Physics 160 Written Homework - Chapter 2.

1 Position, Velocity, and Acceleration

Two cars, starting from rest, begin their trips to a mutual meeting point at the same time. Car A travels true East, and accelerates at 6 m/s^2, but has a top speed of 55 m/s. Car B travels true North, and accelerates at 5 m/s^2, but has a top speed of 72 m/s. If Car B has been traveling at top speed for 4.7 seconds when the two cars meet:

a. For how long had each car been traveling?

b. How far away from the meeting point did Car A start?

c. How far away from the meeting point did Car B start?

d. How far away were the cars from each other when they started?

2 Interrupted Free Fall

Usain Bolt, the fastest man in the world, stands at the beginning of an infinite flight of stairs, waiting for a nearby cannon to shoot a tennis ball straight up into the air. If he can climb one flight of stairs every 3 seconds, each of which is 10 m tall, and the cannon shoots the tennis ball with an initial velocity of 250 m/s:

a. How many flights of stairs can he climb before he'll need to lean out the window to catch the ball?

b. What will the speed of the ball be when he catches it?

Assume that Usain Bolt never gets tired, and air resistance is negligible.