

QUADRATIC RELATIONS: Word Problems

Date: Notes

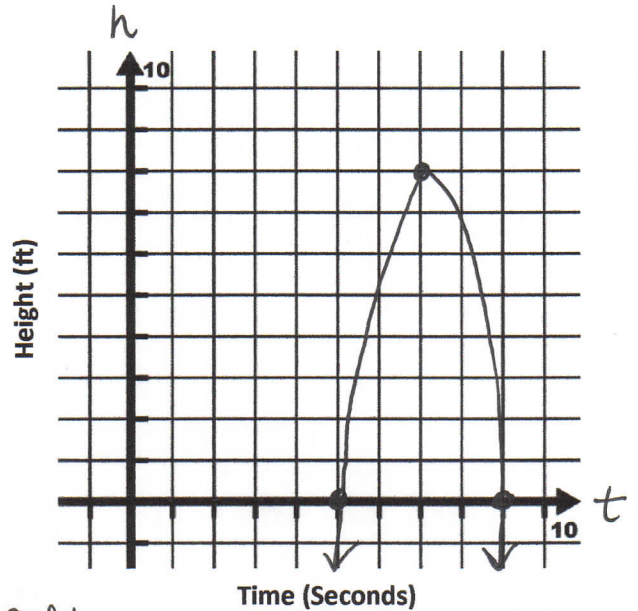
EXAMPLE 1: The path of a paper airplane is given by $h = -2t^2 + 28t - 90$ where t is the time in seconds, and h is the height in feet.

- a) Find the maximum height of the airplane. (Hint: Need to find vertex to find maximum height). Sketch the graph to help you.

Step 1: Factor to find zeros $h = -2(t^2 - 14t + 45)$
 $0 = -2(t-9)(t-5)$
 $\boxed{t=9}$ $\boxed{t=5}$

Step 2: Find axis of symmetry $\frac{9+5}{2} = \frac{14}{2} = \boxed{7}$

Step 3: Find vertex using x-value from axis of symmetry
 Let $t=7$ $h = -2(7)^2 + 28(7) - 90$
 $h = -2(49) + 28(7) - 90$
 $h = 8$
 \therefore vertex is $(7, 8)$



Step 4: What is the max height that the airplane reaches? 8 ft.

- b) When does the airplane reach the maximum height? 7 seconds.

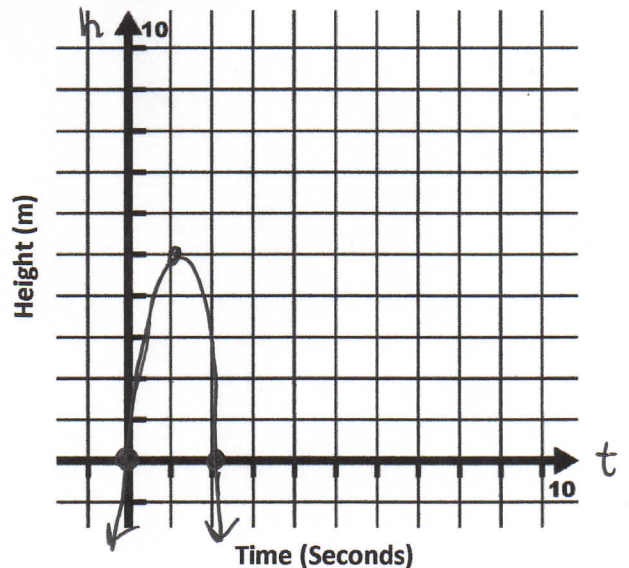
EXAMPLE 2:

A football player kicks a ball off a football tee. The height of the ball, h , in metres after t seconds can be modelled using the formula: $h = -5t^2 + 10t$. What is the maximum height of the ball?

Zeros $h = -5t(t-2)$
 $0 = -5t(t-2)$
 $\boxed{t=0}$ $\boxed{t=2}$

AOS $\frac{0+2}{2} = \frac{2}{2} = 1$

Vertex Let $t=1$
 $h = -5(1)^2 + 10(1)$
 $h = -5(1) + 10$
 $h = -5 + 10$
 $h = 5$ $(1, 5)$



- b) When does the ball reach the maximum height? 5 m at 1 second

- c) When does the ball hit the ground? 2 seconds when $h=0$.