

Form A: 2. C 3. A 4. B 5. D 6. C

Form B: 2. A 3. B 4. D 5. C 6. C

Form C: 2. B 3. D 4. C 5. A 6. C

Form D: 2. D 3. C 4. A 5. B 6. C

Form E: 2. D 3. C 4. A 5. B 6. C

$$7. m_1 = 2.00 \text{ kg} \quad Y_{01} = 0 \quad v_{01} = 0 \quad m_2 = 4.00 \text{ kg} \quad Y_{02} = 1.00 \text{ m} \quad v_{02} = 0$$

$$KE_{01} + KE_{02} + PE_{g01} + PE_{g02} = KE_1 + KE_2 + PE_{g1} + PE_{g2}$$

$$0 + 0 + 0 + m_2 g Y_{02} = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 + m_1 g Y_{02} + 0$$

$$(m_2 - m_1) g Y_{02} = \frac{1}{2} v^2 (m_1 + m_2) \quad v = \left(\frac{2(m_2 - m_1) g Y_{02}}{(m_1 + m_2)} \right)^{1/2}$$

$$v = \left(\frac{2(4-2)(9.8)(1)}{(4+2)} \right)^{1/2} = 2.56 \text{ m/sec}$$

$$8. \vec{p}_x(\text{total})(\text{before}) = 0 \quad (\text{due to symmetry})$$

$$(a) \vec{p}_y(\text{total})(\text{before}) = \vec{p}_{wy} + \vec{p}_{1y} + \vec{p}_{2y} = \vec{p}_{wy} + 2\vec{p}_y$$

$$= -m_w v_w + 2(mv \sin \theta)$$

$$= -(95)(3.2) + 2(110)(1.7)(\sin 60^\circ) = -304 + 323.9$$

$$= 19.9 \text{ kg} \cdot \text{m/sec}$$

$$(b) \text{ Direction is north because } \vec{p}_y(\text{total})(\text{before}) > 0$$

$$(m_w + m_1 + m_2) v = p \quad v = \frac{p}{m_w + 2m} = \frac{19.9}{95 + 2(110)}$$

$$v = 6.32 \text{ cm/sec}$$

$$9. \quad F_g = F_c \quad \frac{GM_1 M_2}{R^2} = \frac{mv^2}{R} \quad v = \sqrt{\frac{GM}{R}}$$

$$R = R_e + h = 2R_e$$

$$v = \sqrt{\frac{GM}{2R_e}} = \left(\frac{(6.67 \times 10^{-11})(5.98 \times 10^{24})}{2(6.38 \times 10^6)} \right)^{1/2}$$

$$v = 5.59 \times 10^3 \text{ m/sec} = 5.59 \text{ km/sec}$$