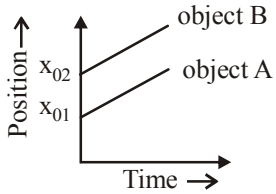
2 Motion in a Straight Line

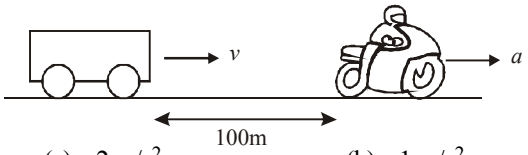
Diagram Based Questions :

1. The graph shown below represents



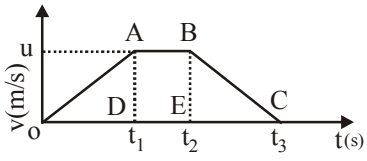
(a) A and B are moving with same velocity in opposite directions
(b) velocity of B is more than A in same direction
(c) velocity of A is more than B in same direction
(d) velocity of A and B is equal in same direction

2. A man travelling in a car with a maximum constant speed of 20m/s watches the friend start off at a distance 100m ahead on a motor cycle with constant acceleration '*a*'. The maximum value of '*a*' for which the man in the car can reach his friend is



(a) 2 m/s^2 (b) 1 m/s^2
(c) 4 m/s^2 (d) None of these

3. The velocity time graph of the motion of the body is as shown below



The total distance travelled by the body during the motion is equal to

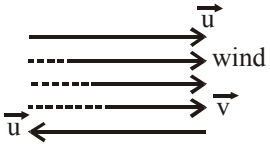
(a) $\frac{1}{2}(AD+BE)\times OC$

(b) $\frac{1}{2}(OA+BC)\times OC$

(c) $\frac{1}{2}(OC+AB)\times AD$

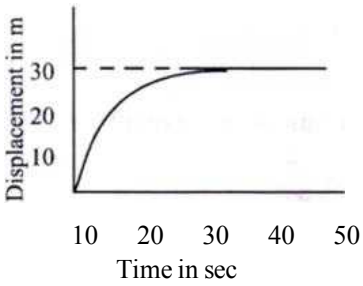
(d) $\frac{1}{2}(OA+AB)\times BC$

4. Wind is blowing west to east along two parallel tracks. Two trains moving with same speed in opposite directions have the relative velocity w.r.t. wind in the ratio 1 : 2. The speed of each train is



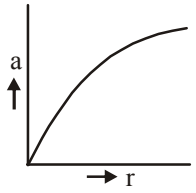
(a) equal to that of wind
(b) double that of wind
(c) three times that of wind
(d) half that of wind

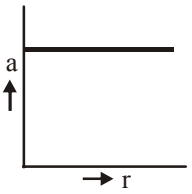
5. The displacement of a particle as a function of time is shown in figure. It indicates that

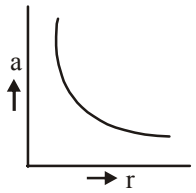


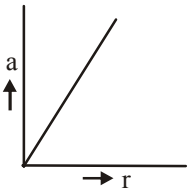
(a) the velocity of the particle is constant throughout
(b) the acceleration of the particle is constant throughout
(c) the particle starts with a constant velocity and is accelerated
(d) the motion is retarded and finally the particle stops

6. If a body moving in circular path maintains constant speed of 10 ms^{-1}, then which of the following correctly describes relation between acceleration and radius ?

(a) 

(b) 

(c) 

(d) 

Solution

1. **(d)**

2. **(a)** $v^2 = u^2 + 2as$

$400 > 2a(100) : a < 2$

3. **(c)**

4. **(c)** Let v be velocity of wind and u be velocity of each train.

Rel. vel. of one train w.r.t. wind = 2 × Rel. vel. of other train w.r.t. wind

$u + v = 2 (u - v)$

$v + 2v = 2u - u = u.$

i.e., $u = 3v.$

5. **(e)** From displacement-time graph, it is clear that in equal intervals of time displacements are not equal infact, decreases and after 40s displacement constant i.e. the particle stops.

6. **(c)** Speed, V = constant (from question)

Centripetal acceleration,

$$a = \frac{V^2}{r}$$

ra = constant

Hence graph **(c)** correctly describes relation between acceleration and radius.