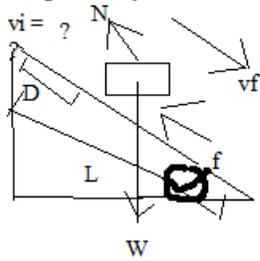


Diagram of system:



N = Normal force

L = Length of ramp

theta = angle

W = Weight of object

f = friction

D = Distance the object moved

vf = velocity of object

vi = initial velocity of object

Known:

d = 2.61 m

theta = 20 degrees

vf = 0.13

u = 0.40

Target: vi

L = 5 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:

$$F = (u)(N)$$

$$W = mg$$

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  $W_x$ :

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

Find W:

$$W = mg$$

How do you find m?

Possible to get formula through work equation?

Force x distance? Force x length? Both?