Read 8.1-8.3

Examples today for exam 3 prep

Exam III April 15 chp 6-7 only

H.w Due today

Next H.w moved to after exam (chp 8)

Ex) A car moving at 30 mi/h is stopped by braking and locks wheels. Car slides 50 ft before coming to rest. How far would car skid if it were moving at 60 mi/h?

Work

$$W_f = F_f d \cos 180^\circ = -F_f d$$

$$W_{net} = \Delta K = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$$

($v_f = 0$)

$$F_f d = \frac{1}{2} m v_i^2$$

$$F_f d_1 = \frac{1}{2} m v_i^2 \qquad v_i = 30 \text{ mi/h} \qquad d_1$$

$$F_f d_2 = \frac{1}{2} m v_{i2}^2 \Rightarrow v_{i2} = 60 \text{ mi/h} \qquad d_2 : ?$$

ratio

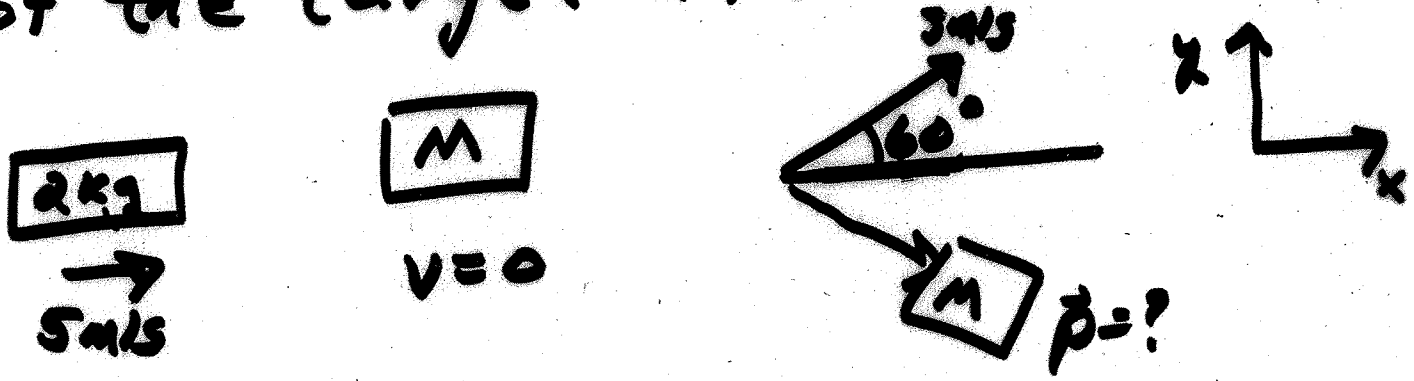
$$\frac{F_f d_1}{F_f d_2} = \frac{\frac{1}{2} m v_i^2}{\frac{1}{2} m v_{i2}^2} \Rightarrow \frac{d_1}{d_2} = \frac{v_i^2}{v_{i2}^2}$$

$$d_2 = d_1 \left(\frac{v_{i2}^2}{v_i^2} \right) = 50 \text{ ft} \left(\frac{60 \text{ mi/h}}{30 \text{ mi/h}} \right)^2$$

$$\Rightarrow 50 \text{ ft} (2)^2 \Rightarrow 50 \text{ ft} \cdot 4$$

$$\Rightarrow \boxed{200 \text{ ft}}$$

ex) A projectile of mass 2.0 kg approaches a stationary target at 5.0 m/s. The projectile is deflected through an angle of 60° and its speed after collision is 3.0 m/s. What is magnitude of the momentum of the target after collision?



x: $(2\text{kg})(5\text{m/s}) + 0 = (2\text{kg})(3\text{m/s})\cos 60^\circ + p_{mx}$

