

## 2.1 Quadratic Functions + Models

### Defns

① polynomial  $\Rightarrow f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_1 x + a_0$   
fn  $a_i \in \mathbb{R}, a_n \neq 0, n \in \mathbb{N}$   
degree =  $n$ , leading coefficient =  $a_n$

② quadratic fn  $\Rightarrow$  a type of polynomial fn where  
degree = 2  
 $f(x) = ax^2 + bx + c$   $a, b, c \in \mathbb{R}, a \neq 0$

Standard Form of Quadratic Fn

$$f(x) = a(x-h)^2 + k \quad a \neq 0$$

$(h, k)$  = vertex of parabola

$a > 0 \Rightarrow$  concave up

$a < 0 \Rightarrow$  concave down

( $a$  affects vertical stretching or shrinking)

Vertex of Parabola

For  $f(x) = ax^2 + bx + c$

vertex is  $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

$\hookrightarrow$  why? "u

## 2.1 (cont)

Ex 1 Sketch the graph.

(a)  $f(x) = (x-6)^2 + 3$

(b)  $h(x) = 16 - x^2$

(c)  $f(x) = -x^2 - 4x + 1$

## 2.1 (cont)

Ex 2 Write standard form of parabola eqn that has vertex  $(2, 3)$  and goes thru the point  $(0, 2)$

Ex 3 Find a quadratic fn that goes through  $(4, 0)$  and  $(8, 0)$ . (Note: there are many correct answers!)