

Physics 101: Major Concepts in Physics I

Fall 2017

Homework 2 on Chapter 2

Go to “Problems” at the end of Chapter 2 beginning on page 49.

(1) 2.24, which stands for the 24th problem in Chapter 2.

Rita Jeptoo of Kenya was the first female finisher in the 110th Boston Marathon. She ran the first 10.0 km in a time of 0.5689 h. Assume the race course to be along a straight line. (a) What was her average speed during the first 10.0 km segment of the race? (b) She completed the entire race, a distance of 42.195 km, in a time of 2.3939 h. What was her average speed for the race?

(2) 2.34 which stands for the 34th problem in Chapter 2.

Draw a motion diagram and sketch graphs of $x(t)$, $v_x(t)$, and $a_x(t)$ for a sprinter running a short race on a straight track, from just before the start of the race until the sprinter has stopped after finishing the race.

(3) 2.50

A typical sneeze has a maximum speed of 44 m/s. Suppose the material emitted in the sneeze begins inside the nose at rest, 2.0 cm from the nostrils. It has a constant acceleration for the first 0.25 cm and then moves at constant velocity for the remainder of the distance. (a) What is the acceleration as it moves the first 0.25 cm? (b) How long does it take to move the 2.0 cm distance in the nose? (c) Sketch a graph of $v_x(t)$.

(4) 2.60

During a walk on the Moon, an astronaut accidentally drops his camera over a 20.0 m cliff. It leaves his hands with zero speed, and after 2.0 s it has attained a velocity of 3.3 m/s downward. How far has the camera fallen after 4.0 s?

(5) 2.76

A cheetah can accelerate from rest to 24 m/s in 2.0 s. Assuming the acceleration is constant over the time interval, (a) what is the magnitude of the acceleration of the cheetah? (b) What is the distance traveled by the cheetah in these 2.0 s? (c) A runner can accelerate from rest to 6.0 m/s in the same time, 2.0 s. What is the magnitude of the acceleration of the runner? By what factor is the cheetah’s average acceleration magnitude greater than that of the runner?

DUE: Wednesday, September 13, 2017 at the beginning of lecture