

PHYS 1401 General Physics I
Homework #9

For the first two questions, express your final answer in the form of a *complete sentence*, with the correct units and number of significant figures. Do not just circle a number. Show all calculations, and draw diagrams where appropriate. The last six questions are found on the [Mastering Physics](#) site, and are worth a point each.

It would be a good idea to try the Tutorials before tackling the homework problems. If you complete the entire Tutorial for Homework #9, you will get 1 bonus point. If you complete any part of the Tutorial, you will get half a bonus point.

Do these problems on paper and turn them in

1. (2 points) A baseball with a mass of 145 grams is pitched perfectly horizontally so that it has a speed of 91.2 miles per hour when the batter hits it. The batter hits the ball so that it leaves the bat with a speed of 109 miles per hour straight back at the pitcher. (This is called a “comebacker” or a “screaming line drive” or “bad news for the pitcher.”)
 - a. What is the momentum of the baseball before and after it is hit?
 - b. What is the impulse imparted to the ball?
 - c. If the ball is in contact with the bat for 1.01 milliseconds, what force does the ball feel? How many pounds is that, if 1 pound equals 4.45 N?
 - d. Find the acceleration the ball experiences. Divide by the acceleration due to gravity to find the number of “gees” it feels.

2. (2 points) A truck with a mass of 1800 kg traveling 32 miles per hour collides with a car (mass = 1100 kg) sitting at a stop sign. The two lock together and both cars slide into the intersection. Both drivers slam on the brakes in desperation. The coefficient of friction between the tires and the road is 0.58.
 - a. What is the momentum of each car before the collision?
 - b. What is their combined momentum after the collision? Justify your answer.
 - c. How fast are they travelling together after the collision?
 - d. We assume this is an inelastic collision, since they are stuck together. PROVE it is an inelastic collision, using energy.
 - e. (0.5 BONUS point) How far do the two cars slide into the intersection?

These are the problems from the book that are online. The data are different, so you can work them out without numbers and then go online.

1. Chapter 9, Problem 40, p. 282
2. Chapter 8, Problem 8, p. 252
3. Chapter 8, Problem 18, p. 252
4. Chapter 8, Problem 24, p. 253
5. Chapter 8, Problem 36, p. 254
6. Chapter 8, Problem 56, p. 255