

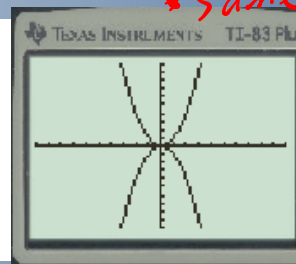
Vertex Form..

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

L/R \neq opposite
 opens up/down
 shape
 u/d
 * same

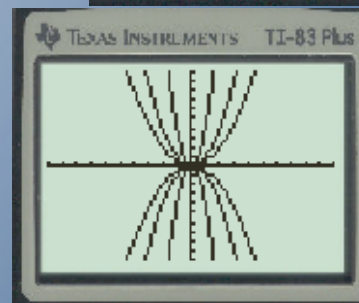
Direction of Opening: (“Look at the sign of the stretch factor”)

- If $a > 0$, then the graph opens upward.
- If $a < 0$, then the graph opens downward.



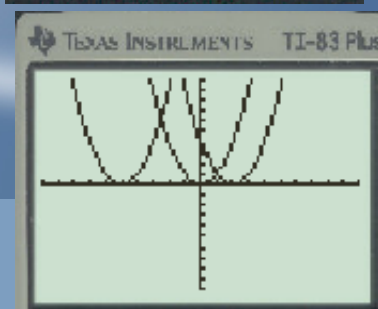
Vertical Stretch: (“Look at the magnitude of the stretch factor”)

- If $|a| > 1$, then the graph becomes narrower.
- If $|a| = 1$, then the graph stays the same. e same.
- If $0 < |a| < 1$, then the graph becomes wider.



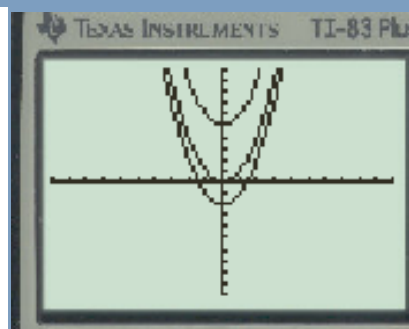
Horizontal Translation: (“Think opposite”)

- If $h > 0$, then the graph moves to the right h units.
- If $h = 0$, then the graph does not move horizontally.
- If $h < 0$, then the graph moves to the left h units.



Vertical Translation: (“Exactly the same”)

- If $k > 0$, then the graph moves upward k units.
- If $k = 0$, then the graph does not move vertically.
- If $k < 0$, then the graph moves downward k units.

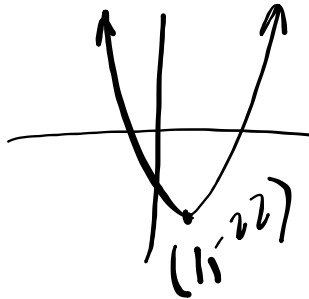


HOMEWORK EXERCISE:

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

Plot1	Plot2	Plot3
$y_1 = x^2$		
$y_2 = -2x^2 + 5$		
$y_3 = 0.5(x - 3)^2 - 4$		
$y_4 = 5x^2$		
$y_5 = -1/2(x + 7)^2 + 2$		
$y_6 = 7(x - 1)^2 - 22$		

a		h	k
OPEN UP? OPEN DOWN?	NARROW? WIDER?	LEFT? RIGHT?	UP? DOWN?
UP	no change	no	no
Down	narrow	no	US
UP	wider	R3	DT
UP	narrow	no	no
Down	wider	L7	Y2
UP	narrow	R1	D22
		↑ opposite	↑ same



ALL Properties of a Quadratic

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

✓ TRANSFORMATIONS...

- 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
--> 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 $x = h$