

Energy #7

p177 MC 4
p182 Prob 61
p121 MC 11
p225 Prob 47

⑦

(6)

p177 - Multiple Choice

4) wagon full of medicine balls rolls, one falls off back
what happens to speed?

$$P_i = P_f$$
$$6mv = mv_1 + 5mv_2$$

(1)

speed of wagon doesn't change \rightarrow
no external force

p182 - Problems

61) $m_1 = 60 \text{ kg}$
 $v_1 = 8.0 \text{ m/s East}$

ice skaters collide + hang on

$m_2 = 80 \text{ kg}$
 $v_2 = 9.0 \text{ m/s N}$

① horizontal:

$$P_{ex} = P_{fx}$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v$$

$$(60 \text{ kg})(8.0 \text{ m/s}) = (140 \text{ kg}) v$$

$$v_x = 3.4 \text{ m/s E}$$

② Vertical:

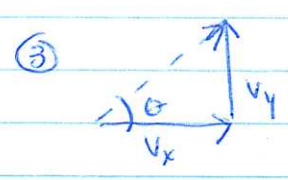
$$P_{oy} = P_{fy}$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v$$

$$(80 \text{ kg})(9.0 \text{ m/s}) = (140 \text{ kg}) v$$

$$v_y = 5.1 \text{ m/s N}$$

(2)



$$V = \sqrt{v_x^2 + v_y^2}$$

$$= \sqrt{(3.4 \text{ m/s})^2 + (5.1 \text{ m/s})^2}$$

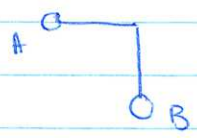
$$= 6.1 \text{ m/s}$$

$$\theta = \tan^{-1}(O/A) = \tan^{-1}\left(\frac{5.1 \text{ m/s}}{3.4 \text{ m/s}}\right)$$

$$= 56^\circ \text{ N of E}$$

p 221 - Multiple Choice

11) clay spheres



A swings + sticks to B
+ they rise up

How determine final height?

- I. Work-energy eqn
- II. impulse-momentum eqn

(1)

- (a) I
- (b) II
- (c) Both
- (d) Either not both
- (e) Neither

p 225 - Problems

$$47) \quad m_1 = 80 \text{ g} = 0.080 \text{ kg} \\ v_1 = 80 \text{ m/s}$$

arrow fires at ice + embeds

$$m_2 = 10 \text{ kg} \\ v_{c2} = 0 \text{ m/s}$$

① sticky $P_o = P_f$
 $m_1 v_1 + m_2 v_2 = (m_1 + m_2) v$

$$(0.080 \text{ kg})(80 \text{ m/s}) = (10.080 \text{ kg}) v$$

$$v_{1,2} = 0.63 \text{ m/s}$$

(1)

② kinematics

$$F_f = 7.2 \text{ N}$$

$$v_f = 0 \text{ m/s}$$

$$v_o = 0.63 \text{ m/s}$$

$$d = ?$$

③ $a = \frac{F_{\text{net}}}{m} = \frac{-7.2 \text{ N}}{10.080 \text{ kg}}$

$$= -0.71 \text{ m/s}^2$$

$$d = \frac{v_f^2 - v_o^2}{2a} = \frac{- (0.63 \text{ m/s})^2}{2(-0.71 \text{ m/s}^2)}$$

$$= 0.28 \text{ m}$$

or $E_o + W = E_f$

$$K + W = 0 \text{ J}$$

$$K = -W$$

$$\frac{1}{2} m v^2 = -F d$$

$$d = \frac{m v^2}{2F}$$