

PHYSICS 180

Problem set #7

Due: 5 PM, Monday, Nov.5th, 2007

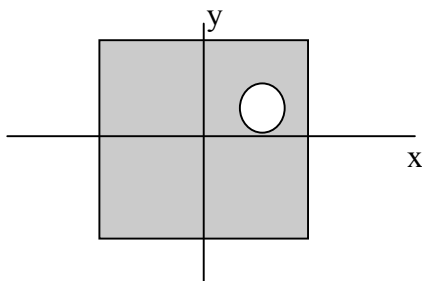
"Experience is the name everyone gives to their mistakes."

--Oscar Wilde (1854-1900)

- 1) A 2007 Toyota Corolla-XE with a mass of $1.0 \times 10^3 \text{ kg}$ accelerates from rest in a straight line using a constant mechanical power of 60 kW (approximately 75 hp).
 - i) What is the Toyota's speed and acceleration 5 s after it starts?
 - ii) How far does the car travel in the 5 s ?
- 2) Willie fires a 100 g bullet at 120 m/s into a 2.2 kg wooden block sitting on a frictionless surface near the bottom of an inclined plane, inclined at 15° . The coefficient of kinetic friction between the mass and the inclined plane is 0.15 .
 - i) What is the speed of the block (and bullet) after the bullet hits the block?
 - ii) What is the maximum elevation of the block relative to the frictionless surface?
 - iii) What is the speed of the block when it returns to its original position?



- 3) A square piece of tin, 0.2 m on a side, has a circular disk cut from it with a diameter of 0.06 m . In the co-ordinate system shown the centre of the disk is at $(0.06, 0.04) \text{ m}$. What are the co-ordinates of the centre of mass of the system?



- 4) Problem #49, Ch. 9 of Serway (P.265).

Practice Problems:

Ch. 8: 34,35,41,42,44,46,50,53,55,56,59,62

Ch.9: 3,4,13,17,22,32,37,39,48,52,69