Answer on Question #72942-Physics-Mechanics-Relativity

A steel safe with a mass 800 kg is to be loaded onto a truck 1.00 m above the ground by sliding it up a plank 3.00 m long. If it tales 100 newtons to overcome friction, what total force is necessary to push the safe up the plank?

Solution

From the conservation of energy:

$$fl + mgh = W_{fr}.$$

W_{fr} is work against friction.

To push the safe up the plank we need:

$$Fl = W_{fr} + mgh.$$

$$(F - f)l = 2mgh.$$

$$F = f + \frac{2mgh}{l}$$

$$F = 100 + \frac{2(800)(9.8)(1)}{3} = 5330\ N = 5.33\ kN.$$

Answer: $5.33\ kN$.