Energy #6

p 177 MC 6, 7, 12
p 181 Prob 42, 43, 68
Online - p in explosion

p 177 - Multiple Choice

(7)

6) example p not constant

X (a) bullet shot from rifle w/ rifle + bullet
(b) free falling ball w/ ball as system
(c) free falling ball w/ ball + Earth as system
(d) not possible, p always conserve

(3)

7) Why do cannons roll back?

(a) cannon push ball, ball push cannon
(b) p of system is constant
(c) both a + b

12) Meteorite strikes Earth + ↓ p to zero
Does it contradict conserve p?

(a) No, meteorite not isolated
(b) No, b/c in met-Earth system E gains p
(c) No, meteorite brings p from space
(d) Yes, meteorite not moving relative to medium before collision

p181 - Problems

42) $m_1 = 72\,kg$
$v_{o1} = 0\,m/s$
$m_2 = .145\,kg$
$v_{o2} = 18\,m/s$

hockey player catches puck

(1) ① Sticky $\quad p_o = p_f$

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

$$v = \frac{m_2 v_{o2}}{m_1 + m_2}$$

$$= \frac{(.145\,kg)(18\,m/s)}{72\,kg + .145\,kg}$$

$$= .036\,m/s$$

time to glide 5m if frictionless

② $t = \frac{d}{v} = \frac{5m}{.036\,m/s} = 139\,s$

43) $m_1 = 10\,kg$
$m_2 = 30\,kg$
$v_{1,2} = 6\,m/s\ E$

(1) Jump off back $v_1 = 20\,m/s$
$v_2 = ?$

$p_o = p_f$

$(m_1 + m_2) v_{o1,2} = m_1 v_1 + m_2 v_2$

$(40\,kg)(6.0\,m/s) = (10\,kg)(20\,m/s) + (30\,kg) v_2$

$v_2 = 1.3\,m/s\ E$

p182 68) $m_1 = m$
$v_{o1} = -V$
$m_2 = 3m$
$v_{o2} = .6V$
stick together
$v_f = ?$

$p_o = p_f$

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

$v_f = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$

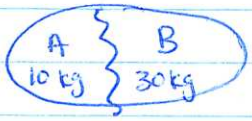
$= \frac{(m)(-V) + (3m)(.6v)}{m + 3m}$

$= \frac{-1mv + 1.8mv}{4m}$

$= \frac{.8mv}{4m} = .2v$ in +x direction

(1)

- Online p in Explosion



a) $P_{oA} = 0 \text{ kgm/s}$

b) F on A compared to F on B

equal to

(1)

c) $P_{Bf} = +500 \text{ kgm/s}$

$P_{Af} = ?$

-500 kgm/s