Mass and Weight

① a) $F_g = mg$

$= (50)(9.8)$

$F_g = \boxed{490\ N}$

b) $m = 100\ g = 0.1\ kg$

$F_g = mg$

$= (0.1)(9.8)$

$F_g = \boxed{0.98\ N}$

② a) $F_g = mg$

$= (50)(1.6)$

$F_g = \boxed{80\ N}$

b) $F_g = mg$

$= (0.1)(1.6)$

$F_g = \boxed{0.16\ N}$

③ a) $F_g = mg$

$= (60)(3.72)$

$F_g = \boxed{223\ N}$

b) $F_g = mg$

$= (60)(10.5)$

$F_g = \boxed{630\ N}$

c) $F_g = mg$

$= (60)(0.31)$

$F_g = \boxed{18.6\ N}$

④ $F_g = mg$

$= (100)(9.8)$

$F_g = 980\ N$

a) $F_N = F_g = \boxed{980\ N}$

b) $\Sigma F = F_N - F_g$

$(100)(0.3) = F_N - 980$

$F_N = \boxed{1010\ N}$

c) $\Sigma F = F_N - F_g$

$(100)(-0.15) = F_N - 980$

$F_N = \boxed{965\ N}$

d) $F_N = F_g = \boxed{980\ N}$

e) $\Sigma F = F_N - F_g$

$(100)(-9.8) = F_N - 980$

$F_N = \boxed{0}$

⑤ $F_g = mg$

$= (2000)(9.8)$

$F_g = 19600\ N$

$\Sigma F = F_T - F_g$

a) $F_T = F_g = \boxed{19600\ N}$

b) $F_T = F_g = \boxed{19600\ N}$

c) $F_T = F_g = \boxed{19600\ N}$

d) $\Sigma F = F_T - F_g$

$(2000)(1) = F_T - 19600$

$F_T = \boxed{21600\ N}$

e) $\Sigma F = F_T - F_g$

$(2000)(-1) = F_T - 19600$

$F_T = \boxed{17600\ N}$

⑥ a) $F_g = 98\ N$

$\Sigma F = F_T - F_g$

$= 93 - 98$

$\Sigma F = -5\ N$

$ma = -5$

$10a = -5$

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

b) down

$F_T = 93\ N$

$m = \frac{F_g}{g}$

$= \frac{98}{9.8} = 10\ kg$

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 $m = 0.1\,g = 0.0001\ kg$

$\Sigma F = F_T - F_g$

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

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

⑨ a) $\Sigma F = F_T - F_g$

$ma = F_T - mg$

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

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

$m(1.2 + 9.8) = 200$

$m = 18.2\ kg$

$F_g = mg$

$= (18.2)(9.8)$

$F_g = \boxed{178\ N}$

b) $\Sigma F = F_T - F_g$

$18.2\,a = 150 - 178$

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

c) $\Sigma F = F_T - F_g$

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

$F_T = \boxed{0}$