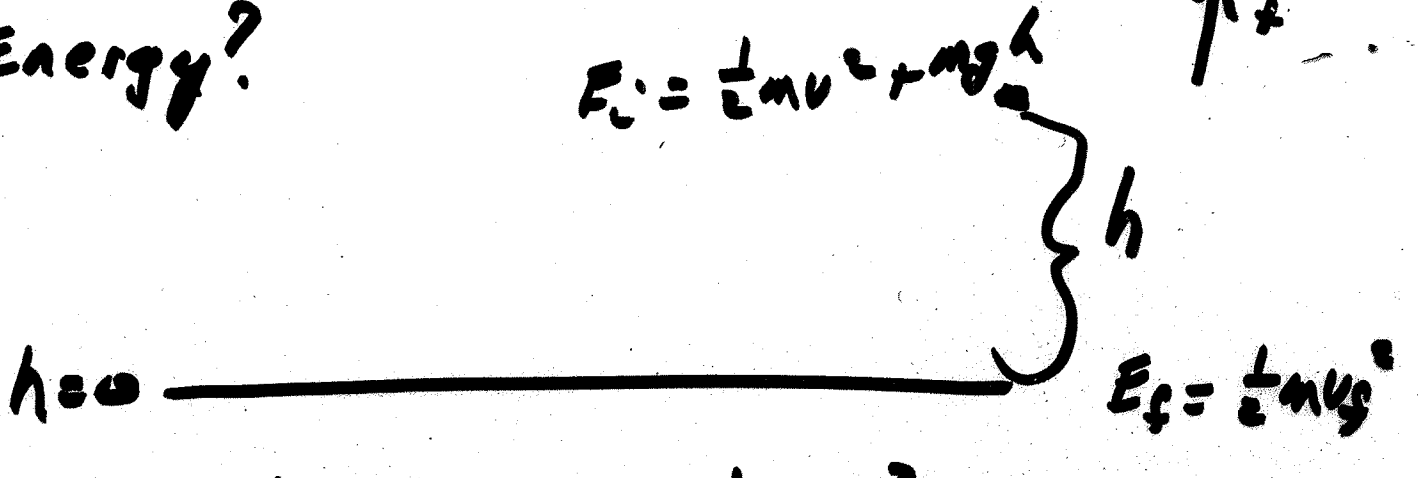
y: $0 + 0 = (2\text{kg})(3\text{m/s})\sin 60^\circ + p_{my}$

