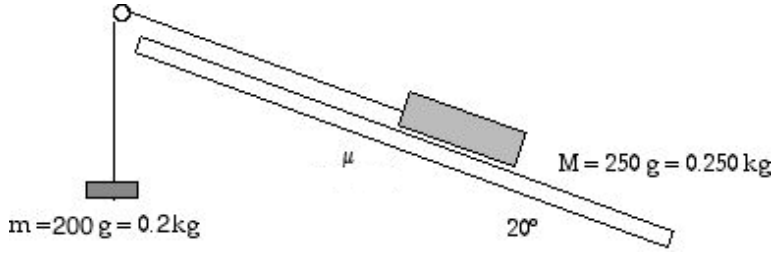
Answer on Question#37510 - <Physics> - < Mechanics>

A 200g mass hangs over a pulley and is attached to a 250g block as shown in the diagram. the block is observed to accelerate to the right with magnitude a= 1.00m/s^2.(you may ignor the mass of string, the pulley, and any friction in the pulley.)

A) Draw free body diagrams for the lock and the mass.
B) find the coefficient of kinetic friction between the block and the table.

Solution:



$a = 1\frac{m}{s^2}$ – acceleration of the block;
$m = 200g = 0.2\ kg$ – that mass that hangs over a pulley;
$M = 250g = 0.25kg$ – mass of the block;
μ – coefficient of kinetic friction between the block and the table
The second Newton's law along the Y – axis:
$y: n - Mg\cos 20° = 0$

$$n = Mg\cos 20° = 0.25kg \cdot 9.8\frac{N}{kg} \cdot \cos 20° = 2.3N$$

The second Newton'sl aw along the X – axis:
$T - F_{frict} - Mg\sin 20° = Ma$
$T = mg;\ F_{frict} = n \cdot \mu \Longrightarrow$
$mg - n\mu - Mg\sin 20° = Ma$

$$\mu = \frac{mg - M(g\sin 20° - a)}{n} = \frac{0.2kg \cdot 9.8\frac{N}{kg} - 0.25kg \cdot \left(9.8\frac{N}{kg} \cdot \sin 20° - 1\frac{N}{kg}\right)}{2.3N}$$
$$= 0.6$$

Answer: the coefficient of kinetic friction between the block and the table is equal to 0.6.