

Question#5017

a 3kg box slides down a 30.0 degree ramp with an acceleration of 1.4 m/sec2. Determine the coefficient of kinetic friction between the box and the ramp.

Solution:

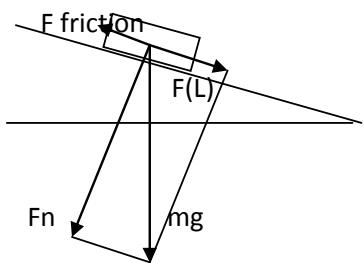
Let:

$$m = 3\text{kg}$$

$$\alpha = 30^\circ$$

$$a = 1.4 \text{ m/sec}^2$$

$$n = ? \text{ coefficient of kinetic friction}$$



$$n = \frac{F(\text{friction})}{F(L)}; F(\text{friction}) = n * F(L)$$

$$F(L) = mg * \sin\alpha$$

$$a = \frac{F(L) - F(\text{friction})}{m} \text{ (Newton's second law)}$$

$$a = \frac{F(L) - n * F(L)}{m}$$

$$a = \frac{F(L) * (1 - n)}{m}$$

$$1 - n = \frac{am}{F(L)}$$

$$n = 1 - \frac{am}{mgsin\alpha}; n = 1 - \frac{a}{gsin\alpha}$$

$$n = 1 - \frac{1.4}{9.8 * 0.5} = 0.714$$

Answer: 0,714