Honors Physics Momentum HW, part 2 (Homework)

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Price: $3

1.
A 6.00 kg bowling ball collides head-on with a 1.50 kg bowling pin which was originally at rest. The pin flies forward with a speed of 2.50 m/s. If the ball continues forward with a speed of 1.80 m/s, what was the initial speed of the ball? Ignore rotation of the ball.

2.
A railroad car of mass 3.20×10^4 kg moving at 3.50 m/s collides and couples with two coupled railroad cars, each of the same mass as the single car and moving in the same direction at 1.20 m/s.
(a) What is the speed of the three coupled cars after the collision?
(b) How much kinetic energy is lost in the collision?

3.
An 8.00 g bullet is fired into a 250 g block that is initially at rest at the edge of a table of 1.00 m height (Fig. P6.26). The bullet remains in the block, and after the impact the block lands 2.00 m from the bottom of the table. Determine the initial speed of the bullet.

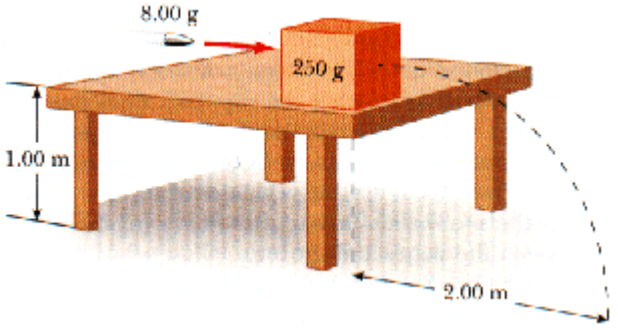

Figure P6.26.

4.
A 10.0 g bullet is fired horizontally into a 105 g wooden block that is initially at rest on a frictionless horizontal surface and connected to a spring of constant 156 N/m. If the bullet-block system compresses the spring by a maximum of 72.0 cm, what was the velocity of the bullet at impact with the block?

5.
A 5.00 g object moving to the right at 20.0 cm/s makes an elastic head-on collision with a 10.0 g object that is initially at rest. Find
(a) the velocity of each object after the collision and

(b) the fraction of the initial kinetic energy transferred to the 10.0 g object.
6.

A 29.0 g object moving to the right at 18.0 cm/s overtakes and collides elastically with a 9.0 g object moving in the same direction at 15.0 cm/s. Find the velocity of each object after the collision.
29 g object:
9.0 g object:

7.
A 88-kg fullback moving east with a speed of 7.0 m/s is tackled by a 96-kg opponent running north at 3.0 m/s. If the collision is perfectly inelastic, calculate
(a) the velocity of the players just after the tackle and
(b) the kinetic energy lost as a result of the collision.
Can you account for the missing energy?

8.
A 2200 kg car moving east at 10.0 m/s collides with a 3000 kg car moving north. The cars stick together and move as a unit after the collision, at an angle of 45.0° north of east and at a speed of 5.98 m/s. Find the velocity of the 3000 kg car before the collision.

9.
A 0.30 kg puck, initially at rest on a frictionless horizontal surface, is struck by a 0.20 kg puck that is initially moving along the x axis with a velocity of 2.8 m/s. After the collision, the 0.20 kg puck has a speed of 0.9 m/s at an angle of $\theta = 53°$ to the positive x axis.
(a) Determine the velocity of the 0.30 kg puck after the collision.
(b) Find the fraction of kinetic energy lost in the collision.

10.
Consult the force-time graph in Figure P6.9. Find the average force exerted on the particle for the time interval $t_i = 0$ to $t_f = 3.0$ s.

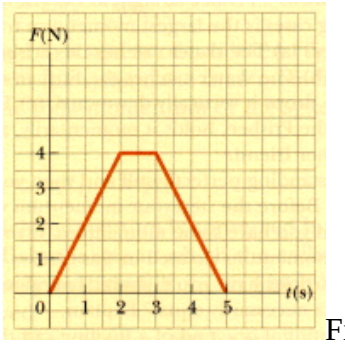

Figure P6.9.