Min Max Answer Key

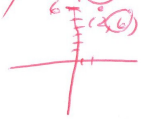
Quadratic Functions Name:

Axis

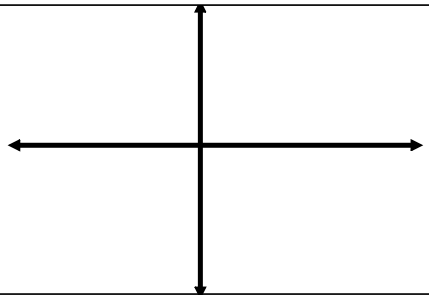
1. The following equations are in Standard Form. Please complete the chart.

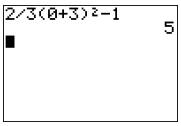
Function Remember: $y = a(x-h)^2 + k$	a	h think opposite	k	Vertex (h,k)	Axis of symmetry X=h	Range - opens? - K value	* Algebra Standard form $y = ax^2+bx+c$	let x=0 y-intercept	Max/Min y-value (k)
$y = \frac{3}{4}(x-2)^2 + 6$	$\frac{3}{4}$ ↑	2	6	(2,6)	X = 2	$y \geq 6$	$y = \frac{3}{4}x^2 - 3x + 9$	(0,9)	Min 6
$y = -(x-5)^2 - 3$	-1 ∩	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 ∪	$\frac{1}{2}$	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 ∩	-3	4	(-3,4)	X = -3	$y \leq 4$	$y = -2x^2 - 12x - 14$	(0,-14)	Max 4
$y = 5(x-1)^2$	5 ∪	1	0	(1,0)	X = 1	$y \geq 0$	$y = 5x^2 - 10x + 5$	(0,5)	Min 0
$y = 4x^2 + 6$	4 ∪	0	6	(0,6)	X = 0	$y \geq 6$	$y = 4x^2 + 6$	(0,6)	Min 6
$y = (x-3)^2 - 17$	1 ∪	3	-17	(3,-17)	X = 3	$y \geq -17$	$y = x^2 - 6x - 8$	(0,-8)	Min -17
$y = x^2 - 5$	1 ∪	0	-5	(0,-5)	X = 0	$y \geq -5$	$y = x^2 - 5$	(0,-5)	Min -5
$y = \frac{3}{4}(x+2)^2 + 1$	$\frac{3}{4}$ ∪	-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 ∩	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 ∪	0	0	(0,0)	X = 0	$y \geq 0$	$y = x^2$	(0,0)	Min 0
$y = (x-2)^2$	1 ∪	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 ∩	-5	-4	(-5,-4)	X = -5	$y \leq -4$	$y = -3x^2 - 30x - 79$	(0,-79)	Max -4
$y = \frac{1}{2}(x-8)^2 + 7$	$\frac{1}{2}$ ∪	8	7	(8,7)	X = 8	$y \geq 7$	$y = \frac{1}{2}x^2 - 8x + 39$	(0,39)	Min 7

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



EXAMPLE 2: Determine ALL properties for the given quadratic...

Vertex Form	$y = \frac{2}{3}(x + 3)^2 - 1$
Direction of Opening	
Stretch Factor	
Vertex	
y - intercept	
Domain	
Range	
Max or Min y - value	
Axis of Symmetry	
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

factor →

← expand

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 --> 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: √First & √Last with sign from middle

VERTEX FORM!!!

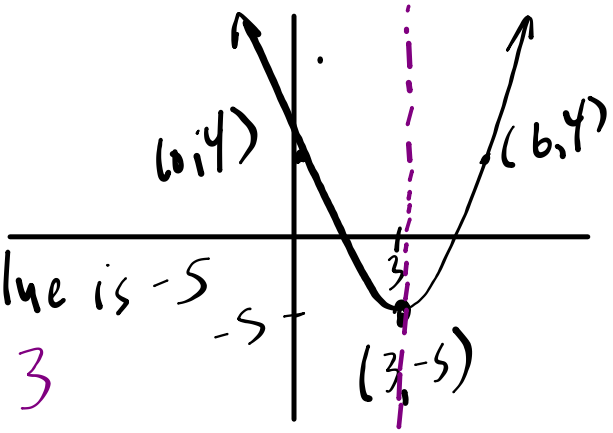
EXAMPLE #1...

