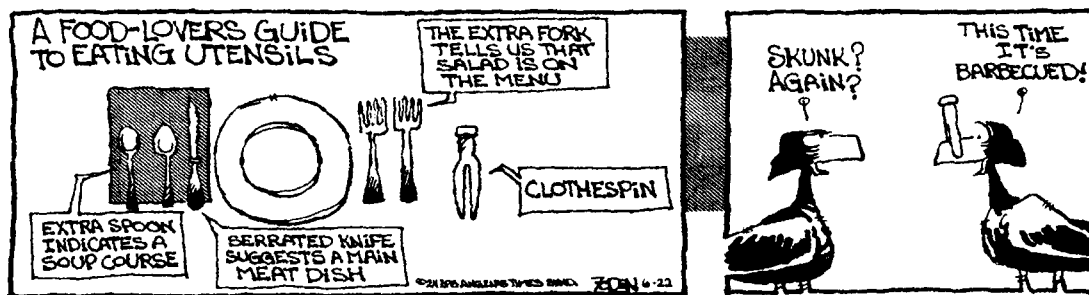


Name _____

Per _____

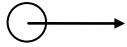


If at first you don't succeed, try, try, again. -- Thomas H. Palmer

1. A 1.15 kg block is pressed into a spring, compressing it by 15.0 cm. The spring constant is 455 N/m. The entire deal rests on a flat, low friction table that is 75.0 cm above the floor. The block is released. It crashes head-on into a 0.750 kg block that is at rest. The first block ends up with a velocity of 0.585 m/s in the same direction after the collision. (a) What is the PE in the spring before the block is released? (b) What is the momentum of the block just before it hits the second block? (c) What is the final velocity of the second block? (d) The second block reaches the end of the table, what is its KE? (e) The second block falls off the table. How far from the edge of the table does it land? (f) What is its KE just before it hits the floor?

5. A 4.2 kg ball traveling to the left at 3.1 m/s, collides with a 5.7 kg ball traveling to the right as shown below:

Before:



$$v_1 = 5.5 \text{ m/s}$$



$$v_2 = -3.1 \text{ m/s}$$

After:



$$v_2' = 2.2 \text{ m/s}$$

Find the velocity of the first ball after the collision.

6. An 80.0 kg astronaut, initially at rest and in space, throws a 10.0 kg oxygen tank away from himself with a speed of 4.30 m/s. With what velocity does the astronaut start to move through space?

7. A 135 kg bomb lying in a field suddenly explodes into 3 pieces having respective masses of 20.0, 47.0 and 68.0 kg. The 20.0 kg piece is thrown horizontally North with an initial speed of 25.0 m/s; the 47.0 kg piece is thrown horizontally East with an initial speed of 40.0 m/s. (a) What is the net momentum of the bomb before the explosion? (b) How much is the net momentum of the 3 pieces after the explosion? (c) If the third piece flies off horizontally to the Southwest, what is its speed?
8. A steel ball bearing is dropped from rest from the roof of a building. An observer standing in front of a 120 cm tall window notes that the ball takes 0.125 s to fall from the top to the bottom of the window. The ball bearing continues to fall, makes a completely elastic collision with a horizontal sidewalk, and reappears at the bottom of the window 2.0 s after it went by the bottom of the window. How tall is the building?