General Physics I
Homework Chapter 2

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Homework: Chapter 2

Problem (1)

A car travels up a hill at a constant speed of 41 mi/h and returns down the hill at a constant speed of 65 mi/h. Calculate the average speed (in mi/h) for the round trip.

R:

Problem (2)

A particle's position is given by $x = 24.0 - 6.0t + 3.0t^2$, in which x is in meters and t is in seconds. Where is the particle when it momentarily stops?

R:

Problem (3)

At a certain time a particle had a speed of 42 ft/s in the positive x direction, and 5.2 s later its speed was 77 ft/s in the opposite direction. What was the average acceleration of the particle during this 5.2 s interval?

R:

Problem (4)

On a dry road, a car with good tires may be able to brake with a constant deceleration of 5.6 m/s^2.

Question (a)

How long does such a car, initially travelling at 29 m/s, take to stop?

R:

Question (b)

How far does it travel in this time?

R:

Problem (5)

The brakes on your automobile are capable of creating a deceleration of 23 ft/s^2. If you are going 93 mi/h and suddenly see a state trooper, what is the minimum time in which you can get your car under the 65 mi/h speed limit? (The answer reveals the futility of braking to keep your high speed from being detected with a radar or laser gun.)

R:

Problem (6)

The speed of a bullet is measured to be 630 m/s as the bullet emerges from a barrel of length 1.1 m. Assuming constant acceleration, find the time that the bullet spends in the barrel after it is fired.

R:

Problem (7)

At a construction site a pipe wrench struck the ground with a speed of 25 m/s.

Question (a)

From what height was it inadvertently dropped?

R:

Question (b)

How long was it falling?

R:

Problem (8)

A hot-air balloon is ascending at the rate of 35 ft/s and is 150 ft above the ground when a package is dropped over the side.

Question (a)

How long does the package take to reach the ground?

R:

Question (b)

With what speed does it hit the ground?

R:

Problem (9)

A ball is shot vertically upward from the surface of another planet. A plot of y versus t for the ball is shown in fig. 1,

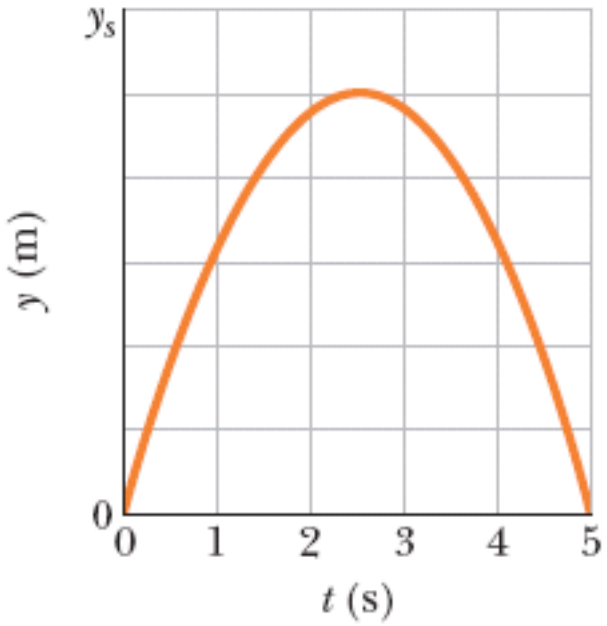

Figure 1: Plot of y versus t

where y is the height of the ball above its starting point and $t = 0$ at the instant the ball is shot. The point marked as y_s has a value of 48.0 m.

Question (a)

What is the magnitude of the free-fall acceleration on the planet?

R:

Question (b)

What is the magnitude of the initial velocity of the ball?

R:

Problem (10)

At the instant the traffic light turns green, an automobile starts with a constant acceleration of 6.7 ft/s^2. At the same instant a truck, traveling with a constant speed of 32 ft/s, overtakes and passes the automobile.

Question (a)

How far beyond the traffic signal will the automobile overtake the truck?

R:

Question (b)

How fast will the car be traveling at that instant?

R:

Problem (11)

A proton moves along the x axis according to the equation $x = 47t + 12t^2$, where x is in meters and t in seconds. Calculate:

Question (a)

The average velocity of the proton during the first 3.0 s of its motion.

R:

Question (b)

The instantaneous velocity of the proton at $t = 3.0\ s$.

R:

Question (c)

The instantaneous acceleration of the proton at $t = 3.0\ s$.

R: