Answer on Question #41293, Physics, Mechanics

Question:

For a 60 kg mass, if the frictional force is 40 N, the magnitude of the applied force required to accelerate the object at 4.0 m/s2 is ___x102 N.

Answer:

Newton's second law of motion:

The acceleration of a body is directly proportional to, and in the same direction as, the net force acting on the body, and inversely proportional to its mass. Thus,

$$F_{net} = ma$$

where F is the net force acting on the object, m is the mass of the object and a is the acceleration of the object.

$$F_{net} = F - F_{fr}$$

where F is the applied force, F_{fr} is the frictional force.

Therefore:

$$F = ma - F_{fr} = 60 \cdot 4 - 40 = 200\ N = 2 \cdot 10^2\ N$$

Answer: $\mathbf{2} \cdot 10^2\ N$