

## Elevator Problems

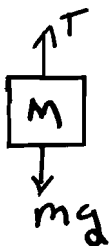
1. A 40 kg person sits in an elevator at rest. The elevator has a mass of 500 kg,

a) What is the tension in the elevator cable?

$$\underline{5292 \text{ N}}$$

b) If the person is standing on a scale that measures force, what will it read?

$$\underline{392 \text{ N}}$$



$$F_{NET} = ma$$

$$T - mg = 0$$

$$T = mg = (500 + 40)(9.8)$$

$$T = 5292 \text{ N}$$

$$F_N = mg$$

$$= 40(9.8)$$

$$= 392 \text{ N}$$

2. A 40 kg person sits in an elevator accelerating upward at  $2.0 \text{ m/s}^2$ . The elevator has a mass of 500 kg,

a) What is the tension in the elevator cable?

$$\underline{6372 \text{ N}}$$

b) If the person is standing on a scale that measures force, what will it read?

$$\underline{472 \text{ N}}$$



$$F_{NET} = ma$$

$$T - mg = ma$$

$$T = mg + ma$$

$$T = m(g + a)$$

$$T = 540(9.8 + 2)$$

$$T = 6372 \text{ N}$$

$$F_N = 40(9.8 + 2) = 472 \text{ N}$$

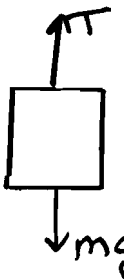
3. A 40 kg person sits in an elevator accelerating downward at  $1.3 \text{ m/s}^2$ . The elevator has a mass of 500 kg,

a) What is the tension in the elevator cable?

$$\underline{4590 \text{ N}}$$

b) If the person is standing on a scale that measures force, what will it read?

$$\underline{340 \text{ N}}$$



$$F_{NET} = ma$$

$$T - mg = ma$$

$$T = m(g + a)$$

$$T = 540(9.8 - 1.3)$$

$$T = 4590 \text{ N}$$

$$F_N = 40(9.8 - 1.3)$$

$$F_N = 340 \text{ N}$$

4. A 40 kg person sits in an elevator and the cable has broken. If the elevator has a mass of 500 kg,

a) What is the acceleration of the elevator and the person?

$$\underline{-9.8 \text{ m/s}^2}$$

$$A = g = -9.8 \text{ m/s}^2$$

b) If the person is standing on a scale that measures force, what will it read?

$$\underline{0}$$