

PRACTICE QUESTIONS: Quadratics Word Problems

Date: Solutions

1. The force of gravity on Mars is less than half that on Earth. A ball thrown upward can be modelled using $h = -2t^2 + 4t + 6$ where h is the height in feet and t is the time in seconds.

a) What is the maximum height of the ball?

Zeros

$$h = -2(t^2 - 2t - 3)$$

$$h = -2(t-3)(t+1)$$

$$0 = -2(t-3)(t+1)$$

$$t = 3 \quad t = -1$$

AOS

$$\frac{3-1}{2} = \frac{2}{2} = 1$$

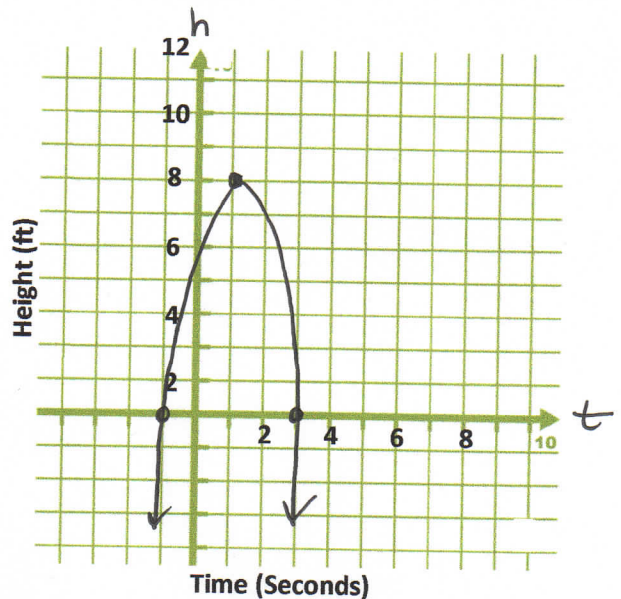
vertex

let $t = 1$

$$h = -2(1)^2 + 4(1) + 6$$

$$h = -2(1) + 4 + 6$$

$$h = -2 + 4 + 6 = 8 \quad \therefore \text{vertex is } (1, 8) \quad \therefore \text{max height is } 8$$



- b) When does the ball reach its maximum height? 1 second.
- c) When does the ball hit the ground? 3 seconds.

2. The path of a firework is given by $h = -5t^2 + 20t$, where h is the height in metres and t is the time in seconds.

a) Find the maximum height of the firework.

Zeros

$$h = -5t(t-4)$$

$$0 = -5t(t-4)$$

$$-5t = 0 \quad t - 4 = 0$$

$$t = 0 \quad t = 4$$

AOS

$$\frac{0+4}{2} = 2$$

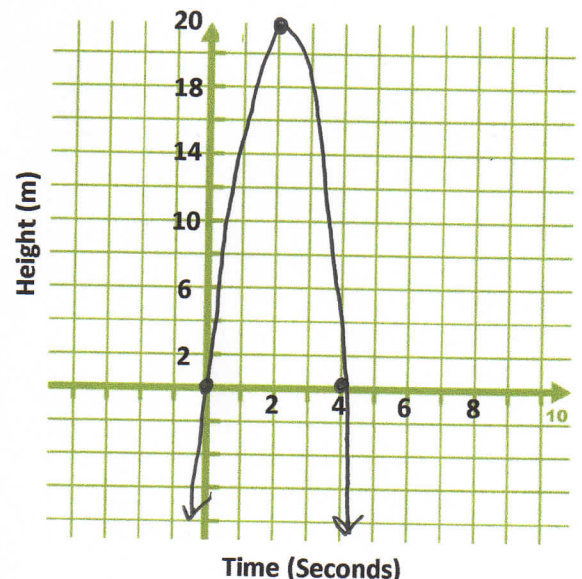
vertex

let $t = 2$

$$h = -5(2)^2 + 20(2)$$

$$h = -5(4) + 40$$

$$h = 20 \quad \therefore \text{vertex is } (2, 20) \quad \therefore \text{max height is } 20 \text{ m.}$$



- b) After how many seconds does the firework reach its maximum height? 2 seconds.
- c) What is the height of the model rocket after 3 seconds? Approx. 16 m.