$p_{mx} = 7\ \text{kg-m/s}$

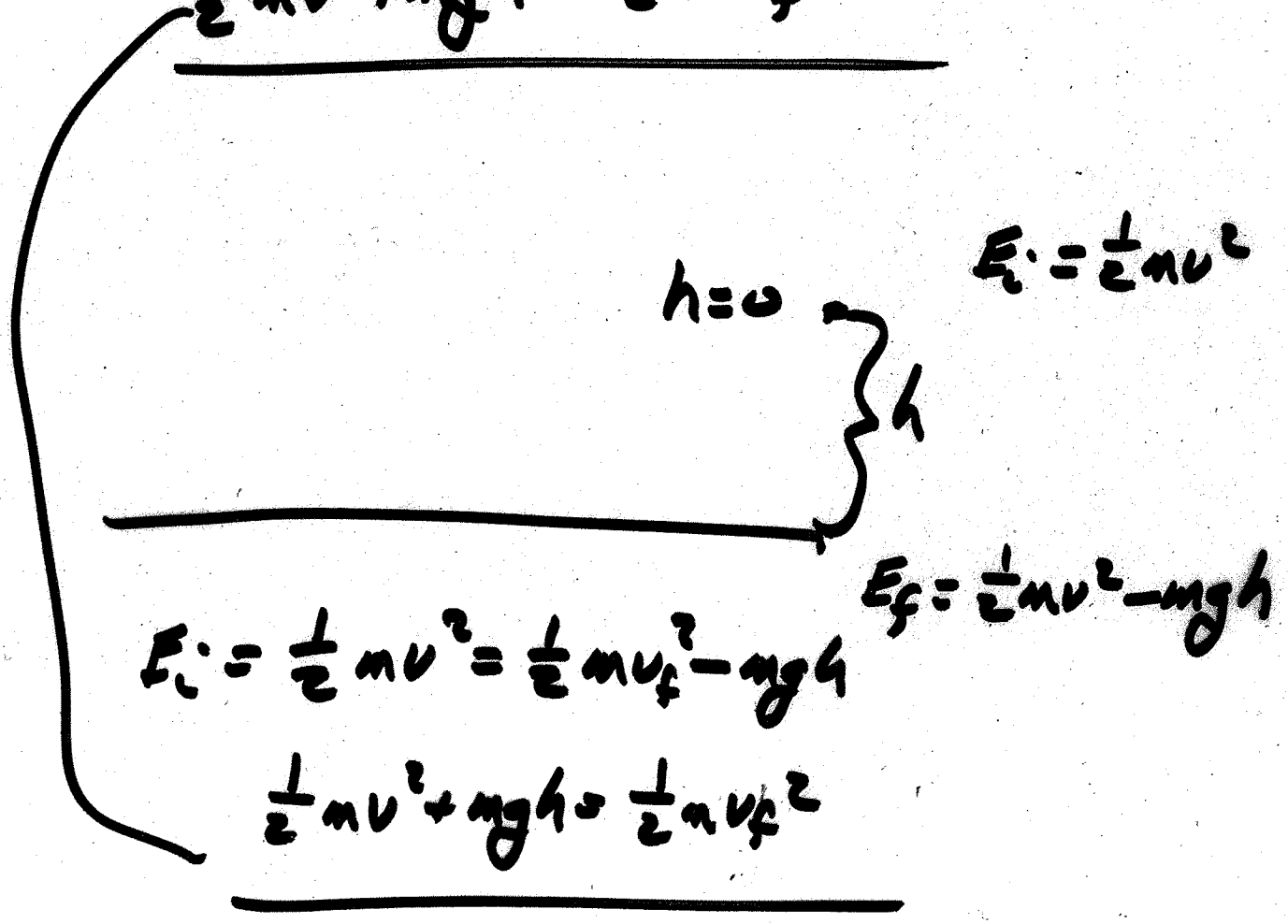
$p_{my} = -5.2\ \text{kg-m/s}$

$$p = \sqrt{(p_{mx})^2 + (p_{my})^2} = 8.7\ \text{kg-m/s}$$

Can I have negative potential Energy?

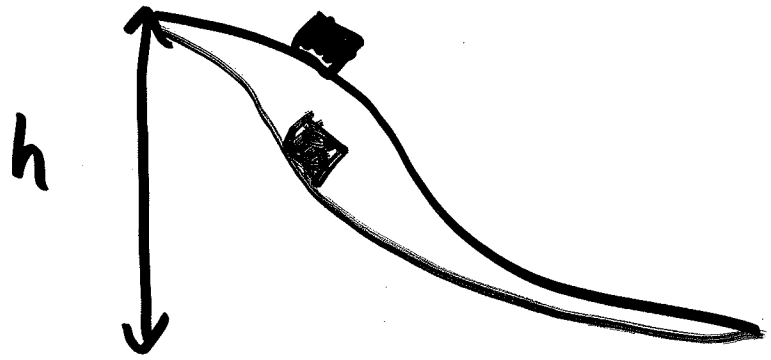


$$\frac{1}{2}mv^2 + mgh = \frac{1}{2}mv_f^2$$



$$E_i = \frac{1}{2}mv^2 = \frac{1}{2}mv_f^2 - mgh$$

$$\frac{1}{2}mv^2 + mgh = \frac{1}{2}mv_f^2$$



Start at same height
End at same height
Both start from rest

	Fastest at Bottom	First to bottom
A)		
B)		
C)	same	same
D)	same	
E)	same	

A box slides down an inclined plane with friction and compresses a spring with spring constant K. The box then goes back up the incline to a height h. I then replace the spring with a new spring with spring constant 4K.
How far will new spring compress compared to original spring?

- A) Same
- B) ½ as much
- C) twice as much
- D) ¼ as much
- E) 4 times as much

Ballistic Pendulum

How to measure velocity of ball?

m = ball mass

M = pendulum mass

① conserve momentum

$$m v_i = (m+M) v_f \qquad v_f = \frac{m v_i}{m+M}$$

② $\frac{1}{2}(m+M) v_f^2 = (m+M) g h \qquad v_f^2 = 2gh$

$$\left(\frac{m v_i}{m+M}\right)^2 = 2gh$$

$$\boxed{v_i^2 = \frac{(m+M)^2}{m^2} 2gh}$$

A small car and a large truck collide and stick together

	Greatest change in momentum	Greatest momentum right after collision
A	car	car
B	car	Truck
C	car	same
D	same	same
E	same	Truck

Two objects P and Q have the same momentum. Q can have more kinetic energy than P if it:

A) weighs more than P

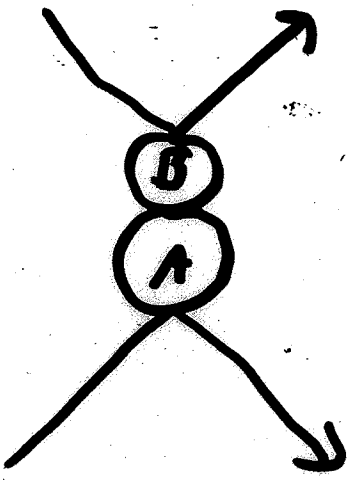
B) is moving faster than P

C) weighs the same as P

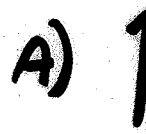
D) is moving slower than P

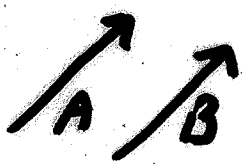
E) is moving at the same speed as P

2 colliding balls



which set of arrows best represents the change in momentum

A) 

B) 

C) 

D) 

E)