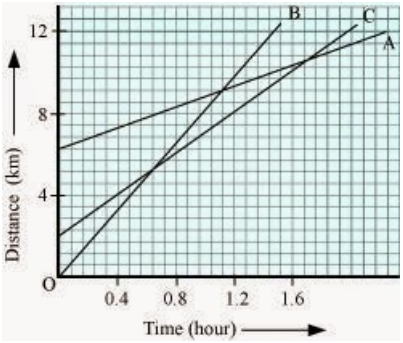
6. Fig. shows the distance-time graph of three objects A, B and C. Study the graph and answer the following questions:

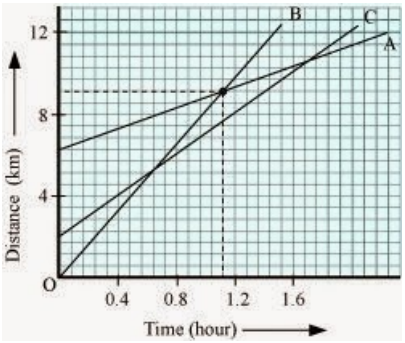


(a) Which of the three is travelling the fastest?
(b) Are all three ever at the same point on the road?
(c) How far has C travelled when B passes A?
(d) How far has B travelled by the time it passes C?
Answer:
(a) Object B
(b) No
(c) 5.714 km
(d) 5.143 km

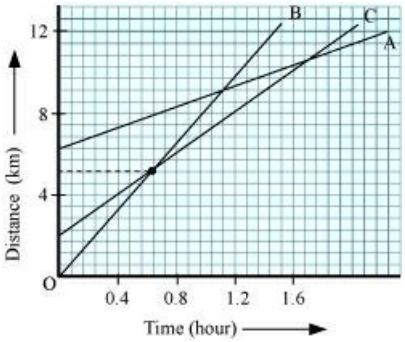
(a) $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

$\text{Slope of graph} = \frac{y-\text{axis}}{x-\text{axis}} = \frac{\text{Distance}}{\text{Time}}$

Therefore, Speed = slope of the graph
Since slope of object B is greater than objects A and C, it is travelling the fastest.
(b) All three objects A, B and C never meet at a single point. Thus, they were never at the same point on road.
(c)



7 square box = 4 km
1 square box = 4/7 km
C is 4 blocks away from origin therefore initial distance of C from origin = 16/7 km
Distance of C from origin when B passes A = 8 km
Thus, Distance travelled by C when B passes A = 8 - 16/7 = (56 - 16)/7 = 40/7 = 5.714 km
(d)

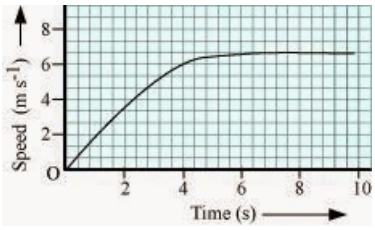


Distance travelled by B by the time it passes C = 9 square boxes
9×4/7 = 36/7 = 5.143 km

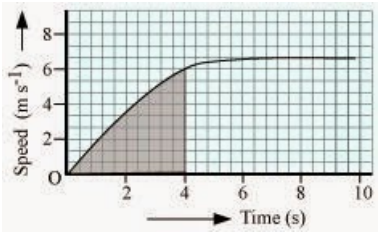
Page No: 113

7. A ball is gently dropped from a height of 20 m. If its velocity increases uniformly at the rate of 10 m s^{-2}, with what velocity will it strike the ground? After what time will it strike the ground?
Answer: Let us assume, the final velocity with which ball will strike the ground be 'v' and time it takes to strike the ground be 't'
Initial Velocity of ball, u =0
Distance or height of fall, s =20 m
Downward acceleration, a =10 m s^{-2}
As we know, $2as = v^2 - u^2$
$v^2 = 2as + u^2$
= 2 x 10 x 20 + 0
= 400
∴ Final velocity of ball, v = 20 ms^{-1}
t = (v-u)/a
∴ Time taken by the ball to strike = (20-0)/10
= 20/10
= 2 seconds

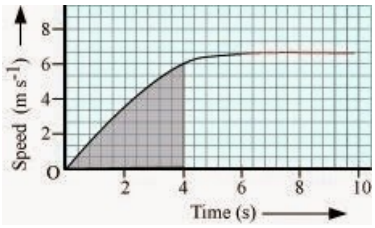
8. The speed-time graph for a car is shown is Fig. 8.12.



(a) Find out how far the car travels in the first 4 seconds. Shade the area on the graph that represents the distance travelled by the car during the period.
(b) Which part of the graph represents uniform motion of the car?
Answer:
(a)



The shaded area which is equal to 1/2 × 4 × 6 = 12 m represents the distance travelled by the car in the first 4 s.
(b)



The part of the graph in red colour between time 6 s to 10 s represents uniform motion of the car.

9. State which of the following situations are possible and give an example for each of these:
(a) an object with a constant acceleration but with zero velocity.
(b) an object moving in a certain direction with an acceleration in the perpendicular direction.
Answer:
(a) Possible
When a ball is thrown up at maximum height, it has zero velocity, although it will have constant acceleration due to gravity, which is equal to 9.8 m/s^2.
(b) Possible
When a car is moving in a circular track, its acceleration is perpendicular to its direction.

10. An artificial satellite is moving in a circular orbit of radius 42250 km. Calculate its speed if it takes 24 hours to revolve around the earth.
Answer:
Radius of the circular orbit, r = 42250 km
Time taken to revolve around the earth, t= 24 h
Speed of a circular moving object, v = (2**π**r)/t
= [2× (22/7)×42250 × 1000] / (24 × 60 × 60)
= (2×22×42250×1000) / (7 ×24 × 60 × 60) $m\ s^{-1}$
= 3073.74 $m\ s^{-1}$

********** END **********