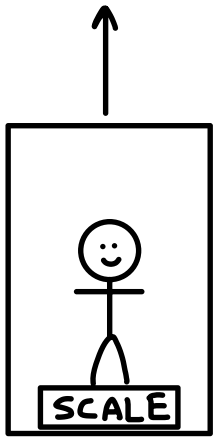
Elevator Problems



- A scale reads the normal force
- The normal force is equal to your apparent weight

A 70 kg person is standing on a scale in an elevator.

a) What will the scale read if he is at rest?

b) The elevator accelerates upwards at 0.70 m/s^2. What will a scale read?

c) After reaching a speed of 1.0 m/s. The elevator travels at a constant velocity for 12 s. What is his apparent weight during this time?

d) After moving upwards at 1.0 m/s for 12 s, the elevator slows down to a stop over 2.5 s. What is his apparent weight?

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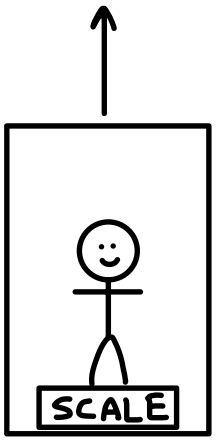

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a)

$F_{net} = ma$ (a = 0)

$F_N - F_g = 0$

$F_N = F_g$

$= mg$

$= (70)(9.8)$

$= \boxed{686\ N}$

b)

$F_{NET} = ma$

$F_N - F_g = ma$

$F_N - mg = ma$

$F_N = ma + mg$

$= m(a+g)$

$= 70(0.7 + 9.8)$

$= \boxed{735\ N}$

c)

CONSTANT VELOCITY

$\rightarrow a = 0,\ F_{NET} = 0$

$F_N = \boxed{686\ N}$ (SAME AS PART a)

d)

$v_i = +1.0\ \frac{m}{s}$

$v_f = 0$

$t = 2.5\ s$

$a = ?$

$v_f = v_i + at$ ($v_f = 0$)

DOWN

$a = \frac{-v_i}{t} = \frac{-(1.0)}{2.5} = -0.40\ \frac{m}{s^2}$

$F_{NET} = ma$

$F_N - F_g = ma$

$F_N - mg = ma$

$F_N = ma + mg$

$= m(a+g)$

$= 70(-0.4 + 9.8)$

$= \boxed{658\ N}$