6.1 Exploring Quadratic Relations

GOAL

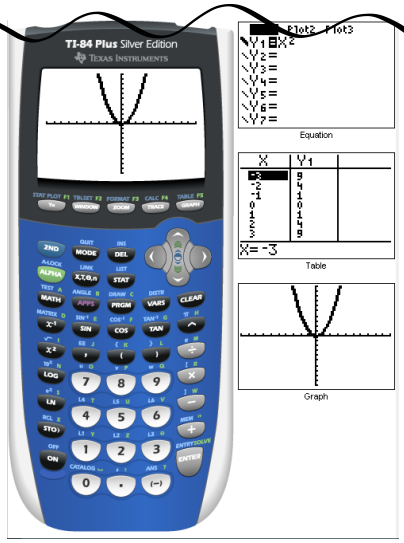
Determine the characteristics of quadratic relations.

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]



Vertex Form...

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

left/Right (Opposite)

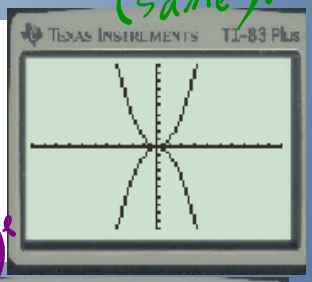
opens up/down shape

up/down (same).

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

positive
- If $a > 0$, then the graph *opens upward*.

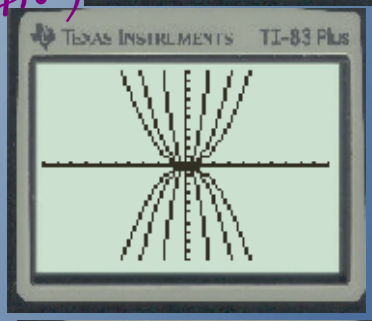
negative
- If $a < 0$, then the graph *opens downward*.



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

* |a| → Absolute Value (make positive)

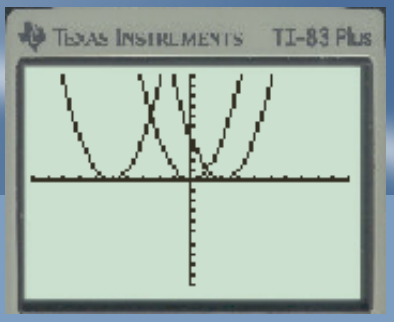
- If $|a| > 1$, then the graph becomes *narrower*. (greater than 1)
- If $|a| = 1$, then the graph *stays the same*. e same.
- If $0 < |a| < 1$, then the graph becomes *wider*. (between 0 & 1)



Horizontal Translation: ("Think opposite")

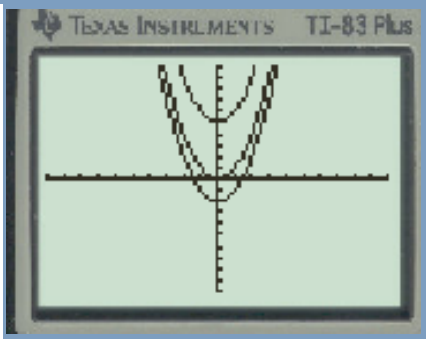
positive
- If $h > 0$, then the graph *moves to the right h units*.
- If $h = 0$, then the graph *does not move horizontally*.

negative
- 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: