Problem Set 1 -- accelerated motion

1. A truck starts from rest and moves with a constant acceleration of 5 m/s2. Calculate the speed, velocity, displacement, and distance the truck has moved after 4 seconds and what is the average velocity of the truck during these 4 seconds?

2. What is the acceleration of an object if the object takes 10 seconds to go from 75 m/s right to a velocity of:

 (a) 100 m/s right? (b) 25 m/s right?

3. An object slides from rest down a 6-m long ramp with an acceleration of 2 m/s/s.

 (a) What is the speed of the object at the bottom of the ramp?

 (b) How long does this take? (meaning: How much time?)

4. A train is moving left at 30 m/s. The train stops in 44 seconds.

 (a) What is the acceleration of the train?

 (b) How far does the train go while stopping?

5. A ball has an initial velocity of 20 m/s. The ball rolls up a ramp with an acceleration of 4 m/s2.

(a) How high up the ramp will the ball roll?

(b) At what time and displacement up the ramp will the object have a speed of 5 m/s?

6. An object starts from rest at the +1-meter mark on a tape measure. The object accelerates along the tape

at -0.5 m/s2. Calculate the following quantities for the object after the object moves for 6 seconds:

(a) the velocity of the object

(b) the displacement of the object

(c) the location of the object compared to the zero mark on the tape measure

7. A ping-pong ball is rolling right at 15 m/s. A strong wind blows left giving the ball an acceleration of 3 m/s2 left.

 (a) For how much time will the ball roll right before the wind pushes the ball backward?

 (b) How far right does the ball roll before the wind pushes the ball backward?

 (c) What is the speed and direction of the ball after 6 seconds?

 (d) What was the displacement of the ball during the 6 seconds?

 (e) What total distance did the ball roll during the 6 seconds?

 (f) What was the average velocity of the ball during the 6 seconds?

 (g) What was the average speed of the ball during the 6 seconds?

ANSWERS – I have assigned right as positive direction. If I do not tell you a direction I have

 assigned the direction in which the object was initially moving or starts to move as positive

 direction.

1. speed = 20 m/s 4. (a) +0.68 m/s2 7. (a) 5 seconds

 velocity = +20 m/s (b) 660 m (b) 37.5 m

 displacement = +40 m (c) 3 m/s left

 distance = 40 m 5. (a) 50 m (d) +36 m

 ave. velocity = +10 m/s (b) time displacement \_ (e) 39 m

 3.75 s 46.8 m up the ramp (f) +6 m/s

2. (a) +2.5 m/s2 6.25 s 46.8 m up the ramp (g) 6.5 m/s

 (b) -5 m/s2

 6. (a) -3 m/s

3. (a) 4.9 m/s (b) -9 m

 (b) 2.45 seconds (c) -8 m