Answer on Question#39659, Physics, Mechanics

Question:

A skier is gliding along at 2.0m/s on horizontal, frictionless snow. He suddenly starts down a 15° incline. His speed at the bottom is 12m/s .

Part A

What is the length of the incline?

Answer:

The law of conservation of energy:

$$\frac{mv^2}{2} + mgh = const$$

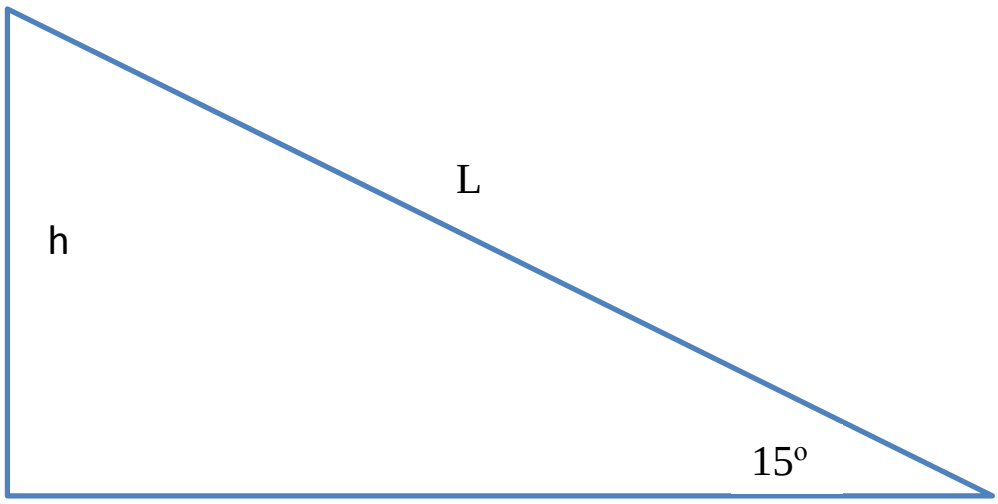
where h is height, v is speed.

$$\frac{mv_0^2}{2} + mgh = \frac{mv'^2}{2}$$

where v_0 is initial speed, v' is speed at the bottom.

$$h = \frac{v'^2 - v_0^2}{2g}$$

Distance along incline equals:



$$L = \frac{h}{\sin 15^\circ} = \frac{v'^2 - v_0^2}{2g \sin 15^\circ} \cong 28\ m$$

Answer: $28\ m$