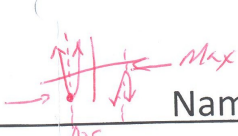
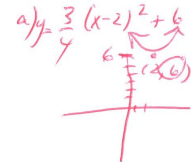


Quadratic Functions

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



HW Questions ...

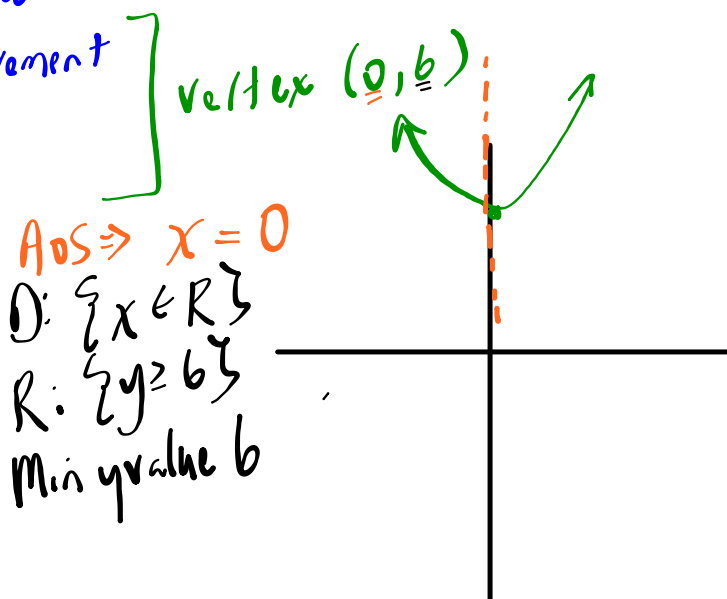
f) $y = 4x^2 + b$

$a = 4$ ← open up & narrow

$h = 0$ ← no L/R movement

$k = b$ ← up b

y -int \rightarrow let $x = 0$
 $y = 4(0)^2 + b$
 y -int = b OR $(0, b)$



Forms of the Quadratic Function

Vertex Form

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

- stretch factor: "a"
- vertex: (h, k)

Properties

- max/min y value
- axis of symmetry
- domain/range

Standard Form

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

- stretch factor: "a"
- y intercept: (0, c)

Example 1: Change from vertex to standard form. $a = -3$
 vertex (2, 5)

Vertex Form → $y = -3(x - 2)^2 + 5$

$$y = -3(x^2 - 4x + 4) + 5$$

$$y = -3x^2 + 12x - 12 + 5$$

$$y = -3x^2 + 12x - 7$$

Expand

Standard

$a = -3$
 y int (0, -7)

Your Turn... $a=6$ opens up narrower

Vertex $(-4, -10)$ $\rightarrow y = 6(x+4)^2 - 10$

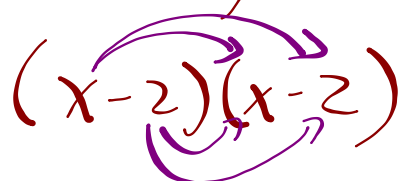
$y = 6(x^2 + 8x + 16) - 10$

$y = 6x^2 + 48x + 96 - 10$

Standard $(0, 86)$ $\rightarrow y = 6x^2 + 48x + 86$
y-int

Review \rightarrow Squaring A Binomial

$$(x-2)^2$$

$$(x-2)(x-2)$$


$$x^2 - 2x - 2x + 4$$

$$x^2 - 4x + 4$$

OR

3 STEP Rule

- ① $(1^{st})^2$
- ② $1^{st} \times 2^{nd} \times 2$
- ③ $(2^{nd})^2$

$$x^2 - 4x + 4$$

ex : $(3x-5)^2$

$$9x^2 - 30x + 25$$

k) $y = x^2$

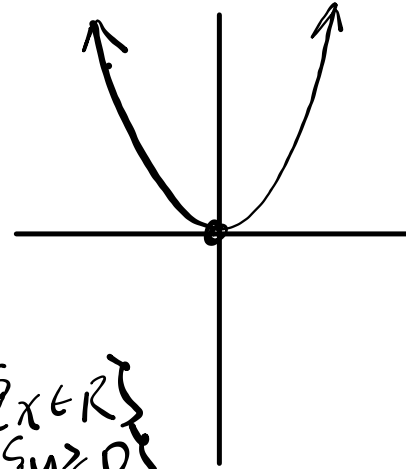
$a = 1$

$h = 0$

$k = 0$

vertex $(0, 0)$

y-int
 $y = 0^2$
 $y_{int} = 0$
 $(0, 0)$



$D: \{x \in \mathbb{R}\}$
 $R: \{y \geq 0\}$
 Min y value of 0
 Abs $\Rightarrow x = 0$

h) $y = x^2 - 5$

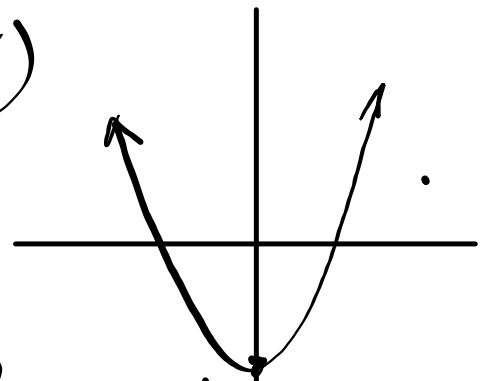
$a = 1$

$h = 0$

$k = -5$

vertex $(0, -5)$

y-int
 $y = 0^2 - 5$
 $y_{int} = -5$
 $(0, -5)$



$D: \{x \in \mathbb{R}\}$
 $R: \{y \geq -5\}$
 Abs $x = 0$
 Min y value of -5

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

Vertex Form	$y = \frac{2}{3}(x + 3)^2 - 1$
Direction of Opening	UP
Stretch Factor	$\frac{2}{3}$ (wider)
Vertex	$(-3, -1)$
y - intercept	$(0, 5)$
Domain	$\{x \in \mathbb{R}\}$
Range	$\{y \geq -1\}$
Max or Min y - value	Min y value of -1
Axis of Symmetry	$x = -3$
Standard Form	$y = \frac{2}{3}x^2 + 4x + 5$
Sketch (label ALL key Points)	

y -int
 $y = \frac{2}{3}(0+3)^2 - 1$
 $y = \frac{2}{3}(9) - 1$
 $y = 6 - 1$
 $y = 5$
 $y = \frac{2}{3}(x^2 + 6x + 9) - 1$
 $y = \frac{2}{3}x^2 + 4x + 6 - 1$
 $y = \frac{2}{3}x^2 + 4x + 5$

HW: p. 335 - #4, 5, 7, 10

 Worksheet - Properties of Quadratics.docx

Finish standard form column

Attachments

Worksheet - Properties of Quadratics.docx