

Answer on Question #50427, Physics, Mechanics | Kinematics | Dynamics

A wood block with a mass of 4.0kg is sliding along a horizontal surface. The coefficient of kinetic friction is 0.60. It is being pulled with a force of 50N [30° above horizontal]

Solution:

The equation of motion is

$$F - F_{fr} = ma,$$

where force is $F = 50 \cdot \cos 30^\circ = 43.3 \text{ N}$,

force of friction is $F_{fr} = \mu N$ ($N = mg$, μ is the coefficient of kinetic friction),

$$F_{fr} = 0.60 * 4.0 * 9.8 = 23.52$$

Thus, the acceleration is a

$$a = \frac{F - F_{fr}}{m} = \frac{43.3 - 23.52}{4} = 4.95 \text{ m/s}^2$$

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