

## Answer on Question #77330 – Math – Calculus

### Question

A 6-foot boy throws the javelin with an initial speed of 87 feet per second at an angle of  $38^\circ$  with the horizontal. How long is the javelin in the air?

### Solution

Formula for the  $y$ -coordinate in this case is

$$y(t) = y_0 + v_y t - \frac{1}{2} g t^2,$$

where  $y_0$  is  $y$  – coordinate in the beginning (the height of the boy),  $v_y$  is starting speed (it could be calculated using formula

$$v_0 = v \sin 38^\circ = 87 \sin 38^\circ \approx 53.56).$$

We need to find the moment, when  $y(t) = 0$ , that is equivalent to

$$6 + 53.56t - 16.087t^2 = 0.$$

Equation has two roots:

$$t_1 \approx -0.108489, t_2 \approx 3.43789.$$

As we are looking for a positive root the answer is approximately 3.44s.

**Answer:** 3.44s.