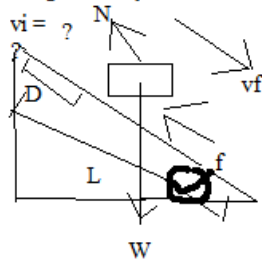


Diagram of system:



N = Normal force

L = Length of ramp

θ = angle

W = Weight of object

f = friction

D = Distance the object moved

v_f = velocity of object

v_i = initial velocity of object

Known:

$d = 2.61 \text{ m}$

$\theta = 20 \text{ degrees}$

$v_f = 0.13$

$\mu = 0.40$

Target: v_i

$L = 5 \text{ meters}$

$$\sum F_x: N - W_x = 0$$

$$\sum F_y: f - W_y = 0$$

Trig functions:

$$\cos \theta = W_x / W$$

$$\sin \theta = W_y / W$$

Other formulas:

$$F = (\mu)(N)$$

$$W = mg$$

Kinetic energy = Work = Force times distance

Energy outputs: f , W

Conservation of Energy:

$$E_{\text{final}} - E_{\text{initial}} = E_{\text{output}} - E_{\text{input}}$$

Unknowns:

W_x , W_y , V_i , N , W , M (mass)

Find N:

$$N - W_x = 0$$

Find W_x :

$$\sin \theta = W_x / W$$

Find W:

$$\cos \theta = W_y / W$$

Find W_y :

$$f - W_y = 0$$

Solve each equation:

Solve for W_y :

$$W \cos \theta = W_y$$

Solve for f:

$$F = W \cos \theta$$

Find N:

$$W \cos \theta / \sin \theta = N$$

Find W_x :

$$W_x = W \sin \theta$$

Find W:

$$W = mg$$

How do you find m?

Possible to get formula through work equation?

Force x distance? Force x length? Both?