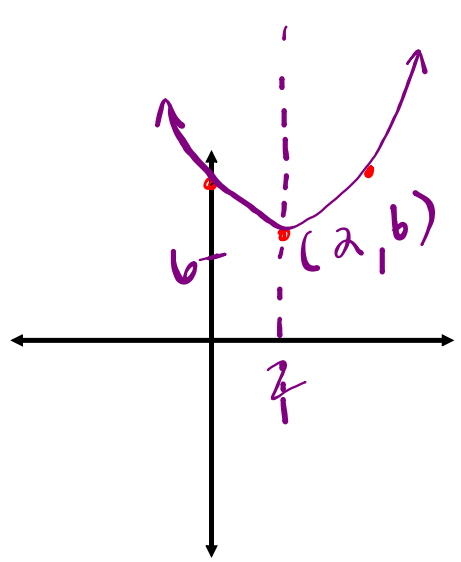
1. The following equations are in Standard

Function Remember: $y = a(x-h)^2 + k$	a	h think opposite		X=h	-k value	$y = ax^2 + bx + c$	Max/Min y-value (k)
$y = \frac{3}{4}(x-2)^2 + 6$	$\frac{3}{4}$	2	6	(2,6)	$x=2$	$y \geq 6$	Min 6
$y = -(x-5)^2 - 3$	-1	5	-3	(5,-3)	$x=5$	$y \leq -3$	Max -3
$y = 9(x-\frac{1}{2})^2 + 10$	9	$\frac{1}{2}$	10	($\frac{1}{2}$, 10)	$x = \frac{1}{2}$	$y \geq 10$	Min 10
$y = -2(x+3)^2 + 4$	-2	-3	4	(-3,4)	$x = -3$	$y \leq 4$	Max 4
$y = 5(x-1)^2$	5	1	0	(1,0)	$x=1$	$y \geq 0$	Min 0
$y = 4x^2 + 6$	4	0	6	(0,6)	$x=0$	$y \geq 6$	Min 6
$y = (x-3)^2 - 17$	1	3	-17	(3,-17)	$x=3$	$y \geq -17$	Min -17
$y = x^2 - 5$	1	0	-5	(0,-5)	$x=0$	$y \geq -5$	Min -5
$y = \frac{3}{4}(x+2)^2 + 1$	$\frac{3}{4}$	-2	1	(-2,1)	$x = -2$	$y \geq 1$	Min 1
$y = -4.9(x-1.5)^2 + 40.2$	-4.9	1.5	40.2	(1.5, 40.2)	$x = 1.5$	$y \leq 40.2$	Max 40.2
$y = x^2$	1	0	0	(0,0)	$x=0$	$y \geq 0$	Min 0
$y = (x-2)^2$	1	2	0	(2,0)	$x=2$	$y \geq 0$	Min 0
$y = -3(x+5)^2 - 4$	-3	-5	-4	(-5,-4)	$x = -5$	$y \leq -4$	Max -4
$y = \frac{1}{2}(x-8)^2 + 7$	$\frac{1}{2}$	8	7	(8,7)	$x=8$	$y \geq 7$	Min 7

$y = \frac{3}{4}(x-2)^2 + 6$
 $y = \frac{3}{4}(x^2 - 4x + 4) + 6$
 $y = \frac{3}{4}x^2 - 3x + 3 + 6$
 $y = \frac{3}{4}x^2 - 3x + 9$

Vertex (2, 6)
 Expand
 Standard
 $a = \frac{3}{4}$ open up wider!
y-int (0, 9)

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



A.O.S $x = 2$
 $D: \{x \in \mathbb{R}\}$
 $R: \{y \geq 6\}$
 Min y value is 6

WARM UP: Determine ALL properties for the given quadratic...

Vertex Form	$y = -2(x-1)^2 + 3$	$y = -2(x^2 - 2x + 1) + 3$
Standard Form	$y = -2x^2 + 4x + 1$	$y = -2x^2 + 4x - 2 + 3$
Direction of Opening	Down	$y = -2x^2 + 4x + 1$
Stretch Factor $ a $	* always positive	2 \leftarrow narrower
Vertex	$(1, 3)$	
y - intercept	$(0, 1)$	$\leftarrow y = -2(0-1)^2 + 3$
Domain	$\{x \in \mathbb{R}\}$	$y = -2(1)^2 + 3$
Range	$\{y \leq 3\}$	$y = 1$
Max or Min y - value	Max y-value is 3	
Axis of Symmetry	$x = 1$	
Sketch (label ALL key Points)		

Standard --> Vertex Form

NOTES - Standard to Vertex Form.pdf

STANDARD

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

- 'a' value
 - stretch factor
 - direction of opening
- y-intercept



VERTEX

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

- 'a' value
 - stretch factor
 - direction of opening
- vertex
 - A.O.S
 - Domain/Range
 - Max/Min y value
 - Sketch/Graph

We need to FACTOR... 'Complete the Square' Method!!!

S \rightarrow V by completing the square

STEPS:

- 1) Factor out the 'a' value from both the x and x^2 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...

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

$$y = (x^2 - 6x + \underline{9}) - 9 + 4$$

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

vertex
(3, -5)

FACTOR

$$1x^2 - 6x + 9$$

Mult → 9
add → -6

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

$$(x-3)^2$$

$\sqrt{1x}$ \sqrt{asx}
 middle

$$x \rightarrow 9 \quad -x = 9$$

$$+ \rightarrow -6 \quad \text{or} \quad - + = -6$$

-3, -3

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

#2. $y = x^2 + 14x$ y-int
(0,0)

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

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

vertex (-7, -49)

#3. $y = x^2 - 8x - 15$ y-int (0, -15)

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

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

vertex (4, -31)

#4. $y = x^2 + 9x + 2$ y-int (0, 2)

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

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

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

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

HOMEWORK

 Worksheet - Standard to Vertex and Properties.pdf

1-5

* Weakest Test : Review

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Attachments

NOTES - Standard to Vertex Form.pdf

Worksheet - Standard to Vertex and Properties.pdf