

HOMWORK SOLUTIONS...

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

	OPEN UP? $a > 0$	OPEN DOWN? $a < 0$	NARROW? WIDER? $0 < a < 1$	LEFT? RIGHT? $h < 0$ $h > 0$	UP? DOWN?
Plot1 $y = x^2$	open up		same	not move	not move
Plot2 $y = -2x^2 + 5$	open down		narrower	not move	up 5
Plot3 $y = 0.5(x-3)^2 - 4$	open up		wider	right 3	down 4
Plot4 $y = 5x^2$	open up		narrower	not move	not move
Plot5 $y = -1/2(x+7)^2 + 2$	open down		wider	left 7	up 2
Plot6 $y = 7(x-1)^2 - 22$	opens up		narrow	right 1	down 22

y-int

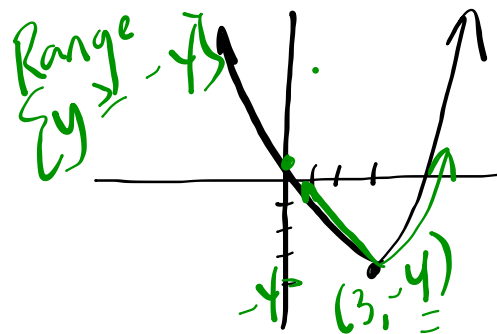
$$y = 7(0-1)^2 - 22$$

$$y = 7(1) - 22$$

$$y_{int} = -15$$

(0, -15)

Vertex (3, -4)



ALL Properties of a Quadratic

VERTEX

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

✓ **TRANSFORMATIONS...** *Shape & Movements*

- stretch factor 'a' --> direction of opening & shape
- translations 'h' and 'k' --> horizontal / vertical movements

• **KEY POINTS...**

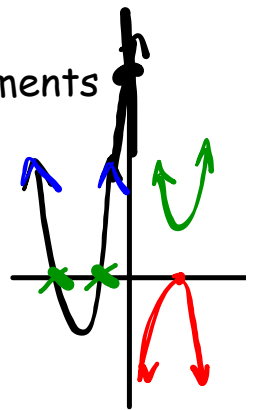
- vertex (h, k) --> lowest / highest point on the parabola
- x intercept(s) --> where the graph crosses the x axis

Pre Calc

--> let $y = 0$ and solve for x

(we will come back to this property)

- y intercept --> where the graph crosses the y axis
 - > let $x = 0$ and solve for y
 - > is the 'c' value in standard form



• **PROPERTIES...**

- Domain --> describes all possible x values
 - > for quadratic functions $\{x \in \mathbb{R}\}$
- Range --> describes all possible y values
 - > depends on direction of opening and "k" value in vertex
- Maximum / Minimum Value --> highest / lowest y value
 - > depends on direction of opening and "k value")
- Axis of symmetry --> vertical line of symmetry through vertex
 - [A.O.S] --> described through $x = h$

