

## Motion in a straight line

### Objective : Revision and application of the 3 equations of motion ( for constant acceleration )

1. A body starts from rest and moves with uniform acceleration. If it attains a velocity of  $20\text{ms}^{-1}$  in 5 seconds then find (a) its acceleration (b) its displacement.
2. A body starts from rest and covers a distance of 200 m in 10 seconds moving with uniform acceleration in the same direction in a straight line. Find the acceleration and final velocity of the body.
3. A body starts from rest and moves with uniform acceleration. If it attains a velocity of  $20\text{ms}^{-1}$  while undergoing a displacement of 200 then find (a) its acceleration (b) its time of travel.
4. A body moving with an initial velocity of  $40\text{ms}^{-1}$ , decelerates uniformly to come to rest in 10 seconds. Find (a) its deceleration (b) its displacement as it comes to rest.
5. A body moving with an initial velocity of  $10\text{ms}^{-1}$ , decelerates uniformly to come to rest in 40 m. Find (a) its deceleration (b) time taken by it to come to rest.
6. A body having an initial velocity of  $5\text{ms}^{-1}$  attains a velocity of  $15\text{ms}^{-1}$  as it undergoes a displacement of 100m with uniform acceleration. Find its (a) acceleration (b) time of travel.
7. A body having an initial velocity of  $10\text{ms}^{-1}$  attains a velocity of  $30\text{ms}^{-1}$  in 5 seconds with uniform acceleration. Find its (a) acceleration (b) displacement.
8. Two bodies A and B start from the same point and move in the same direction with uniform accelerations of  $2\text{ms}^{-2}$  and  $3\text{ms}^{-2}$  respectively for 5 seconds. Find (a) the ratio of their final velocities (b) distance between them.
9. Two bodies A and B start from the same point and move in opposite directions, with uniform accelerations of  $1\text{ms}^{-2}$  and  $2\text{ms}^{-2}$  respectively for 10 seconds. Find (a) the ratio of their final speeds (b) distance between them.
10. Two bodies A and B are separated by a distance of 1200m. They start from rest and move towards each other with uniform accelerations of  $4.0\text{ms}^{-2}$  and  $2.0\text{ms}^{-2}$  respectively. Find (a) the instant of time when they meet each other (b) distance covered by each of them as they meet (c) ratio of their speeds when they meet.

### Answers

1. (a)  $4 \text{ ms}^{-2}$  (b) 50 m
2. (a)  $4 \text{ ms}^{-2}$  (b)  $40 \text{ ms}^{-1}$
3. (a)  $1 \text{ ms}^{-2}$  (b) 20 s
4. (a)  $-4 \text{ ms}^{-2}$  (b) 200 m
5. (a)  $-1.25 \text{ ms}^{-2}$  (b) 8 s
6. (a)  $1 \text{ ms}^{-2}$  (b) 10 s
7. (a)  $4 \text{ ms}^{-2}$  (b) 100 m
8. (a) 2:3 (b) 12.5 m
9. (a) 1:2 (b) 150 m
10. (a) 20 seconds (b) 800 m and 400 m respectively (c) 2:1