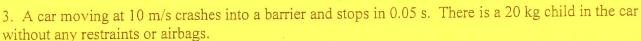
IMPULSE-MOMENTUM PROBLEMS

1. Before a collision, a 25 kg object is moving at +12 m/s. Find the impulse that acted on the object if, after the collision, it moves at: a. +8.0 m/s.

b. -8.0 m/s.

Impulse = FOT = MOV = MOMENTUM = P 100= 40-11 = +8M/8 - +12M/5 = -4M/5 Impulse = P = MOV = (OSK) (-4M/5) = 3--

2. According to Newton's Third Law of Motion, small thruster rockets can be used to make fine adjustments in satellite orbits. One such rocket has a thrust of 35 N. If it is fired to change the velocity of a 72,000 kg satellite by 63 cm/s, for how long should it be fired?



a. What is the impulse acting on the child?

- b. What is the average force (in Newtons and pounds) acting on the child?
- c. How many "g's" does this force (part b answer) exert on the child?
- d. Would you be able to safely hold this child in your lap during the collision?
- 4. A meter stick has a 750 g mass on one end and a 180 g mass on the other. Calculate location of the center of mass along the meter stick.
- 5. A 165 g hockey puck, moving at 35 m/s, strikes a 265 g octopus thrown on the ice by a Badger fan. If the puck and octopus slide off together, calculate their velocity.
- 6. A 50 kg woman is riding on a 10 kg cart moving east at 5.0 m/s. The woman jumps off the front of the cart and hits the ground at 7.0 m/s eastward, relative to the ground. Calculate the cart's velocity after the woman jumps off.
- 7. A 200 g plastic ball, moving with a speed of 0.30 m/s, collides with a 100 g plastic ball moving in the same direction with a speed of 0.10 m/s. After the collision, both balls continue moving in the same direction and the speed of the 100 g ball is 0.26 m/s. Calculate the velocity of the 200 g ball.

UNIT 6: MOMENTUM

Upon completion of this unit, the student should be able to:

- 1. Define impulse and momentum and their metric units, describe their relationship, and calculate each from given data.
- 2. Explain Newton's second law of motion in terms of momentum.
- 3. Explain the Law of Conservation of Momentum and apply it in calculating initial and final momenta, velocities, and masses of colliding objects.
- 4. Describe the transfer of momentum during elastic, inelastic, and explosion collisions.
- 5. Define center of mass and why it is important in the study of collisions.
- 6. Describe the relationship between center of mass and stability and balance.
- 7. Calculate the center of mass of two objects given their masses and relative positions.
- 8. Describe the motion of the center of mass of a system of objects during a collision.

Reference: Holt Physics (Serway/Faughn), Chapter 6

Homework: Problem-solving handout (on back side)

Labs: All-American egg drop, Conservation of Momentum, hallway physics

HAGAR the Horrible

By Dik Browne