$y = x^2 - 6x + 4$ y-int (0, 4)

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

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

vertex (3, -5)



D: $\{x \in R\}$

R: $\{y \geq -5\}$

Min y value is -5

AOS $x = 3$

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

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

y int (0, 0)

$y = (x^2 + 14x + 49) - 49$

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

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

yint(0, -15)

$y = (x^2 - 8x + 16) - 16 - 15$

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

vertex(4, -31)

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

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

$y = (x + \frac{9}{2})^2 - \frac{81}{4} + \frac{8}{4}$

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

y-int $(0, 2)$

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

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

HOMEWORK

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

Do even #'s

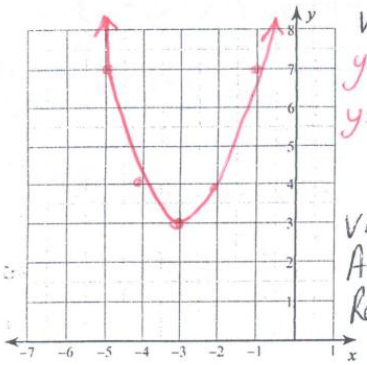
SOLUTIONS...

Algebra 1 Name Key ID: 1

Assignment Date _____ Period ____

Sketch the graph of each function.

1) $y = x^2 + 6x + 12$

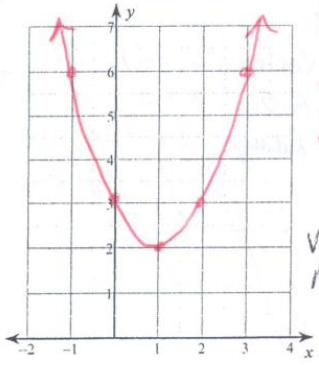


Vertex Form
$y=(x^2+6x+9)-9+12$
$y=(x+3)^2+3$

Vertex $(-3,3)$
A.O.S $x=-3$
Range $\{y \geq 3\}$

x	y
-5	7
-4	4
-3	3
-2	4
-1	7

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

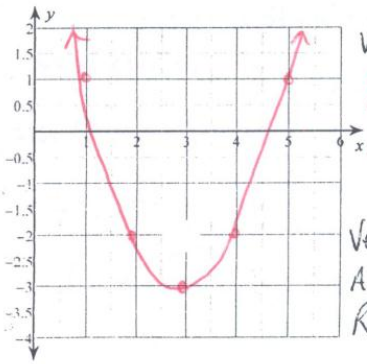


Vertex Form
$y=(x^2-2x+1)-1+3$
$y=(x-1)^2+2$

Vertex $(1,2)$
A.O.S $x=1$
Range $\{y \geq 2\}$

x	y
-1	6
0	3
1	2
2	3
3	6

3) $y = x^2 - 6x + 6$

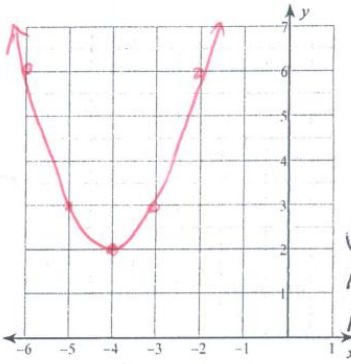


Vertex Form
$y=(x^2-6x+9)-9+6$
$y=(x-3)^2-3$

Vertex $(3,-3)$
A.O.S $x=3$
Range $\{y \geq -3\}$

x	y
2	1
3	-2
4	-3
5	-2
6	1

4) $y = x^2 + 8x + 18$

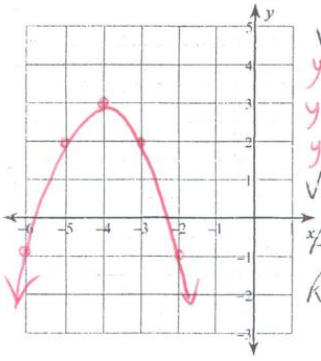


Vertex Form
$y=(x^2+8x+16)-16+18$
$y=(x+4)^2+2$

Vertex $(-4,2)$
A.O.S. $x=-4$
Range $\{y \geq 2\}$

x	y
-6	6
-5	3
-4	2
-3	3
-2	6

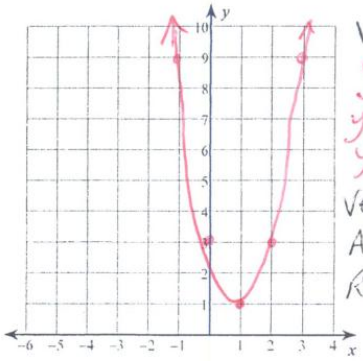
5) $y = -x^2 - 8x - 13$



Vertex Form
$y=-(x^2+8x)-13$
$y=-(x^2+8x+16)-16(-1)-13$
$y=-(x+4)^2+3$
Vertex $(-4,3)$
A.O.S. $x=-4$
Range $\{y \leq 3\}$

x	y
-5	2
-4	3
-3	2
-2	-1

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



Vertex form
$y=2(x^2-2x)+3$
$y=2(x^2-2x+1)-1(2)+3$
$y=2(x-1)^2+1$
Vertex $(1,1)$
A.O.S. $x=1$
Range $\{y \geq 1\}$

x	y
-1	9
0	3
1	1
2	3
3	9

-1-

Attachments

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

NOTES - Standard to Vertex Form.pdf