APPLICATIONS WITH PARABOLIC FUNCTIONS (DAY 7)

EX. 1 Using the graph at the right, 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 = -16t² + 128t.**

h (height (feet))

1. How long is the rocket in the air? _8 seconds_

2. What is the greatest height the rocket reaches? _260 ft_

$X = \frac{-b}{2a}$ $x = \frac{-128}{2(-16)} = 4$ $-16(4)^2 + 128(4) = 256 ft$

3. About how high is the rocket after 1 second? _100 ft_

4. After 2 seconds, about how high is the rocket? _190 ft_

   is the rocket going up or going down? _up_

5. After 6 seconds, about how high is the rocket? _190 ft_

   is the rocket going up or going down? _down_

6. Do you think the rocket is traveling faster from 0 to 1 second or from 3 to 4 seconds? Explain your answer. _bc it grows by about 100ft as opposed to about 20ft from 3-4 sec_

7. Using the equation, find the **exact** value of the height of the rocket at 2 seconds.

   $-16(2)^2 + 128(2) = 192 ft$

8. What is the domain of the graph?

   $[0, 8]$ $0 \le x \le 8$ from 0 to 8
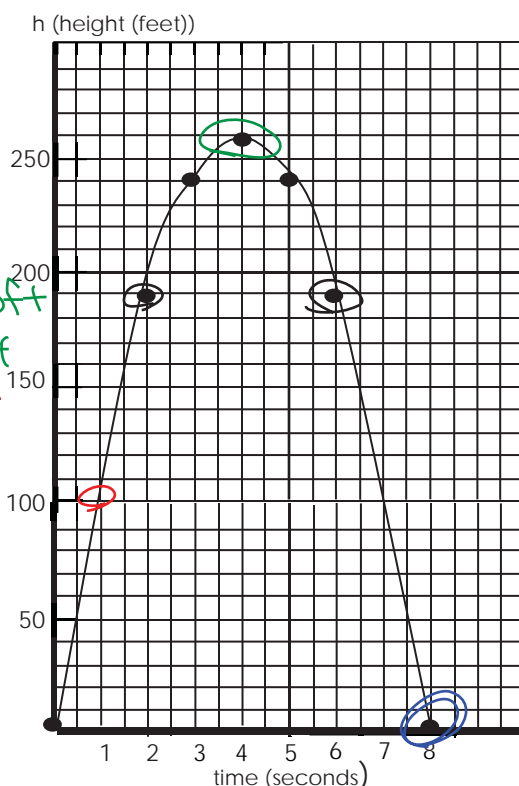
9. What is the range of the graph?

   $[0, 256]$ $0 \le y \le 256$ from 0 to 256

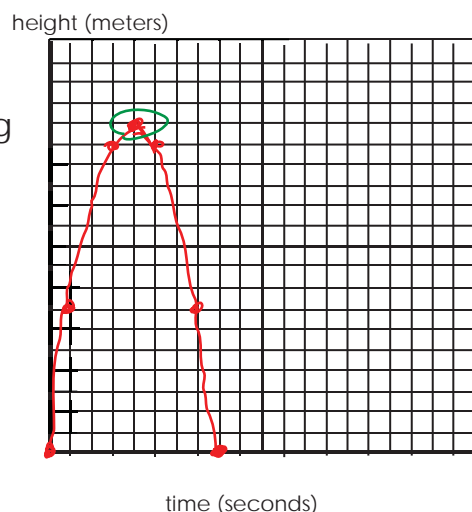10. Express the interval over which the graph is increasing.

    $[0, 4)$

11. Express the interval over which the graph is decreasing.

    $(4, 8]$

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EX2: A ball is thrown in the air. The path of the ball is represented by the equation h = -t² + 8t. Graph the equation over the interval 0 ≤ t ≤ 8 on the accompanying grid.
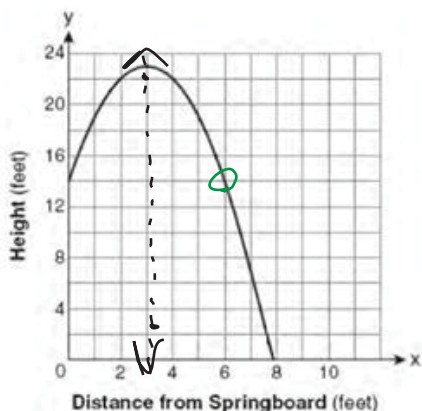
height (meters)

a) What is the maximum height of the ball? __16 meters__

$X = \frac{-8}{2(-1)} = 4$ $-(4)^2 + 8(4) = 16$

b) What is the amount of time that the ball is above 7 meters? __6 seconds__

time (seconds)

EX3: A swim team member performs a dive from a 14-foot high springboard. The parabola below shows the path of her dive.

Height (feet)

Distance from Springboard (feet)

a) What is the axis of symmetry? __X = 3__

b) Find f(6) __14 ft__

EX4: Consider the graph of the equation y = ax² + bx + c, when a ≠ 0. If a is multiplied by 3, what is true of the graph of the resulting parabola?

  1) The vertex is 3 units above the vertex of the original parabola.
  2) The new parabola is 3 units to the right of the original parabola
  3) The new parabola is wider than the original parabola.
  4) The new parabola is narrower than the original parabola.

EX5: Melissa graphed the equation y = x² and Dave graphed the equation y = -3x² on the same coordinate grid. What is the relationship between the graphs that Melissa and Dave drew? Both parabolas touching the origin, axis of symmetries are x=0 with 1 solution, Dave's is skinnier and faces down, Melissa's faces up.

EX6: The graph of a parabola is represented by the equation y = ax² where a is a positive integer. What happens to the new parabola if a is multiplied by 2? What if multiplied by ½ ? It'll become narrower.

It'll become wider.

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