

A box with a mass of 15 kg is pushed up an incline with an angle of 40 degrees, if the coefficient of kinetic friction is 0.35 what force must be applied parallel to the ramp to have the box move up at 2.3 m/s<sup>2</sup>?

Solution:

Let:

$$m = 15 \text{ kg}$$

$$\alpha = 40^\circ$$

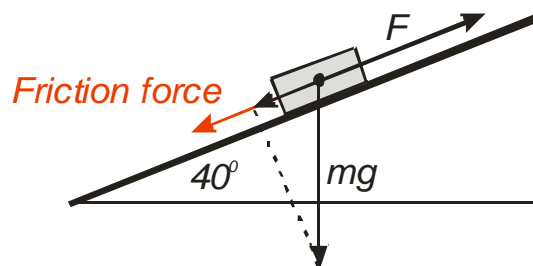
$$\mu_k = 0.35$$

$$a = 2.3 \text{ m/s}^2$$

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$$F = ?$$

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$$F = (ma - mg\cos\alpha) - \mu_k(ma - mg\cos\alpha)$$

$$F = m(a - g\cos\alpha)(1 - \mu_k)$$

$$F = 15(2.3 - 9.8\cos 40^\circ)(1 - 0.35) = 15(2.3 - 7.51)0.65 = -50.8 \text{ N}$$

**Answer: 50.8 N**