

Homework 3
PHYS 1403
due February 12, 2004

Homework should be written out neatly on a separate sheet of paper. Explain your reasoning.

1) A ball is thrown upward from the top of a 20m tall building in such a way that it clears the building on the way down and lands on the ground. The ball's initial speed is 11m/s.

a) What is the velocity of the ball just before it hits the ground? Show your work and explain your reasoning.

b) How long has the ball been in the air when it passes the top of the building again on the way down? Show your work and explain your reasoning.

c) What is the acceleration at its maximum height Explain your reasoning.

d) Is the acceleration positive, negative or zero on the way down? Explain your reasoning.

2) A crumpled piece of paper is dropped 3m to the floor. The mass of the paper is 0.015kg. It hits the ground in $t = 0.83\text{s}$.

a) Draw a force diagram for the piece of paper while it is in the air. Explain why you drew the diagram the way you did.

b) Determine if air resistance is negligible. Show your work and explain your reasoning.

c) If air resistance is not negligible, determine the average force of air resistance. If air resistance is negligible, skip this part. Show your work.

3) A hot air balloon is ascending straight up at a constant speed of 7m/s. The balloon is 50m above the ground when one of the passengers reaches over the side and releases a ball from her hand.

a) What is the initial velocity of the ball relative to the ground? Explain your reasoning.

b) Describe the motion of the ball as seen by an observer on the ground.

c) What is the velocity of the ball just before it hits the ground? Show your work and explain your reasoning.