Review

11. a) constant velocity: $v = \frac{\Delta d}{\Delta t}$

$\Delta d = v\Delta t$

"thinking" distance → $\Delta d = (25 m/s)(0.80 s)$

$\boxed{\Delta d = 20 m}$

b) $a = -9.3 m/s^2$

$v_1 = 25 m/s$

$v_2 = 0$

$\Delta d = ?$

$v_2^2 = v_1^2 + 2a\Delta d$

$v_2^2 - v_1^2 = 2a\Delta d$

$\Delta d = \frac{v_2^2 - v_1^2}{2a}$

$\Delta d = \frac{0 - (25 m/s)^2}{2(-9.3 m/s^2)}$

braking distance → $\boxed{\Delta d = 34 m}$

total stopping distance = $20 m + 34 m = \underline{\underline{54 m}}$

19. $v_1 = 0$, $\Delta d = 18\,m$, $\Delta t = 3.0\,s$ } $a = ?$

$F_g(\text{earth}) = 710\,N$

$F_g(\text{planet}) = ?$

$F_g = mg$

$\Delta d = \cancel{v_1 \Delta t}^{0} + \frac{1}{2} a (\Delta t)^2$

$\Delta d = \frac{1}{2} a (\Delta t)^2$

$\frac{2\Delta d}{(\Delta t)^2} = a$

$a = \frac{2(18\,m)}{(3.0\,s)^2} = 4.0\,m/s^2$

Earth: $F_g = mg$

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

$m = \frac{710\,N}{9.81\,m/s^2}$

$m \doteq 72.4\,kg$

Planet: $F_g = mg$

$F_g = (72.4\,kg)(4.0\,m/s^2)$

$\boxed{F_g \doteq 2.9 \times 10^2\,N}$

18. m_1: $F_{net} = m_1 a$

$m_1 = \frac{F_{net}}{a}$

$m_1 = \frac{8.0\,N}{2.0\,m/s^2}$

$\frac{kg \cdot m/s^2}{m/s^2}$

$m_1 = 4.0\,kg$

m_2: $F_{net} = m_2 a$

$m_2 = \frac{F_{net}}{a}$

$m_2 = \frac{8.0\,N}{4.0\,m/s^2}$

$m_2 = 2.0\,kg$

Combined $(m_1 + m_2)$ $F_{net} = ma$

$a = \frac{F_{net}}{m}$

$a = \frac{8.0\,N}{6.0\,kg}$

$a = 1.3\,m/s^2$