

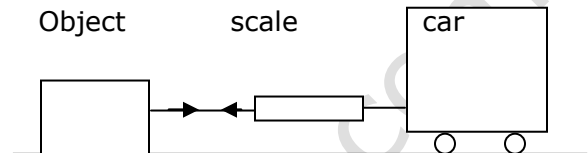
Q- An object of mass 5.00kg, attached to a spring scale, rests on a frictionless, horizontal surface. The spring scale attached to the front end of a boxcar, has constant reading of 18.0N when the car is in motion.

(a) Determine the acceleration of the car.

(b) What constant reading will the spring scale show if the car moves with constant velocity?

(c) Describe the forces on the object as observed by someone in the car and by someone outside at rest outside the car.

As the surface is frictionless, the only force acting on the object is the tension of the string which is also on the spring and gives the same reading in the spring.



(a) if the reading of the scale is 18.0 N means the tension in the string and hence the force on the object is 18.0 N and thus the acceleration of the of the car and the object will be given by the equation

$$F = ma$$

Or $a = F/m = 18.0 / 5.00 = 3.60 \text{ m/s}^2$.

(b) If the car is moving with constant velocity means that the acceleration in the car and the object is zero hence the reading of the spring or tension in the siring will be

$$F = m*a = 5.00*0 = 0$$

(c)When the reading in the spring is 18.0 N (the car moving right) the person in the car will see that the object is having no acceleration relative to him but still the scale is reading 18.0 N means a force of 18.0 N is acting on the object to the left which stretches the spring to read 18.0N. (such forces are called pseudo forces)

On the other hand the person at rest outside the car will see that the object is accelerating to the right with an acceleration of 3.60 m/s^2 hence a force acting on it is

$$F = ma = 5.00*3.60 = 18.0 \text{ N}$$