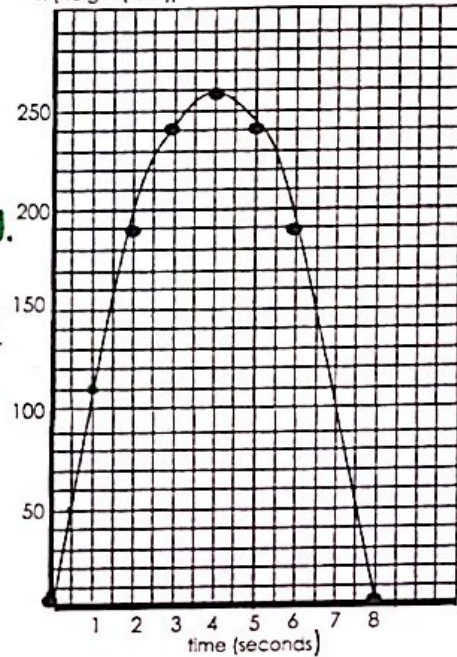




APPLICATIONS WITH PARABOLIC FUNCTIONS (DAY 7)

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:
 $h = -16t^2 + 128t$.

h (height (feet))



1. How long is the rocket in the air? 8 sec
2. What is the greatest height the rocket reaches? 260 ft.
3. About how high is the rocket after 1 second? 110 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.

1 sec to go 110 ft 1 sec to go 20 feet First second went way faster 110 feet.

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

$$h = -16(2)^2 + 128(2) = -64 + 256 = \boxed{192 \text{ feet}}$$

8. What is the domain of the graph?

$$0 \leq x \leq 8 \text{ (sec)}$$

9. What is the range of the graph?

$$0 \leq y \leq 260 \text{ (feet)}$$

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

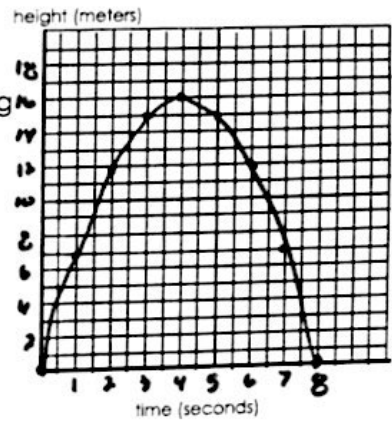
From 0 to 4 seconds. $0 \leq x \leq 4$

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

From 4 to 8 seconds. $4 < x \leq 8$



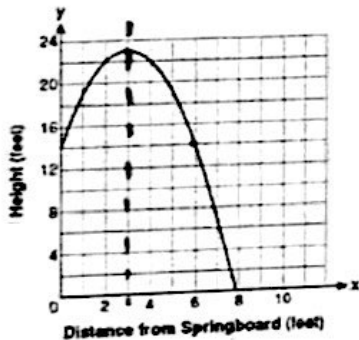
EX2: A ball is thrown in the air. The path of the ball is represented by the equation $h = -t^2 + 8t$. Graph the equation over the interval $0 \leq t \leq 8$ on the accompanying grid.



a) What is the maximum height of the ball? 16m

b) What is the amount of time that the ball is above 7 meters? 6 seconds
(1, 7) (7, 7)

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



a) What is the axis of symmetry? $x=3$

b) Find $f(6)$ 14 feet
 $x=6$

EX4: Consider the graph of the equation $y = ax^2 + bx + c$, when $a \neq 0$. 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 $y = x^2$ and Dave graphed the equation $y = -3x^2$ on the same coordinate grid. What is the relationship between the graphs that Melissa and Dave drew?

EX6: The graph of a parabola is represented by the equation $y = ax^2$ where a is a positive integer. What happens to the new parabola if a is multiplied by 2? What if multiplied by $\frac{1}{2}$?