

Answer on Question #42191 – Physics - Mechanics | Kinematics | Dynamics

13. A person performs the following experiment to measure the acceleration of an elevator. He takes a weighing machine, keeps it on the floor of an elevator. He records his mass as 50 kg when the elevator is at rest. He continues to stand on the machine and then starts the elevator, which begins to move down. He records his mass to be 48 kg during the downward acceleration of the elevator. From this observation, calculate the acceleration of the elevator

Solution:

$M = 50\text{ kg}$ – mass of the person;

$m = 48\text{ kg}$ – mass of the person in the elevator;

Second Newton's law for the person in the elevator along Y-axis ($N = mg$ – reacting force):

$$Mg - N = Ma$$

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$$a = g \frac{M - m}{M} = 9.8 \frac{\text{m}}{\text{s}^2} \cdot \frac{50\text{ kg} - 48\text{ kg}}{50\text{ kg}} = 0.4 \frac{\text{m}}{\text{s}^2}$$

Answer: acceleration of the elevator is equal to $0.4 \frac{\text{m}}{\text{s}^2}$