

### Answer on Question #41194 – Physics – Mechanics | Kinematics | Dynamics

A body hangs from a spring balance supported from the roof of an elevator. If the elevator has an upward acceleration of  $3\text{ms}^{-2}$  and the balance reads  $50\text{ N}$ , what is the true weight of the body?

#### Solution:

According to the Second Newton's law:

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

For vertical axis taking up as positive direction:

$$F = T - F_{gravity}$$

We are given:

$$T = 50\text{ N}$$

Force of gravity:

$$F_{gravity} = m \cdot g$$

Thus:

$$T - F_{gravity} = m \cdot a$$

$$T - m \cdot g = m \cdot a$$

For inertial system

$$W = F_{gravity} = m \cdot g$$

So:

$$m = \frac{T}{a + g}$$

$$W = \frac{gT}{a + g}$$

Calculating:

$$W = \frac{9.8 \cdot 50}{3 + 9.8} \approx \mathbf{38.3\text{ N}}$$

Answer: **38.3 N**