

Task. A train is moving at a constant speed on a surface inclined upward at 15.0° with the horizontal and travels $d = 300$ meters in $t = 5$ seconds. Calculate the horizontal velocity of the train at the end of 3 seconds.

Solution. The surface is inclined upward at 15.0° with the horizontal, therefore the horizontal velocity of the train at time t is equal to

$$v_{hor}(t) = v(t) \cos 15^\circ.$$

By assumption the speed of the train along surface is constant, and so it is equal to

$$v = \frac{d}{t} = \frac{300}{5} = 60 \text{ m/s}.$$

Hence

$$v_{hor} = v \cos 15^\circ = 60 * 0.96593 = 57.95554 \approx 58 \text{ m/s}$$

and it does not depend on t . Therefore at the end of 3 seconds, the horizontal velocity will be equal to 58 m/s .

Answer. 58 m/s .