Jimpulse and Pmomentum

With all natural flavours!

1. A 125kg cart is traveling west at 8.00m/s. A Force of 175N east acts on the cart for 1.50s. What is the final velocity of the cart?

2. A 1200kg car travelling at 14m/s North collides head on with a 5600kg truck travelling South at 22m/s. The collision is perfectly inelastic (they stick together). Find:

a. The final velocity of the two.

b. The Impulse experienced by the car (magnitude and direction)

c. The impulse experienced by the truck (magnitude and direction)

d. compare your answers to b. and c.

3. A 225kg is traveling west at 4.00m/s. A Force of 175N east acts on the cart for 3.50s.

a. What is the Impulse on the cart?

b. What is the change in momentum of the cart?

c. What is the change in velocity of the cart?

d. What is the acceleration of the cart?

e. What is the final velocity of the cart?

4. A large, fully loaded, truck collides with an unfortunate environmentalist braving the Vancouver weather riding a bicycle. Fill in the blanks below with GREATER THAN, LESS THAN or EQUAL TO:

a. The cyclist experiences a force that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that experienced by the truck.

b. The cyclist experiences an impulse that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that experienced by the truck.

c. The cyclist experiences an acceleration that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that experienced by the truck.

d. The cyclist experiences a Δp that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that experienced by the truck.

e. The cyclist experiences a Δv that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that experienced by the truck.

5. Consider the collision shown below:

4m/s

5m/s

4kg

m1

3m/s

0.25m/s

4kg

m1

Find m1.

6. A 65g bouncy ball is dropped, from rest, from a height of 2.0m above the ground.

a. Find the velocity of the ball when it reaches the floor.

The ball bounces back up, but only reaches a maximum height of 1.4m.

b. Find the velocity of the ball as it leaves the floor.

c. Find the change in the ball’s velocity.

d. Find the change in the balls momentum.

e. Find the net impulse on the ball.

The ball is in contact with the floor for 0.100s.

f. Find the average net force while the ball is in contact with the floor.

g. Find the average normal force on the ball while it is in contact with the floor.

7. A 125kg cart is traveling west at 8.00m/s. A Force of 175N east acts on the cart for 10.50s. What is the final velocity of the cart?

8. A 2.00kg wheel of smoked Gouda cheese is rolling at 1.7m/s East. A force of 0.35N East acts on the cheese for 1.00minute. Find the final velocity of the cheese.

9. After experiencing a force of 25N to the east for 3.0s a 12kg ball of cookie dough and cat hair is travelling with a final velocity of 5.0m/s west. What was the initial velocity of the ball?

10. A massive object has an acceleration of 4.00m/s2 north. **If possible** indicate the direction of the following:

a. net force b. final momentum c. initial velocity d. change in velocity

e. final velocity f. impulse g. change in momentum h. initial momentum

11. A 125g bullet is fired at 350m/s, horizontally, at a stationary 5.0kg wooden block sitting on a table. Assume friction between the block and table is negligible.

a. If the bullet becomes stuck within the block, find vf.

b. If the bullet travels through the block and exits at 150m/s, find vf of the block.

c. If the bullet bounces straight back from the block at 150m/s, find vf of the block.

12. An egg dropped from 1metre onto a concrete floor breaks. An egg dropped from 1 metre onto a pillow does not break. Which of the following explains why?

a. the pillow increases the time needed to stop the egg and therefore applies a smaller impulse

to the egg.

b. the pillow increases the time needed to stop the egg and therefore decreases the change in

momentum of the egg.

c. the pillow increases the time needed to stop the egg and therefore applies a smaller force to

the egg.

d. the pillow increases the time needed to stop the egg and therefore applies a larger impulse to

the egg.

13. Two steel pucks collide as shown in the diagram below.

BEFORE COLLISION AFTER COLLISION

v’1=1.70 m/s

v1=2.40 m/s

30.0o

v2=0 m/s

m1=1.00kg

m2=0.800kg



v’2

Determine the velocity of the 0.800kg puck after the collision.