

Quadratic Graphs & Their Properties (Section 3-1)

* Quadratic Functions:

* degree: 2

* graphs a parabola

* standard form: $y = ax^2 + bx + c$

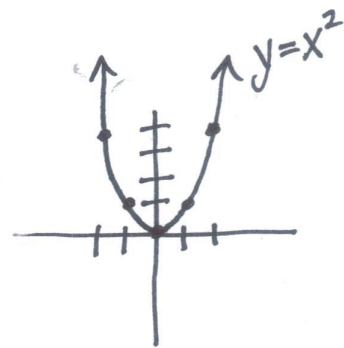
* parent graph: $y = x^2$

* axis of symmetry: $x = \frac{-b}{2a}$

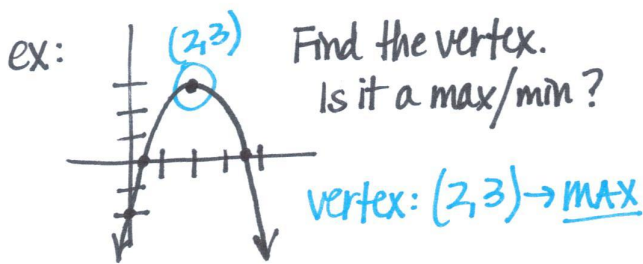
* only one max/min @ the vertex

* for $y = a(x-b)^2 + c$ ← moves it up/down
 vertical stretch/shrink \swarrow moves it \searrow
 L/R

* if "a" is (-), flip the graph → opens downward



"a" is (+): min
 "a" is (-): max



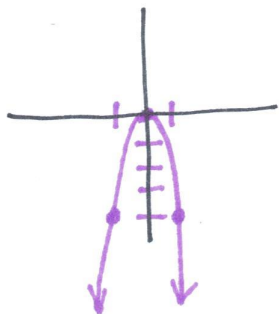
ex:

x	y
0	8
1	2
2	0
3	2
4	8

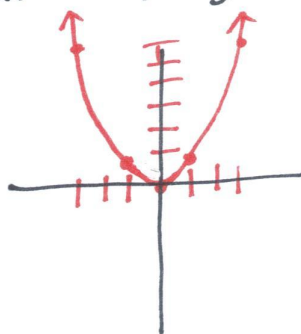
 Vertex? Max/Min?

2 | 0 vertex (because of symmetry)
MIN

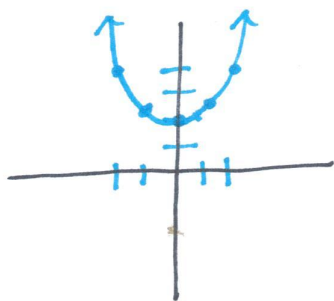
ex: $y = -4x^2$ domain: $(-\infty, \infty)$
 range: $(-\infty, 0]$



ex: $f(x) = \frac{2}{3}x^2$ domain: $(-\infty, \infty)$
 range: $[0, \infty)$

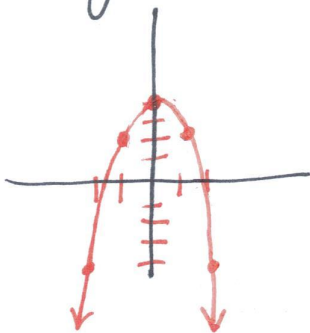


ex: $y = \frac{1}{2}x^2 + 2$ Describe transformations & graph.



- Vert. shrink by $\frac{1}{2}$
- Up 2

ex: $y = -2x^2 + 4$ Describe transformations & graph



- Flip it!
- Stretch by 2 vert.
- Up 4

* Falling objects: $h = -16t^2 + c$

height ↙ time ↘ object's initial height ←

#9

ex: drops an orange from 40 ft.

$$h = -16t^2 + 40$$

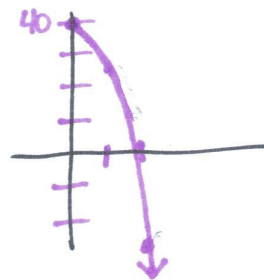
Graph it. When will it hit the water?

$$0 = -16t^2 + 40$$

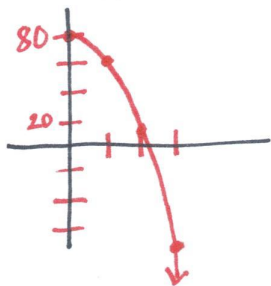
$$16t^2 = 40$$

$$t^2 = 40/16 = 5/2$$

$$t = \sqrt{5/2} \approx 1.581 \text{ sec.}$$



#10 ex: $h = -16t^2 + 80$ Graph it. When will it hit the ground?



$$0 = -16t^2 + 80$$

$$16t^2 = 80$$

$$t^2 = 80/16 = 5$$

$$t = \sqrt{5} \approx 2.236 \text{ sec.}$$