Name:

Physics 12
M. Lam   Momentum (2 Dimensions)   Block:

1. A 0.31 kg baseball moving horizontally at 41 m/s is hit back in the direction of the pitcher at an upward angle of 30° and at a speed of 53 m/s. Find the impulse given to the ball.

2. A 140 g tennis ball travelling 30° east of north at 15 m/s is struck by a tennis racquet, giving it a velocity of 25 m/s, west. What are the magnitude and direction of the impulse given to the ball?

3. A 12.0 kg shopping cart rolls due south at 1.70 m/s. After striking the bumper of a car, it travels at 0.80 m/s, 30° east of south. What is the magnitude of the change in momentum sustained by the shopping cart?

4. A 1100 kg vehicle travelling westward at 17 m/s is subjected to a 1.0×10^4 N·s impulse northward. What its the magnitude of the final momentum of the vehicle?

5. An 850 kg car travelling at 12 m/s due east collides with at 620 kg car travelling at 24 m/s due north. As a result of the collision, the two cars lock together. What is the velocity immediately after the collision?

6. Two steel pucks are moving as shown int he diagram. They collide inelastically. Determine the speed and direction of the 1.3 kg puck before the collision.
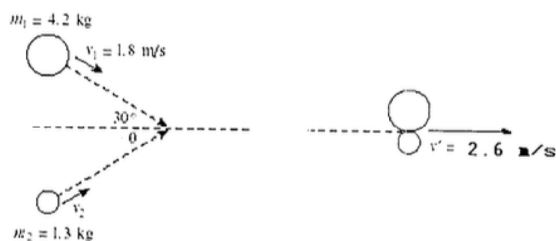
7. A 9.0 kg object moving at 12 m/s to the east explodes into two unequal fragments. The larger 5.0 kg fragment moves at 15 m/s south. What is the velocity (speed and direction) of the smaller fragment?
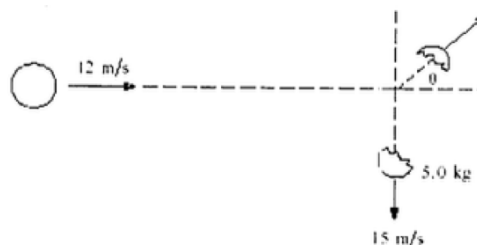
8. A defective 8.5 kg landmine explodes into 3 pieces. A 2.5 kg piece goes northeast at 190 m/s and a 2.9 kg piece goes 30° north of west at 280 m/s. Find the velocity of the third piece.

9. A 310 000 kg meteor is heading directly towards a space shuttle at 35 m/s. It is pushed for a period of 45 seconds after which its velocity is 27 m/s and it has veered 22° from its original course.
   a) Find the impulse given to the meteor (magnitude and direction).
   b) Find the magnitude of the force applied.

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