

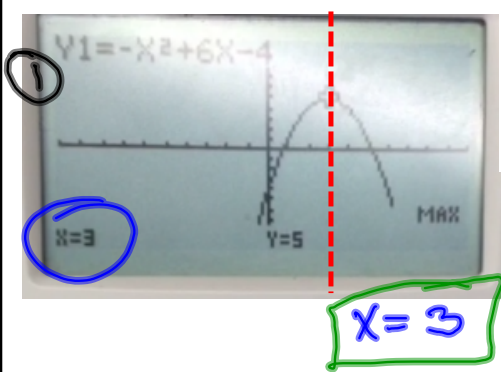
MES44QCS-Lesson 5

Mr. Pineda

Aim: How can we solve numerical verbal problems leading to a quadratic equation?

Do Now:

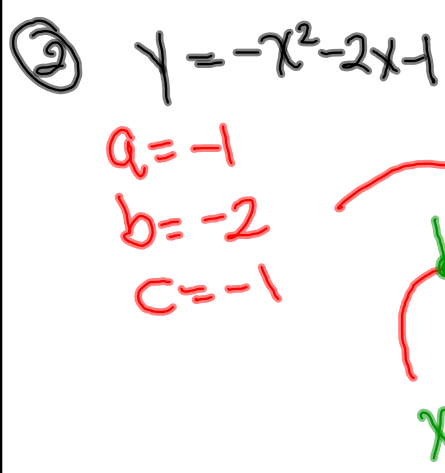
1. What is an equation of the axis of symmetry of the parabola represented by $y = -x^2 + 6x - 4$?
 $a = -1$ $b = 6$ $c = -4$
2. What is the equation for the axis of symmetry for: $y = -x^2 - 2x - 1$
 (1) $x = 1$ (2) $x = -1$ (3) $y = 1$ (4) $y = -1$



Para una función cuadrática en la forma estándar, $y = ax^2 + bx + c$, el eje de simetría es una recta vertical $x = -\frac{b}{2a}$.

$$x = \frac{-b}{2a} = \frac{-(6)}{2(-1)} = \frac{-6}{-2} = +3$$

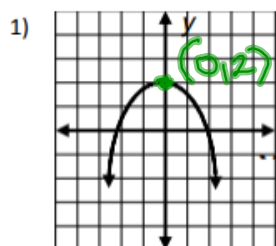
$x = +3$



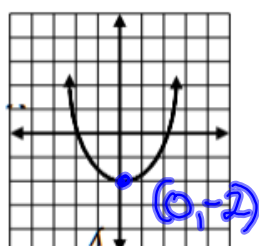
$x = \frac{-(-2)}{2(-1)} = \frac{+2}{-2} = -1$

$x = -1$

I – Verbal Problems



$$x = 0$$
$$y = 2$$

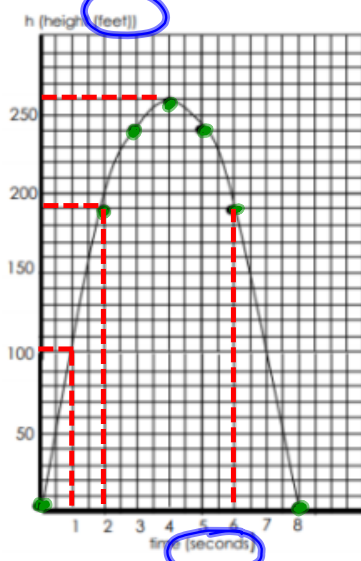


$$x = 0$$
$$y = -2$$

Punto DE GIRO

In a verbal problem, the **turning point** is usually the answer to the problem.

2) Example:



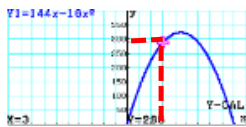
EX. 1 Using the graph at the right, ^{left} it shows the height h in feet of a small rocket t seconds after it is launched. The path of the rocket is given by the equation: $h = -16t^2 + 128t$.

