1. A train having 85 cars in all including the engine, each of which has a mass of 8.0 x 104 kg, is moving down the track at 0.50 m/s.
(A) What is the momentum of the train?
(B) What impulse would have to be put on the train in order to stop it?
(C) What impulse was given to the train in the first place to get it up to speed?

2. How long must an unbalanced force of 500 N act on a 1500 kg car in order to increase its speed from 5.0 m/s to 15 m/s?

3. A ball that weighs 2.3 N is moving at a velocity of 15 m/s when it is hit by a bat causing it to move in the opposite direction at 30 m/s. Find the force exerted by the bat if the blow lasts for 0.01 seconds.

4. A car of mass 1400 kg crashes into a solid wall and is stopped in 0.50 seconds. If the car was travelling at a speed of 5.0 m/s when it hit the wall,
(A) What is the force of the wall on the car?
(B) What is the force of the car on the wall?
(C) What impulse did the car put on the wall?

5. A 150 gram baseball travelling at 30 m/s is stopped by a Catcher's mitt in 0.050 s. What force must the Catcher exert while stopping the ball?

6. If a bullet of mass 50 grams is moving at 400 m/s when it encounters a retarding force of 3000 N, find (A) the time required to stop the bullet and (B) the distance it will go in that time.

7. A small red cart of mass 2.0 kg is travelling west at 4.0 m/s when it collides "head-on" with a blue cart of mass 5.0 kg travelling east at 3.0 m/s. If the carts remain stuck together after the collision, find:
(A) the common velocity after the collision and
(B) the impulse on the red cart.

8. A 4000 kg truck travelling east at 8.0 m/s hits a 2500 kg car that was travelling west at 6.0 m/s. If they lock bumpers, find the common velocity after the collision.

9. A 16 gram bullet is fired into a 484 gram block of wood resting on a large ice surface. If the bullet strikes the wood horizontally at 80 m/s and remains in the wood after impact,
(A) what will the velocity of the wood be after impact?
(B) what impulse will the ice put on the block in getting it stopped?

10. A plastic ball having a mass of 250 grams and a velocity of 20.0 cm/s east collides with another ball having a mass of 100 grams moving along the same line, also east, but at 10.0 cm/s. After the collision, the 250 g ball has a velocity of 15.0 cm/s east.
A) What is the velocity of the other ball?
B) What impulse does the 100 g ball put on the 250 g ball?
C) What impulse does the 250 g ball put on the 100 g ball?