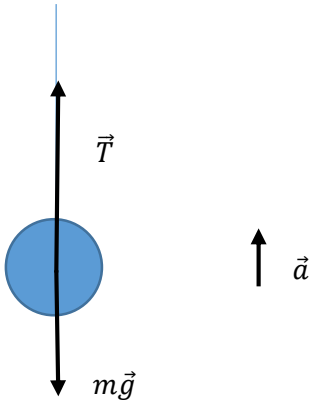
Answer on Question #65597 – Physics – Mechanics – Relativity

Question:

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 ms−2. Draw the free body diagram using the non-inertial frame of reference and determine the tension in the string. (Take g = 10 ms−2)

Solution:



By Newton's second law:

$\vec{F} = m\vec{a}$;

At the same time:

$\vec{F} = \vec{T} + m\vec{g}$;

So, we have:

$m\vec{a} = \vec{T} + m\vec{g}$;

Or, in scalar form:

$ma = T - mg \Rightarrow T = mg + ma = m(g + a) = 0.05 \cdot (10 + 1.5) = 0.575\ N$;

Answer:

$T = 0.575\ N$.