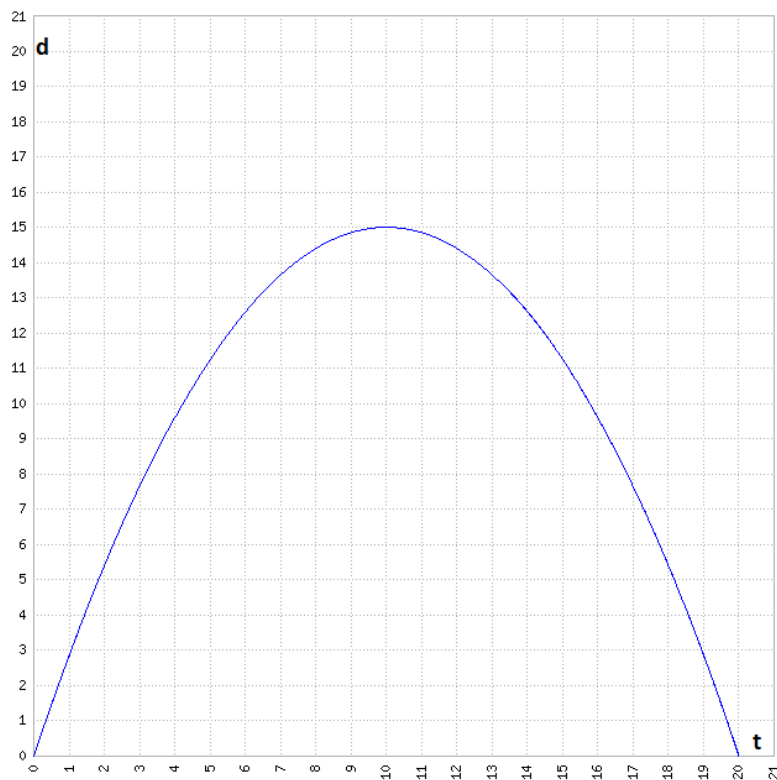


### Answer on Question #48472 - Math - Calculus

The trajectory of a missile is described by the by the function  $d=-0.15t^2+3.0t$ . Where  $d$  is the number of meters above the ground and  $t$  is the number of seconds after being lunched. Produce a graph of this function using an appropriate domain and range and use it and the above equation to answer the questions.

- a) what is the maximum height of the missile
- b) at what time does the missile reach this maximum height
- c) how long is the missile in the air
- d) is the missile launched from a point on the ground
- e) what is the height of the missile at  $t=2$  seconds and  $t=16$  seconds
- f) at what time would the height of the missile be 10 metres

#### Solution.



$$d = -0.15t^2 + 3.0t, \quad d = t(3 - 0.15t),$$

$$d = 0 \text{ when } t = 0 \text{ or } t = \frac{3}{0.15} = 20.$$

Calculate  $d' = -0.3t + 3.0$ ,  $d' = 0 \rightarrow t = 10$

a)  $d_{max} = d(10) = -0.15 * 100 + 3.0 * 10 = 15 \text{ m.}$

b)  $t = 10 \text{ sec.}$

c)  $d = 0 \rightarrow t = 20 \text{ sec.}$

d)  $d(0) = 0 \rightarrow$  the missile is launched from a point on the ground

e)  $d(2) = -0.15 * 4 + 3.0 * 2 = 5.4 \text{ m.}$

$$d(16) = -0.15 * 256 + 3.0 * 16 = 9.6 \text{ m.}$$

f)  $d = 10 \rightarrow -0.15t^2 + 3.0t - 10 = 0 \rightarrow$

$$D = 3^2 - 4 * (-0.15) * (-10) = 9 - 6 = 3,$$

$$t = \frac{-3 \mp \sqrt{3}}{2 * (-0.15)} = -\frac{-3 \mp \sqrt{3}}{0.3},$$

$$t = 10 - \frac{10}{3}\sqrt{3} \approx 4.23 \text{ sec. or } t = 10 + \frac{10}{3}\sqrt{3} \approx 15.77 \text{ sec.}$$