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 1200kg car heading east on an icy road at 35.0km/h collides with a 2200kg pick-up truck going north at 50.0km/h. Assuming the vehicles stick together after the collision find their combined velocity.

2. The basketball player shown at the right wants to get the basketball spinning at 200rpm from rest in 3.00s. The ball has a mass of 0.450kg, a radius of 12.0cm and is hollow. Find the average torque that she must exert.

3. A hollow ball and a solid ball of equal mass and radius each roll without slipping up an incline with the same initial speed. Decide which ball will go the furthest up the incline and explain your answer. Be sure your explanation includes the names of important physical principles.

4. (a)Find the angular momentum of the basketball in problem 2. (b)Divide the answer to this problem by your answer to problem 2 and explain the result.

5. The uniform 200kg beam show at the right is supported by a cable connected to the ceiling while the lower end rests on the floor. In the drawing, sketch each force that acts on the beam and find the size of each. Be sure you are very clear about labeling angles.