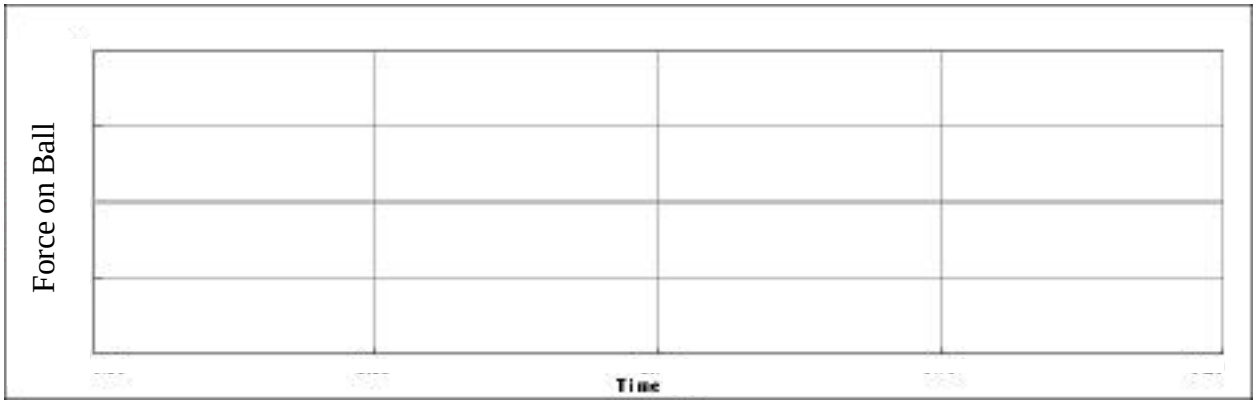
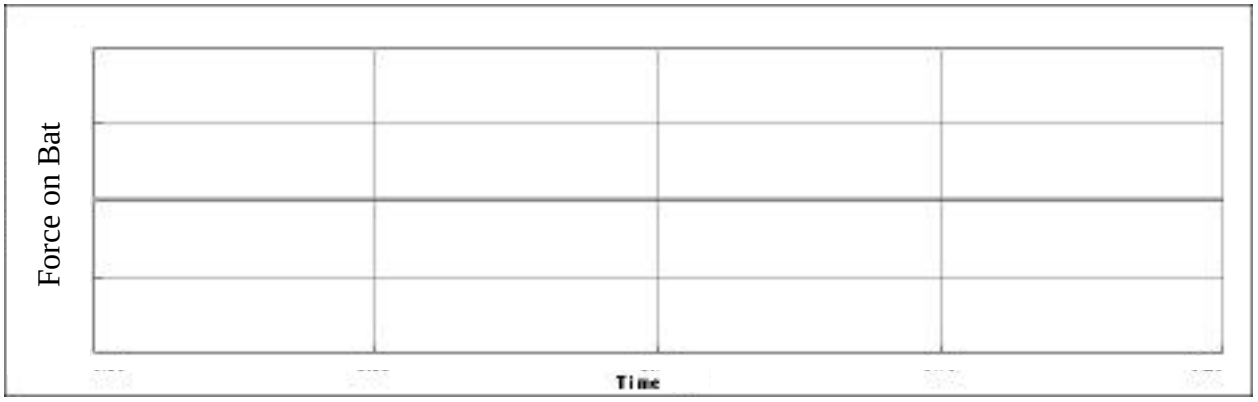
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles shown on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. A 0.145kg baseball collides with a 1.10kg baseball bat. (a)On the upper graph below sketch the force felt by the ball as a function of time. (b)On the lower graph sketch the force felt by the bat as a function of time. (c)Explain your thinking as well as the important features of your curves.

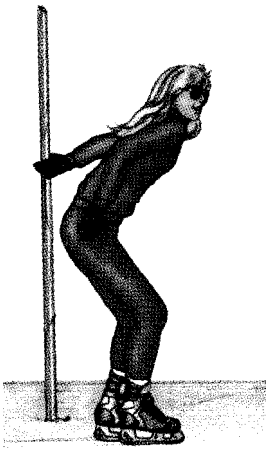




2. A 7.00kg bowling ball traveling at 5.00m/s make a head-on elastic collision with 2.00kg bowling pin initially at rest. Find (a)the speed of the ball after the collision and (b)the speed of the pin after the collision.

3. A 0.145kg baseball starts near rest and rolls without slipping down a 55.0cm high pitchers mound. Find the speed of the ball at the bottom.

4. A 60.0kg ice skater moving at 4.00m/s reaches out and grabs a 10.0cm diameter pole to reverse direction. Assume that as she rotates around the pole her center of mass is 75.0cm from the center of the pole. She releases the pole after 0.500s heading back the way she came at 3.50m/s. Find (a)her initial angular momentum relative to the center of the pole, (b)her final angular momentum relative to the center of the pole and (c)the average frictional force between her hand and the pole.



5. A hungry bear weighing 700N walks out on a beam in an attempt to retrieve a basket of food hanging at the end. The beam is uniform, weights 200N, and is 6.00m long. The basket weighs 80.0N. When the bear is at x=2.00m, find the tension in the wire and the components of the force exerted by the wall on the beam.