

Name: \_\_\_\_\_

Forces & Elevators Problems

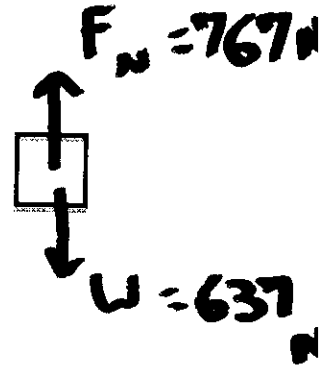


1) A 65-kg man stands on a bathroom scale in an elevator. The scale reads 767 N.

(a) Determine the net force acting on the man (including direction).

$$W = mg = (65 \text{ kg})(9.8 \text{ m/kg}) = 637 \text{ N}$$

$$\Sigma \vec{F} = \vec{F}_N + \vec{W} = \boxed{130 \text{ N UP}}$$



(b) Determine the acceleration the man experiences (including direction).

$$\vec{a} = \frac{\Sigma \vec{F}}{m} = \boxed{2 \text{ m/s}^2 \text{ UP}}$$

(c) Give two possible scenarios for the motion of the man and elevator that could be happening.

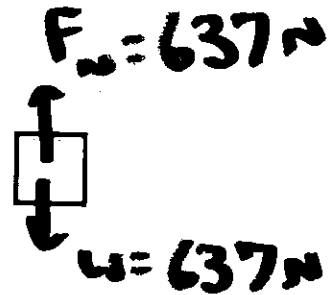
Moving Up + Speeding Up

Moving Down + Slowing Down

2) A 65-kg man stands on a bathroom scale in an elevator. The scale reads 637 N.

(a) Determine the net force acting on the man (including direction).

$$\Sigma \vec{F} = \emptyset \text{ N}$$



(b) Determine the acceleration the man experiences (including direction).

$$\vec{a} = \emptyset \text{ m/s}^2$$

(c) Give two possible scenarios for the motion of the man and elevator that could be happening.

At Rest + Staying At Rest

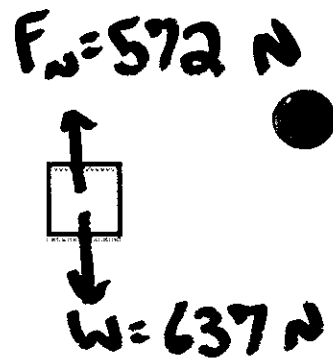
Moving At Constant Velocity

(UP OR DOWN)

3) A 65-kg man stands on a bathroom scale in an elevator. The scale reads 572 N.

(a) Determine the net force acting on the man (including direction).

$$\Sigma \vec{F} = 65 \text{ N DOWN}$$



(b) Determine the acceleration the man experiences (including direction).

$$\vec{a} = 1 \text{ m/s}^2 \text{ DOWN}$$

(c) Give two possible scenarios for the motion of the man and elevator that could be happening.

MOVING UP + SLOWING DOWN

MOVING DOWN + SPEEDING UP

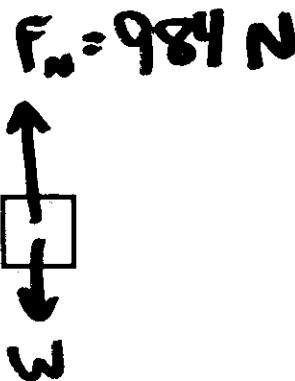
4) A person stands on a bathroom scale in an elevator that is accelerating at  $2.5 \text{ m/s}^2$  up. The scale reads 984 N.

(a) Determine the person's mass.

$$\Sigma \vec{F} = m\vec{a} = \vec{F}_N + \vec{W}$$

$$m(+2.5 \text{ m/s}^2) = (+984 \text{ N}) - m(9.8 \text{ m/s}^2)$$

$$\boxed{m = 80 \text{ kg}}$$



(b) What would the scale read if the person was accelerating at  $2.5 \text{ m/s}^2$  down?

$$\Sigma \vec{F} = m\vec{a} = 200 \text{ N DOWN}$$

$$W = mg = 784 \text{ N}$$

$$\boxed{F_N = 584 \text{ N}}$$

