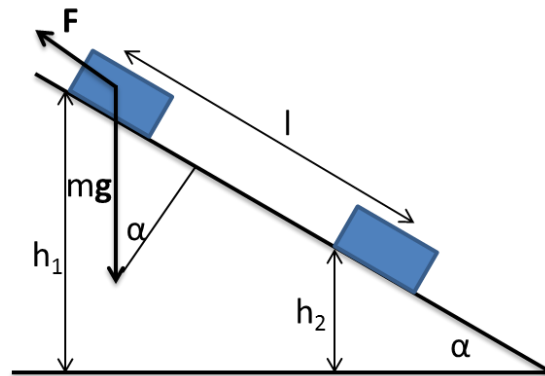


Answer on Question #43396 , Physics, Mechanics | Kinematics | Dynamics

A block is allowed to slide down a frictionless plane which is inclined at 42 degree with the horizontal. A force of 56.0 N is applied parallel and toward the top of the plane. If the block has a mass of 15.0 kg, what is the kinetic energy of the block when it has moved 2.50m down the plane?

Solution.



From the law of conservation of energy:

$$E_1 + A_{nc} = E_2$$

Where A_{nc} is a work of non-conservative forces. In our case this force is \mathbf{F} . So:

$$E_{pot1} + E_{K1} + (-F \cdot l) = E_{pot2} + E_{K2}$$

Work of force is \mathbf{F} have is negative because block is moving towards opposite direction related to vector \mathbf{F} . Initially block was at the state of rest. So:

$$mgh_1 + 0 - F \cdot l = mgh_2 + E_{K2}$$

$$E_{K2} = mg(h_1 - h_2) - F \cdot l = mgl \cdot \sin(\alpha) - F \cdot l = (mg \sin(\alpha) - F) \cdot l$$

Numerically:

$$E_{K2} = 15kg \cdot 9.8 \frac{m}{s^2} \cdot 2.5m \cdot \sin(42^\circ) - 56N \cdot 2.5m \approx 106 J$$

Answer: 106 J