

Kinematics W.S. 65

Use the equations of kinematics to solve the following problems.

The equations are:

$$d_f = d_i + v t$$

$$v_f = v_i + a t$$

$$d = (1/2) a t^2$$

$$v_{avg} = (v_i + v_f)/2$$

$$v_f^2 - v_i^2 = 2 a d$$

1) A car travels 780 km in 9.3 hours.

a) Find the speed in km/hr.

b) Find the speed in m/s.

2) A boy on a bike travels with a velocity of 15 km/hr.

a) How far will he travel in 20. minutes?

b) How long would it take for him to travel 40. km?

3) On a trip by car, the speed is 50. km/hr for the first 2.0 hours, then 80. km/hr for the next 3.0 hr.

a) Find the total distance traveled.

b) Find the average speed.

4) A boy starts at a displacement of +45 m. He starts to run with a velocity of -2.5 m/s.

a) Find the displacement at 12. s.

b) Find the time when the displacement is -55 m.

5) A stone is dropped from a cliff.

a) Find the velocity at 3.8 s.

b) Find the time when it has fallen 130 m.

6) A car accelerates from rest to 30. m/s in 8.0 seconds at a constant rate.

a) Find the acceleration.

b) Find the distance traveled in this time.

c) What was the velocity at 4.0 s?

7) A truck accelerates at a constant rate from 5.0 m/s to 13 m/s in a time of 6.0 s.

a) Find the acceleration.

b) Find the distance traveled during this time.

c) Find the speed after the truck has traveled 36 m.

8) A car decelerates from 24 m/s to 0.0 m/s, in 6.0 s at a constant rate.

a) Find the acceleration.

b) Find the distance traveled during the 6.0 seconds.

c) Find the velocity after 4.0 seconds have passed.

d) Find the distance traveled during the last 2.0 seconds.

9) A ball is thrown upwards from the ground with a speed of 32 m/s.

- a) Find the acceleration.
- b) Find the time that it takes to reach the maximum height.
- c) Find the maximum height.
- d) Find the velocity at 2.0 seconds.
- e) Find the velocity at 5.0 seconds.
- f) Find the height at 5.0 seconds.

10) A football player starts from rest and accelerates at a constant rate for 2.0 s to make a tackle 8.0 m away.

- a) Find the acceleration.
- b) Find the velocity at the time of the tackle.

11) A fish jumps to a height of 2.4 m to get over a waterfall.

- a) Find the minimum speed necessary.
- b) Find the time that it took for the fish to reach that height.

Answers: 1)a) 84 km/hr, b) 23 m/s, 2)a) 5.0 km, b) 2.7 hrs, 3)a) 340 km, b) 68 km/hr, 4)a) 15 m, b) 40. s, 5)a) -37 m/s, b) 5.2 s, 6)a) 3.8 m/s², b) 120 m, c) 15 m/s, 7)a) 1.3 m/s², b) 54 m, c) 11 m/s, 8)a) -4.0 m/s², b) 72 m, c) 8.0 m/s, d) 8.0 m, 9)a) -9.8 m/s², b) 3.3 s, c) 52 m, d) 12 m/s, e) -17 m/s, f) 38 m, 10)a) 4.0 m/s², b) 8.0 m/s, 11)a) 6.9 m/s, b) 0.70 s.