Answer on Question #51065 – Physics – Mechanics, Kinematics, Dynamics

Question: a 20 kg block on an inclined plane is pulled up the plane with rope tied to the block. The rope is at angle of 37 degrees above the surface of the plane. The tension in the rope is 250 N and the frictional force on the block is 8.0 N.What is theacceleration of the block?

Solution: let us use the Newton's second law. The block is moving in the direction along the inclined plane. The projections of forces along this directions are

$$ma = T - mg \sin \theta - f$$

Here a is acceleration of the block, m is its mass, θ is the angle of inclined plane, T is the tension in the rope and f is the frictional force.

So we have

$$a = \frac{T - f}{m} - g \sin \theta = \frac{250 - 8}{20} - 9.81 \cdot \sin 37° = 6.196 \, \frac{m}{s^2} \approx 6.2 \, \frac{m}{s^2}$$

Answer:

$$a = 6.2 \, \frac{m}{s^2}$$