6.1 Exploring Quadratic Relations

GOAL

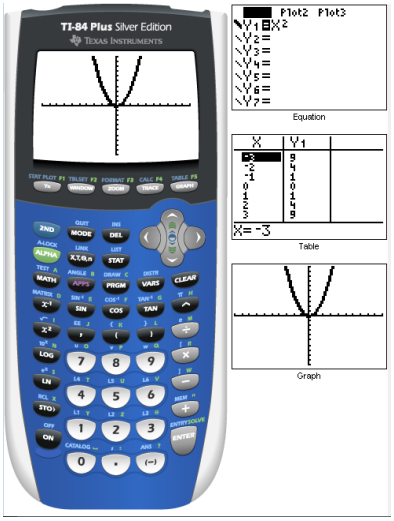
Determine the characteristics of quadratic relations.

quadratic relation

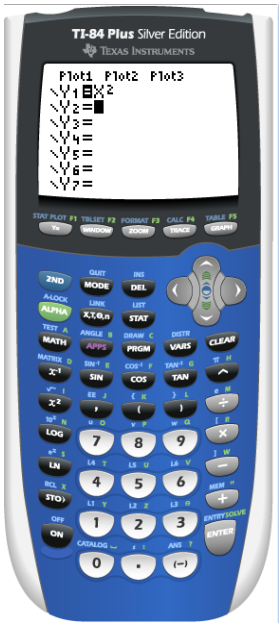
A relation that can be written in the standard form $y = ax^2 + bx + c$, where $a \neq 0$; for example, $y = 4x^2 + 2x + 1$

Notes...

- parabolic in shape
- non linear
- highest power is 2 (degree 2)
- is a **function**, where each x value has only one y value [vertical line test]



Properties in Vertex Form...



Grab a 'Graphing Calculator'

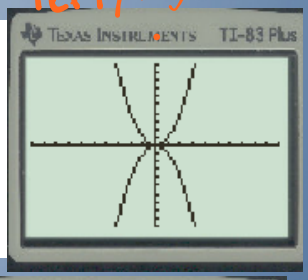
Vertex Form...

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

a: open up/down, shape (narrow/wide)
h: move left/right
k: move up/down

Direction of Opening: ("Look at the sign of the stretch factor.")

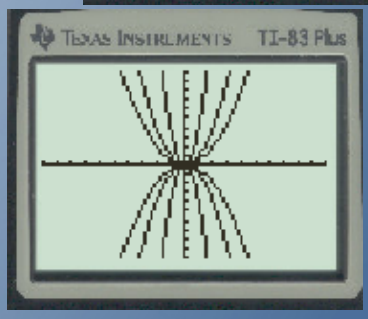
- If $a > 0$, then the graph *opens upward*. (positive)
- If $a < 0$, then the graph *opens downward*. (negative)



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

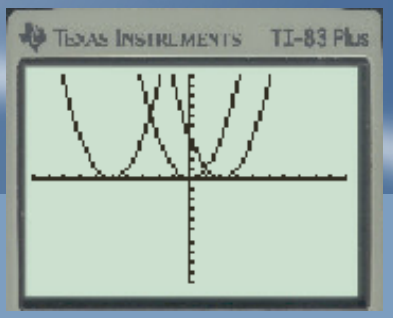
|a| → always positive

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



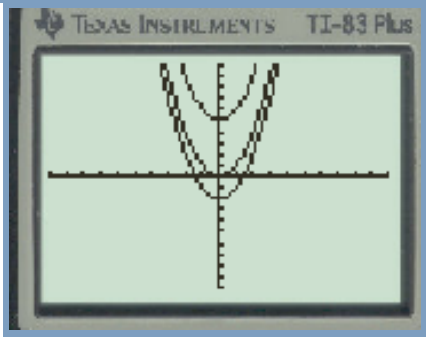
Horizontal Translation: ("Think opposite")

- 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: