

§7-6 Vertex Form of a Quadratic Function

This form is useful if you given the equation then you can easily sketch the graph OR if you are given the vertex and a point, you can easily write the equation.

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

where (h, k) is the vertex

Example 2 (p411)

minimum
(vertex) $(12, 47.5)$

time length

point $(10, 85.3)$

x y

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

$$85.3 = a(10-12)^2 + 47.5$$

$$37.8 = a(-2)^2$$

$$37.8 = a(4)$$

$$a = 9.45$$

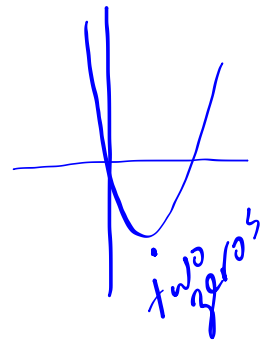
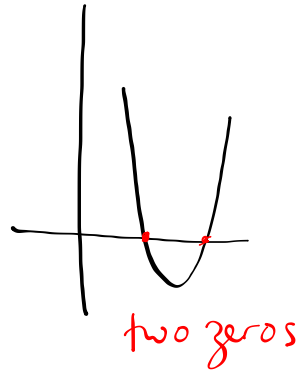
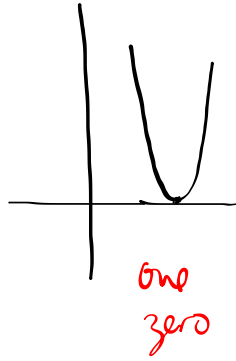
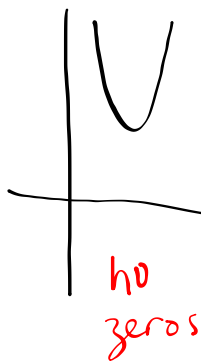
$$y = 9.45(x-12)^2 + 47.5$$

Example 3 (p412) $y = a(x-h) + k$

Consider: $f(x) = 2(x-2)^2 - 5$

How many zeros?

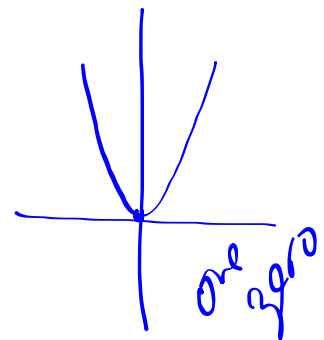
Vertex:
(2, -5)
opens up



What about: $f(x) = x^2$

vertex is (0,0)

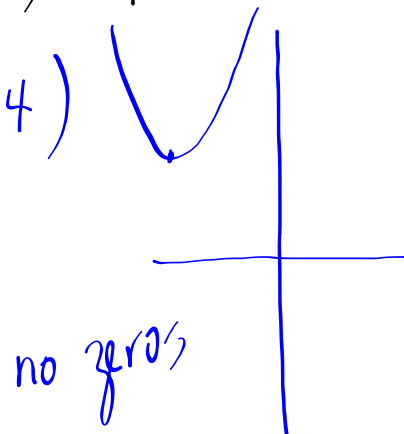
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What about: $f(x) = 2(x+3)^2 + 4$

vertex: (-3, 4)

opens up



Example 4 (p413)

x - time (s)

y - height (m)

vertex $(2, 20)$
 h k point $(4, 0)$
 x y

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

$$0 = a(4-2)^2 + 20$$

$$0 = a(2)^2 + 20$$

$$-20 = a(4)$$

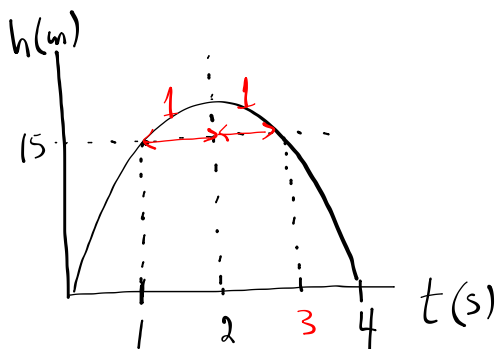
$$a = -5$$

$$y = -5(x-2)^2 + 20$$

 a h k

b) Domain: $x \in \mathbb{R}, 0 \leq x \leq 4$ Range: $y \in \mathbb{R}, 0 \leq y \leq 20$

c) height at 1s?



$$y = -5(1-2)^2 + 20$$

$$y = -5(-1)^2 + 20$$

$$y = -5 + 20$$

$$y = 15\text{m}$$

At 3s, the ball will be at the same height.
(i.e. 15m)TODD

① c4u (p417)

② p417 (4-15)