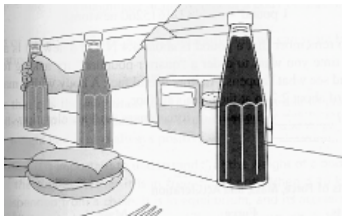
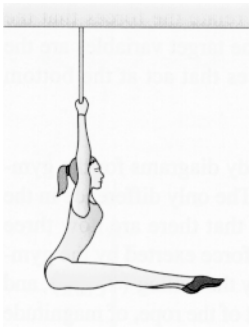
Name:_____

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 which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

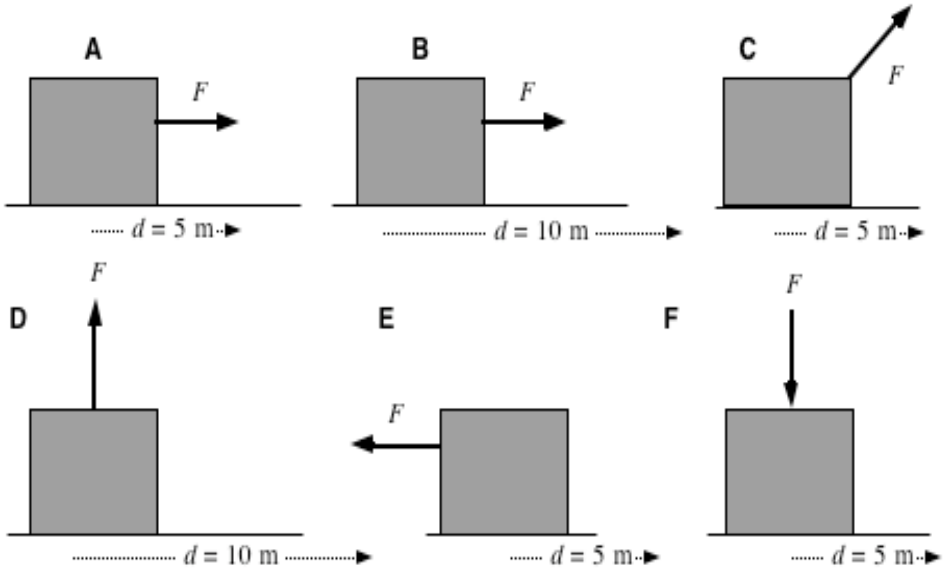
1. A fellow diner at the dorms shoves a 0.450kg bottle of ketchup along the table toward you. As the bottle leaves her hand, it is moving at 2.80m/s. It slides 1.00m before coming to rest in front of you. (a)Draw and name all the forces that act on the bottle while it is in motion. (b)Find their magnitudes.



2. A 35.0kg gymnast swings at the end of a 3.70m rope at a speed of 2.50m/s. Find the tension in the rope as she swings through the vertical.



3. In the figures below, identical boxes of mass 10 kg are moving at the same initial velocity to the right on a flat surface. The same magnitude force, F, is applied to each box for the distance, d, indicated in the figures. Rank these situations in order of the work done on the box by F while the box moves the indicated distance to the right. Carefully explain your reasoning.



4. A chase scene in a movie shows a car skidding over level ground at 40.0km/h when it comes upon a 10.0m high cliff. Find the speed of the car just before it hits the ground below the cliff.

5. A 0.800kg mass oscillates horizontally at the end of spring with a spring constant of 2.00N/m. The graph of its position versus time is shown below. (a)Sketch the graph of the system's potential energy. (b)Sketch the graph of kinetic energy versus time. (c)Sketch the graph of the total energy versus time. Be sure to label the maximum value on vertical axis of each graph. Be sure to your explain your thinking on each part for full credit.