

Mass and Weight

$$\begin{aligned} \text{① a) } \bar{F}_g &= mg \\ &= (50)(9.8) \\ \bar{F}_g &= \boxed{490 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{b) } m &= 100 \text{ g} = 0.1 \text{ kg} \\ \bar{F}_g &= mg \\ &= (0.1)(9.8) \\ \bar{F}_g &= \boxed{0.98 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{② a) } \bar{F}_g &= mg \\ &= (50)(1.6) \\ \bar{F}_g &= \boxed{80 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{b) } \bar{F}_g &= mg \\ &= (0.1)(1.6) \\ \bar{F}_g &= \boxed{0.16 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{③ a) } \bar{F}_g &= mg \\ &= (60)(3.72) \\ \bar{F}_g &= \boxed{223 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{b) } \bar{F}_g &= mg \\ &= (60)(10.5) \\ \bar{F}_g &= \boxed{630 \text{ N}} \end{aligned}$$

$$\begin{aligned} \text{c) } \bar{F}_g &= mg \\ &= (60)(0.31) \\ \bar{F}_g &= \boxed{18.6 \text{ N}} \end{aligned}$$

$$\textcircled{4} \quad \begin{aligned} \vec{F}_g &= mg \\ &= (100)(9.8) \end{aligned}$$

$$\vec{F}_g = 980 \text{ N}$$

$$\text{a) } \vec{F}_N = \vec{F}_g = \boxed{980 \text{ N}}$$

$$\begin{aligned} \text{b) } \quad \Sigma F &= \vec{F}_N - \vec{F}_g \\ (100)(0.3) &= \vec{F}_N - 980 \end{aligned}$$

$$\vec{F}_N = \boxed{1010 \text{ N}}$$

$$\begin{aligned} \text{c) } \quad \Sigma F &= \vec{F}_N - \vec{F}_g \\ (100)(-0.15) &= \vec{F}_N - 980 \end{aligned}$$

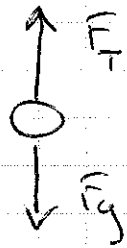
$$\vec{F}_N = \boxed{965 \text{ N}}$$

$$\text{d) } \vec{F}_N = \vec{F}_g = \boxed{980 \text{ N}}$$

$$\begin{aligned} \text{e) } \quad \Sigma F &= \vec{F}_N - \vec{F}_g \\ (100)(-9.8) &= \vec{F}_N - 980 \end{aligned}$$

$$\vec{F}_N = \boxed{0}$$

$$\textcircled{a} \quad \begin{aligned} \vec{F}_g &= mg \\ &= (2000)(9.8) \\ \vec{F}_g &= 19600 \text{ N} \end{aligned}$$



$$\Sigma \vec{F} = \vec{F}_T - \vec{F}_g$$

$$a) \quad \vec{F}_T = \vec{F}_g = \boxed{19600 \text{ N}}$$

$$b) \quad \vec{F}_T = \vec{F}_g = \boxed{19600 \text{ N}}$$

$$c) \quad \vec{F}_T = \vec{F}_g = \boxed{19600 \text{ N}}$$

$$d) \quad \begin{aligned} \Sigma \vec{F} &= \vec{F}_T - \vec{F}_g \\ (2000)(1) &= \vec{F}_T - 19600 \\ \vec{F}_T &= \boxed{21600 \text{ N}} \end{aligned}$$

$$e) \quad \begin{aligned} \Sigma \vec{F} &= \vec{F}_T - \vec{F}_g \\ (2000)(-1) &= \vec{F}_T - 19600 \\ \vec{F}_T &= \boxed{17600 \text{ N}} \end{aligned}$$

$$\textcircled{b} \quad a) \quad \begin{aligned} \vec{F}_g &= 98 \text{ N} \\ \Sigma \vec{F} &= \vec{F}_T - \vec{F}_g \\ &= 93 - 98 \\ \Sigma \vec{F} &= -5 \text{ N} \end{aligned}$$

$$\vec{F}_T = 93 \text{ N}$$

$$\begin{aligned} m &= \frac{\vec{F}_g}{g} \\ &= \frac{98}{9.8} = 10 \text{ kg} \end{aligned}$$

$$\begin{aligned} ma &= -5 \\ 10a &= -5 \end{aligned}$$

$$a = \boxed{-0.5 \text{ m/s}^2}$$

b) down

⑦ Not good physics. Since the people fall at the same rate as the elevator, they should float, not be pressed against the roof.

⑧ $m = 0.1 \text{ g} = 0.0001 \text{ kg}$

$$\Sigma F = F_T - F_g$$

$$(0.0001)a = 0.00056 - (0.0001)(9.8)$$

$$a = \boxed{-4.2 \text{ m/s}^2}$$

⑨ a) $\Sigma F = F_T - F_g$

$$ma = F_T - mg$$

$$m(1.2) = 200 - m(9.8)$$

$$m(1.2) + m(9.8) = 200$$

$$m(1.2 + 9.8) = 200$$

$$m = 18.2 \text{ kg}$$

$$F_g = mg$$

$$= (18.2)(9.8)$$

$$F_g = \boxed{178 \text{ N}}$$

b) $\Sigma F = F_T - F_g$

$$18.2a = 150 - 178$$

$$a = \boxed{-1.55 \text{ m/s}^2}$$

c) $\Sigma F = F_T - F_g$

$$(18.2)(-9.8) = F_T - 178$$

$$F_T = \boxed{0}$$