

Answer on Question 58970, Physics, Mechanics | Relativity

Question:

The mass of 43.3 kg , is pulled along the ground. The static friction coefficient is $\mu_s = 0.35$ and the sliding friction coefficient $\mu_k = 0.16$.

- a) What does the table weigh?
- b) What force will be needed to start the table moving?
- c) What force is needed to keep the table moving at a constant velocity?

Solution:

- a) The mass and weight are related by the formula:

$$W = mg,$$

here, W is the weight of the table, m is the mass of the table and g is the acceleration due to gravity.

Then, from this formula we can find the weight of the table:

$$W = mg = 43.3\text{ kg} \cdot 9.8 \frac{\text{m}}{\text{s}^2} = 424.34\text{ N}.$$

- b) We can find the horizontal pulling force needed to start the table moving:

$$F_{\text{appl}} = \mu_s N = \mu_s mg = 0.35 \cdot 43.3\text{ kg} \cdot 9.8 \frac{\text{m}}{\text{s}^2} = 148.52\text{ N}.$$

- c) The horizontal pulling force needed to keep the table moving at a constant velocity:

$$F_{\text{appl}} = F_k = \mu_k N = \mu_k mg = 0.16 \cdot 43.3\text{ kg} \cdot 9.8 \frac{\text{m}}{\text{s}^2} = 67.9\text{ N}.$$

Answer:

- a) $W = 424.34\text{ N}$.
- b) $F_s = 148.52\text{ N}$.
- c) $F_k = 67.9\text{ N}$.