

Applications with Quadratic Functions

The graph at the right shows the height, $h(t)$, in feet of a small rocket, t seconds after it launched. The path of the rocket is given by the equation:

$$h(t) = -16t^2 + 128t$$

1. What is the quadratic term? $-16t^2$

2. What does the quadratic term represent?

acceleration due to gravity

3. What is the linear term? $128t$

4. What does the linear term tell us?

Initial velocity

5. What is the constant? 0

6. What does the constant tell us?

Initial Height

7. What ordered pair represents when the rocket hits the ground? $(8, 0)$

8. How long is the rocket in the air? _____ Explain how you got your answer.

8 seconds. It is the second x-intercept

9. Using the graph, estimate the greatest height the rocket reaches. 258 ft

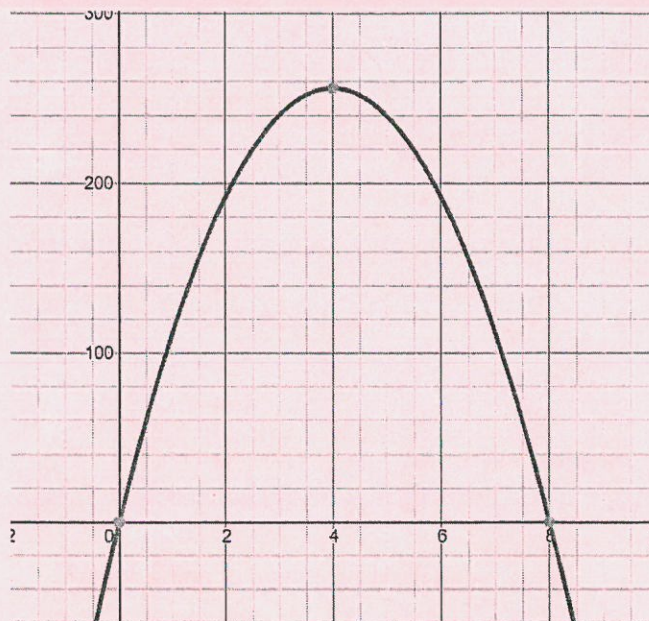
Where did you find this information? (Be specific)

The vertex of the graph - y value

10. Using the graph, estimate how long it took the rocket to get to the greatest height. 4 seconds

Where did you find this information? (Be specific)

The vertex of the graph - t value



11. Using the equation, calculate the greatest height the rocket reaches AND the time it took to get there.

$$t = \frac{-128}{2(-16)} = 4$$

4 seconds

$$h(4) = -16(4)^2 + 128(4) = 256 \text{ feet}$$

256 ft.

12. Estimate how high the rocket is after 1 second. 105 ft.

13. Using the equation, calculate the exact value of the height of the rocket at 1 second.

$$h(1) = -16(1)^2 + 128(1) = \boxed{112 \text{ ft}}$$

14. After 2 seconds:

a. Estimate how high the rocket is. 140 ft

b. Is the rocket going up or going down? up

c. Using the equation, calculate the exact value of the height of the rocket at 2 seconds.

$$-16(2)^2 + 128(2) \quad h(2) = -16(2)^2 + 128(2) = \boxed{142 \text{ ft}}$$

15. After 6 seconds,

a. Estimate how high the rocket is. 140 ft

b. Is the rocket going up or going down? down

c. Using the equation, calculate the exact value of the height of the rocket at 6 seconds.

$$h(6) = -16(6)^2 + 128(6) = \boxed{142 \text{ ft}}$$

16. Do you think the rocket is traveling faster from 0 to 1 second or from 3 to 4 seconds. Explain your answer.

faster from 0 to 1 seconds

It covers more feet per second.

Gravity is slowing its ascent.