

**Answer on** Question #65500, Physics / Mechanics | Relativity

A pendulum bob of mass 50 g is suspended on a string from the ceiling of an elevator which is moving downwards with an acceleration  $1.5 \text{ ms}^{-2}$ . Draw the free body diagram using the non-inertial frame of reference and determine the tension in the string. (Take  $g = 10 \text{ ms}^{-2}$ )

**Find:**  $T - ?$

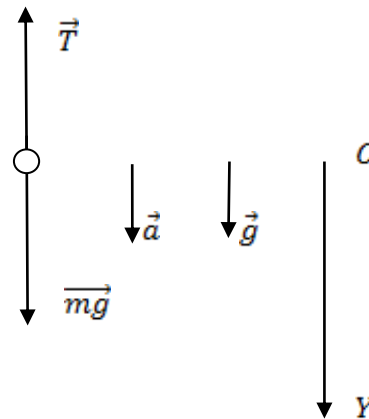
**Given:**

$$m=50 \times 10^{-3} \text{ kg}$$

$$a=1.5 \text{ m/s}^2$$

$$g=10 \text{ m/s}^2$$

**Solution:**



Newton's Second Law:

$$\vec{F} = m\vec{a} \quad (1)$$

$$\text{Of (1)} \Rightarrow m\vec{g} + \vec{T} = m\vec{a} \quad (2),$$

where  $m\vec{g}$  is gravity force,  $\vec{T}$  is tension force

$$\text{Projections on axis OY: } mg - T = ma \quad (3)$$

$$\text{Of (3)} \Rightarrow T = m(g - a) \quad (4)$$

$$\text{Of (4)} \Rightarrow T=0.425 \text{ N}$$

**Answer:**

$$0.425 \text{ N}$$