Example... State transformations & properties

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

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

$a = -2 \rightarrow$ opens down & narrower

$h = 1 \rightarrow$ right 1

$k = 3 \rightarrow$ up 3

vertex $(1, 3)$

y-int

$$y = -2(0-1)^2 + 3$$

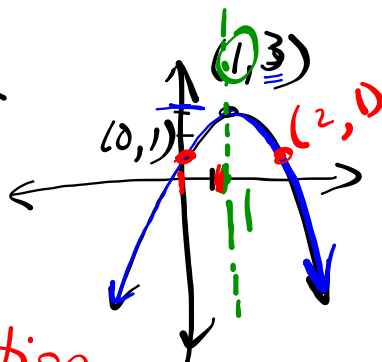
$$y = -2(1) + 3$$

$$y = 1$$

$(0, 1)$

Sketch

- 1) Vertex
- 2) y-int
- 3) Reflection



Domain $\{x \in \mathbb{R}\}$

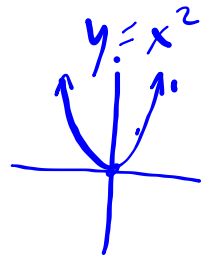
Range $\{y \leq 3\}$

Max y-value of 3

A.O.S $x = 1$

Ex #2

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



$a = \frac{1}{2}$ open up / wider
 $h = -4$ left 4
 $k = -1$ down 1

Vertex $(-4, -1)$

y-int

$$y = \frac{1}{2}(0+4)^2 - 1$$

$$y = \frac{1}{2}(16) - 1$$

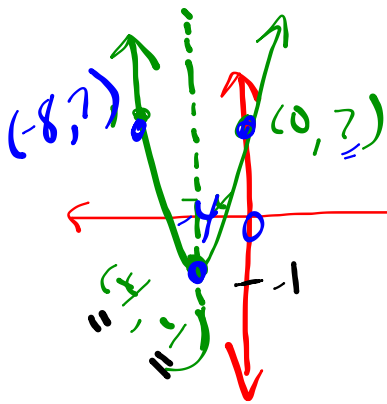
$$y = 8 - 1$$

$$y = 7$$

$(0, 7)$

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

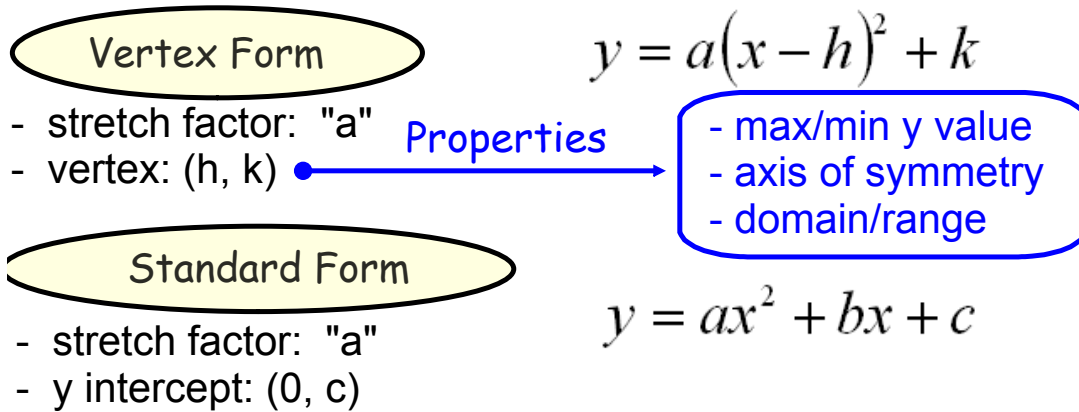
R: $\{y \geq -1\}$



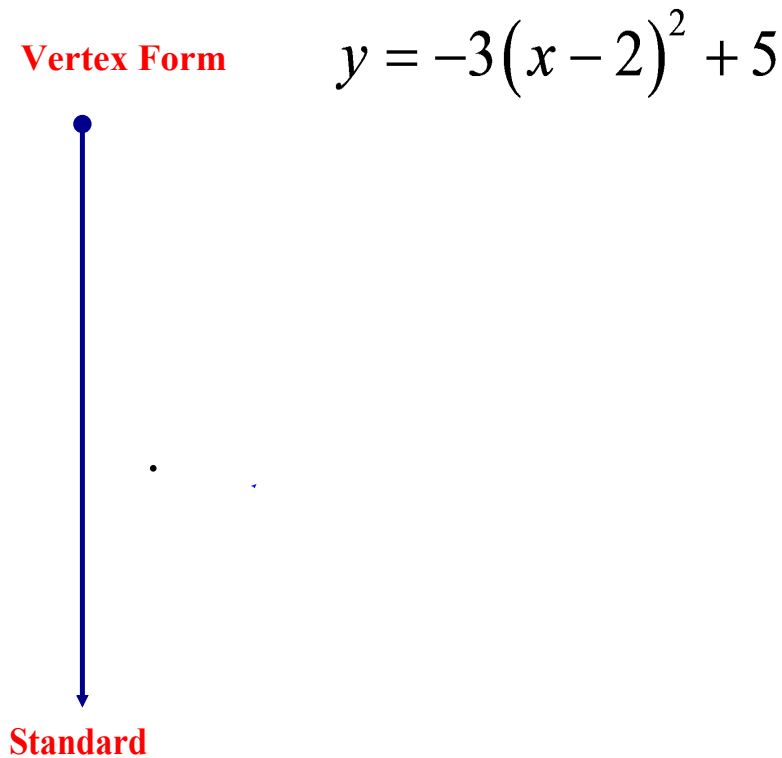
Min-value
y = -1

A.O.S
x = -4

Forms of the Quadratic Function



Example 1: Change from vertex to standard form.



HOMework...

 Worksheet - Properties of Quadratics.docx

#1 → omit Standard
#2 → sketch within #1

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Attachments

Worksheet - Properties of Quadratics.docx