

HOMEWORK #5

NOTES:

- This homework is due by the beginning of class on Mar 18. It covers material from chapter 6.
 - You will need a calculator and lots of scrap paper.
 - Answers are to be recorded on a scantron that you will turn in. You may keep the questions (i.e., these sheets).
 - You may (should) use your book. You may even work with other students. However, you should not copy the answers of other students. The homeworks are exam prep, and so you need to be able to work these problems yourself. If you do not apply yourself and do your own work, you are not likely to perform well on the exams.
1. A ball is shot with a momentum of 63 kg m/s . It has a mass of 440 grams . What is its speed?
 - a. 12 km/hr
 - b. 37 km/hr
 - c. 43 km/hr
 - d. 51 km/hr
 2. A bullet goes from rest to 350 m/s in 0.003 seconds . What is the bullet's impulse if its mass is 19 grams ?
 - a. 7.9 kg m/s
 - b. 5.2 kg m/s
 - c. 6.7 kg m/s
 - d. 12.1 kg m/s
 3. Alex throws a 0.18-kg rubber ball down onto the floor. The ball's speed just before impact is 7.9 m/s , and just after is 4.3 m/s . If the ball is in contact with the floor for 0.04 s , what is the magnitude of the average force applied by the floor on the ball?
 - a. 68 N
 - b. 34 N
 - c. 55 N
 - d. 1.9 N

4. A marble is shot with a momentum $p = 0.12 \text{ kg m/s}$. How many marbles, N , are needed to make a catcher's mitt slide along a horizontal, frictionless surface with a speed of 2 m/s if the mitt has a mass of $m = 0.5 \text{ kg}$?
- a. 310
 - b. 83
 - c. 27
 - d. 5
5. A railroad freight car, mass $15,000 \text{ kg}$, is allowed to coast along a level track at a speed of 2.5 m/s . It collides and couples with a $35,000\text{-kg}$ loaded second car, initially at rest and with brakes released. What percentage of the initial kinetic energy of the $15,000\text{-kg}$ car is lost in the two-coupled cars after collision?
- a. 30%
 - b. 9%
 - c. 99%
 - d. 70%
6. A ball of mass m moves left to right at speed v_0 . It strikes a ball of mass M sitting at rest. The body of mass m bounces backwards with speed $v_0/2$. If the surface is frictionless, and the collision is elastic, determine the speed v of the body of mass M .
- a. $1/2 v_0$
 - b. $2/5 v_0$
 - c. $5/6 v_0$
 - d. $5/9 v_0$