Answer on Question 48797, Physics, Mechanics | Kinematics | Dynamics

Question:

A cliff diver must clear rocks that extend 15 meters out from the cliff's edge when diving from a cliff that is 40 meters above the water below.

a. How much time passes before the diver hits the water after jumping?

b. What minimum horizontal speed must the diver have in order to just

clear the rocks below?

Solution:

The time before the diver hits the water after jumping we can find from formula:

$$h = \frac{1}{2} g t^2,$$

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 40m}{9.8 \frac{m}{s^2}}} = 2.86s.$$

So, in this time $t = 2.86s$, a cliff diver travels horizontaly a distance of 15 meters.

Therefore, the minimum horizontal speed is:

$$v = \frac{\text{Distance}}{\text{Time}} = \frac{15m}{2.86s} = 5.25 \frac{m}{s}.$$

Answer:

a) $t = 2.86s.$

b) $v = 5.25 \frac{m}{s}.$