Problems of Kinematics: Motion in 1 dimension

1) The displacement of a ball in 120 seconds is 6000 m. Find its speed in cm/s and m/min.

2) The speed of a particle is 90 km/h. If its displacement was 8250 m, calculate: **a)** Its speed in m/s. **b)** How long does it take?

3) A rock has a speed of 75 m/s. Determine: **a)** Its speed in km/h. **b)** Its displacement in a time interval of 1.5 minutes.

4) A block accelerates from 50 m/s to 110 m/s in 5 s. Determine: **a)** The acceleration. **b)** Its displacement.

5) A rock starts out moving at 300 m/s and accelerates to get to 324 m/s. If its displacement is 1872 m, find out: **a)** The acceleration. **b)** How long does it take?

6) A ball has an initial speed of 285 m/s and accelerates at 10 m/s^2 for 13 s. Calculate: **a)** The final velocity. **b)** Its displacement.

7) A car has an initial speed of 112 m/s. To brake to a stop requires a stopping distance of 392 m. Determine: **a)** The average braking acceleration. **b)** How much time it takes to come to a stop.

8) A ball is thrown vertically upward, with an initial velocity of 225.4 m/s. Find out: **a)** The time at which it reaches its maximum height. **b)** The maximum height.
Data: Gravitational acceleration $g = -9.8$ m/s^2.

9) A car moving at 75 m/s applies the brakes and comes to a stop in 5 s. Calculate: **a)** The average braking acceleration. **b)** The car's displacement during the braking.

10) An object is thrown from a height of 120 m vertically upward, with an initial velocity of 205.8 m/s. Find out: **a)** The time at which it reaches its maximum height. **b)** The maximum height (measured from the ground level).
Data: Gravitational acceleration $g = -9.8$ m/s^2.

11) A rock is thrown directly downward, with an initial speed of 28 m/s from a height of 3494.4 m. Calculate: **a)** How much time it takes to fall. **b)** Its velocity when it hits the ground.
Data: Gravitational acceleration $g = 9.8$ m/s^2.

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Answers:

1) 5000 cm/s, 3000 m/min.

2) **a)** 25 m/s, **b)** 330 s.

3) **a)** 270 km/h, **b)** 6750 m.

4) **a)** 12 m/s^2 **b)** 400 m.

5) **a)** 4 m/s^2 **b)** 6 s.

6) **a)** 415 m/s **b)** 4550 m.

7) **a)** –16 m/s^2 **b)** 7 s.

8) **a)** 23 s **b)** 2592.1 m.

9) **a)** –15 m/s^2 **b)** 187.5 m.

10) **a)** 21 s **b)** 2280.9 m.

11) **a)** 24 s **b)** 263.2 m/s.