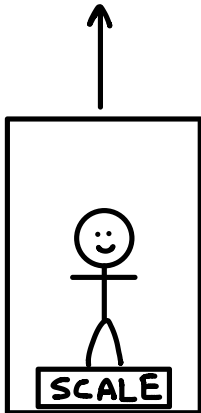


Elevator Problems

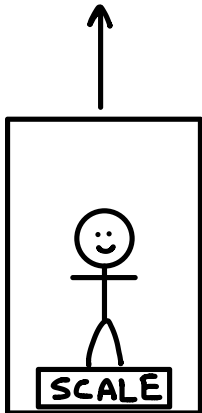


- ▶ A scale reads the normal force
- ▶ The normal force is equal to your apparent weight

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

- What will the scale read if he is at rest?
- The elevator accelerates upwards at 0.70 m/s^2 . What will a scale read?
- 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?
- 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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a)

$$F_{net} = ma$$
$$F_N - F_g = 0$$
$$F_N = F_g$$
$$= mg$$
$$= (70)(9.8)$$
$$= \boxed{686 \text{ N}}$$

b)



$$\begin{aligned}
 F_{\text{net}} &= ma \\
 F_N - F_g &= ma \\
 F_N - mg &= ma \\
 F_N &= ma + mg \\
 &= m(a + g) \\
 &= 70(0.7 + 9.8) \\
 &= \boxed{735 \text{ N}}
 \end{aligned}$$

c)



CONSTANT VELOCITY
 $\rightarrow a = 0, F_{\text{net}} = 0$

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

d)



$$\begin{aligned}
 v_i &= +1.0 \frac{\text{m}}{\text{s}} \\
 v_f &= 0 \\
 t &= 2.5 \text{ s} \\
 a &= ?
 \end{aligned}$$

$$\begin{aligned}
 v_f &= v_i + at \\
 a &= \frac{-v_i}{t} = \frac{-(1.0)}{2.5} = \textcircled{-0.40} \frac{\text{m}}{\text{s}^2}
 \end{aligned}$$

DOWN



$$\begin{aligned}
 F_{\text{net}} &= ma \\
 F_N - F_g &= ma \\
 F_N - mg &= ma \\
 F_N &= ma + mg \\
 &= m(a + g) \\
 &= 70(-0.4 + 9.8) \\
 &= \boxed{658 \text{ N}}
 \end{aligned}$$