1. How long is the rocket in the air? ≈ 8 seconds
2. What is the greatest height the rocket reaches? 260 feet
3. About how high is the rocket after 1 second? 100 feet
4. After 2 seconds,
 about how high is the rocket? 190 feet
 is the rocket going up or going down? up
5. After 6 seconds,
 about how high is the rocket? 190 feet
 is the rocket going up or going down? down

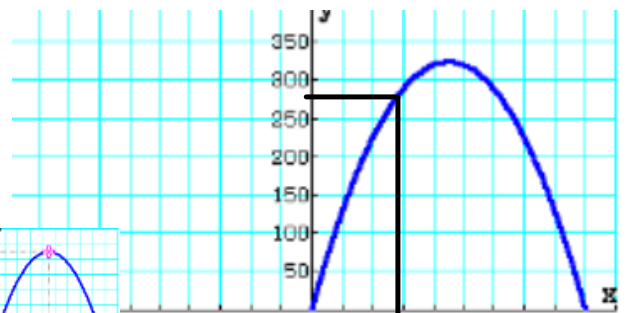
3) Try it on your own:

After t seconds, a ball tossed in the air from the ground level reaches a height of h feet given by the function $h(t) = 144t - 16t^2$.

a. What is the height of the ball after 3 seconds?

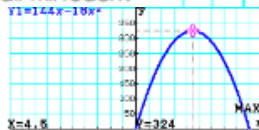


$(3, 288)$

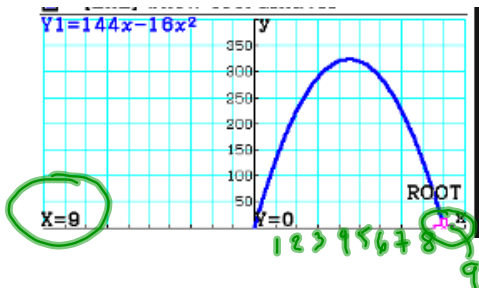


b. What is the maximum height the ball will reach?

$(4.5, 324)$
 ↓ MAX



c. After how many seconds will the ball hit the ground before rebound?



3) Try it on your own: **without a calculator**

After t seconds, a ball tossed in the air from the ground level reaches a height of h feet given by the function $h(t) = 144t - 16t^2$.

a. What is the height of the ball after 3 seconds? $(3, 288)$

$$h(3) = 144(3) - 16(3)^2 \quad \uparrow$$

b. What is the maximum height the ball will reach?

$$x = \frac{-b}{2a} = 4.5 \quad (4.5, 324)$$

$$h(4.5) = 144(4.5) - 16(4.5)^2$$

BCF^c.

After how many seconds will the ball hit the ground before rebound?

$$144 =$$

$$t =$$

$$16 =$$

$$t^2 =$$

$$\frac{144t}{16t} - \frac{16t^2}{16t} = 0$$

$$16t(9 - t) = 0$$

$$16t = 0 \quad 9 - t = 0$$

$$t = \frac{0}{16} \quad t = 9$$

$$t = 0 \quad t = 9$$

$$h(t) = 144t - 16t^2$$

How to adjust the window in the calculator?

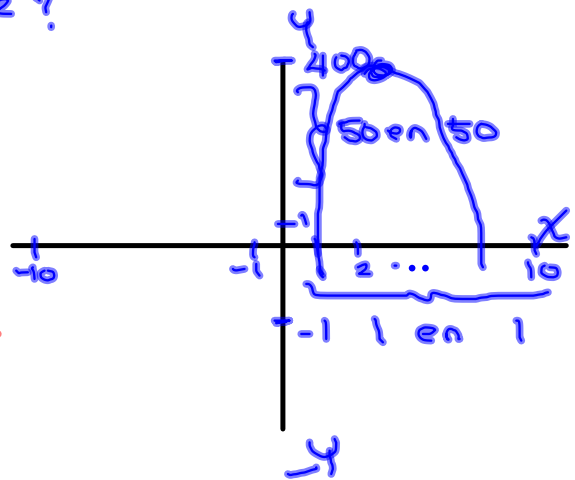
3) MAX
VERTEX (x, y)
(4.5, 324)

$$x = \frac{-b}{2a} = -\frac{(144)}{2(-16)} = 4.5$$

$$a = -16 \quad y = 144(4.5) - 16(4.5)^2$$

$$b = 144 \quad y = 324$$

$$c = 0$$



- 4) A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground t seconds after it is thrown is given by $d(t) = -16t^2 - 4t + 382$. How long after the rock is thrown is it 370 feet from the ground?

