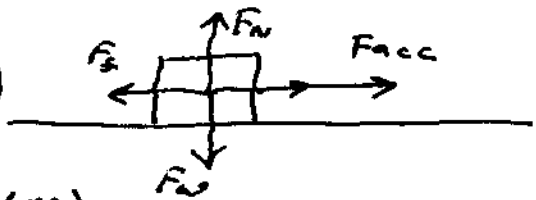


20080207_0201

A force of 122.7 N causes an object to accelerate at 1.000 m/s^2 on a flat horizontal surface on Earth. The coefficient of friction is .2000. Determine the object's mass.

$$\begin{aligned} F_w &= mg = (9.800 \text{ m})(\frac{\text{m}}{\text{s}^2}) \\ F_N &= F_w = (9.800 \text{ m})(\frac{\text{m}}{\text{s}^2}) \\ F_{\text{acc}} &= ma = (1.000 \text{ m})(\frac{\text{m}}{\text{s}^2}) \\ F_f &= \mu F_N = (.2000)(9.800 \text{ m})(\frac{\text{m}}{\text{s}^2}) = (1.960 \text{ m})(\frac{\text{m}}{\text{s}^2}) \end{aligned}$$


Applied force must overcome friction + acc.

$$F_{\text{Applied}} = F_f + F_a = (1.960 \text{ m})(\frac{\text{m}}{\text{s}^2}) + (1.000 \text{ m})(\frac{\text{m}}{\text{s}^2})$$

$$F_{\text{Applied}} = (2.960 \text{ m})(\frac{\text{m}}{\text{s}^2})$$

$$122.7 \text{ N} = (2.960 \text{ m})(\frac{\text{m}}{\text{s}^2})$$

$$122.7 \text{ kg}(\frac{\text{m}}{\text{s}^2}) = (2.960 \text{ m})(\frac{\text{m}}{\text{s}^2})$$

$$122.7 \text{ kg} = 2.960 \text{ m}$$

$$\therefore m = \frac{122.7 \text{ kg}}{2.960} = 41.45 \text{ kg}$$

$$\text{check } F_{\text{acc}} = ma = (41.45 \text{ kg})(1.000 \frac{\text{m}}{\text{s}^2}) = 41.45 \text{ N}$$

$$F_f = \mu F_N = \mu mg = (.2)(41.45 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2}) = 81.24 \text{ N}$$

$$F_{\text{Applied}} = F_f + F_a = 41.45 \text{ N} + 81.24 \text{ N} = 122.69 \text{ N}$$

Round to 4 places to get 122.7 N

which is what we had to start with