$(3.0 \text{ m/s})^2 = 2(0.73 \text{ m/s}^2)\, d$

$d = 6.1 \text{ m east}$

b) $a = \dfrac{v_f - v_0}{t}$

$0.73 \text{ m/s}^2 = \dfrac{3.0 \text{ m/s} - 0}{t}$

$t = 4.1 \text{ s}$

Lesson 2–Newton's Third Law of Motion

1. $F_1 = -F_2$

$m_A a_A = -m_B a_B$

$(38 \text{ kg})(0.60 \text{ m/s}^2) = -m_B (-0.75 \text{ m/s}^2)$

$m_B = 3.0 \times 10^1 \text{ kg}$

2. $F = ma$

$a = \dfrac{F}{m}$

$= \dfrac{125 \text{ N}}{50.0 \text{ kg}}$

$= 2.50 \text{ m/s}^2$

$a = \dfrac{v_f - v_0}{t}$

$2.50 \text{ m/s}^2 = \dfrac{v_f - 0}{0.110 \text{ s}}$

$v_f = 0.275 \text{ m/s west}$

3. $a = \dfrac{v_f - v_0}{t}$

$= \dfrac{22 \text{ m/s} - 11 \text{ m/s}}{0.75 \text{ s}}$

$= 14.7 \text{ m/s}^2$

$F = ma$

$= (9.8 \times 10^3 \text{ kg})(14.7 \text{ m/s}^2)$

$= 1.4 \times 10^5 \text{ N east}$

4. $v_f^2 = v_0^2 + 2ax$

$(9.6 \text{ m/s})^2 = 2(a)(0.60 \text{ m})$

$a = 76.8 \text{ m/s}^2$

$F = ma$

$= (3.0 \text{ kg})(76.8 \text{ m/s}^2)$

$= 230.4 \text{ N}$

$a = \dfrac{v_f - v_0}{t}$

$76.8 \text{ m/s}^2 = \dfrac{9.6 \text{ m/s} - 0}{t}$

$t = 0.125 \text{ s}$

Student

$F = ma$

$a = \dfrac{F}{m}$

$= \dfrac{230.4 \text{ N}}{45 \text{ kg}}$

$= 5.12 \text{ m/s}^2$

$a = \dfrac{v_f - v_0}{t}$

$5.12 \text{ m/s}^2 = \dfrac{v_f - 0}{0.125 \text{ s}}$

$v_f = 0.64 \text{ m/s left}$

Lesson 3–Newton's Law of Universal Gravitation

1. $F_g = \dfrac{Gm_1m_2}{r^2}$

$= \dfrac{\left(6.67 \times 10^{-11} \dfrac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(70.0 \text{ kg})(52.0 \text{ kg})}{(1.50 \text{ m})^2}$

$= 1.08 \times 10^{-7} \text{ N}$

2. $F_g = \dfrac{Gm_1m_2}{r^2}$

$= \dfrac{\left(6.67 \times 10^{-11} \dfrac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(5.98 \times 10^{24} \text{ kg})}{(7.34 \times 10^{22} \text{ kg})}$

$= \dfrac{}{(3.88 \times 10^8 \text{ m})^2}$

$= 1.94 \times 10^{20} \text{ N}$

3. $F_g = \dfrac{Gm_1m_2}{r^2}$

$m^2 = \dfrac{F_g r^2}{G}$

