PHYSICS

BOOKS - KUMAR PRAKASHAN KENDRA PHYSICS (GUJRATI ENGLISH)

MOTION

Example

1. A bus starts from village A to $7:00$ am and reaches village B at $8:30$ am. If the discatnace

between the villages A and B is 60 km. Find the average speed of the bus.

2. A bus starts from village A to $7:00$ am and reaches village B at $8:30$ am. If the discatnace between the villages A and B is 60 km. Find the average speed of the bus.

1. Discuss whether the walls of your classroom are at rest or in motion.

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2. Have you ever experienced that the train in which you are sitting appears to move while it is at rest ? Discuss and share your experience.

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3. Take a metre scale and a long rope.

Walk from one corner A of a basketball court to its opposite corner Calong its sides AB and AC.

Measure the distance covered by you and magnitude of the displacement.

What difference would you notice between the two in this case ?

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4. Automobiles are fitted with a device that shows the distance travelled. Such a device is known as an odometer. A car is driven from Bhubaneshwar to New Delhi. The difference between the final reading and the initial reading of the odometer is 1850 km.

Find the magnitude of the displacement between Bhubaneshwar and New Delhi by using the Road Map of India.

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5. The data regarding the motion of two different objects A and B are given in the following table :

Time	Distance travelled by object A in m	Distance travelled by object B in m
9.30 am	10	12
9.45 am	20	19
10.00 am	30	23
10.15 am	40	35
10.30 am	50	37
10.45 am	60	41
11.00 am	70	44

Examine them carefully and state whether the motion of the objects is uniform or non-uniform.

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6. Measure the time it takes you to walk from your house to your bus stop or the school. If you consider that your average walking speed is $4 kms per hr$ estimate the distance of the bus stop or school from your house.

7. At a time when it is cloudy. there may be frequent thunder and lightning. The sound of thunder takes some time to reach you after

you see the lightning .

Can you answer why this happens ?

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8. Measure this time interval using a digital

wrist watch or a stopwatch.

Calculate the distance of the nearest point of

lightning (Speed of sound in air = 346 ms^{-1})

> ▶ **Watch Video Solution**

9. In your everyday life you come across a range of motions in which

(a) acceleration is in the direction of motion.

(b) acceleration is against the direction of motion.

(c) acceleration is uniform.

(d) acceleration is non-uniform.

Can you identify one example each of the above type of motion ?

10. The time of arrival and departure of a train at three stations A, B and Cand the distance of stations B and C from A are given in the following table:

Distances of stations B and C from A and times of arrival and departure of the train			
Station	Distance from A (km)	Time of arrival (hour)	Time of departure (hour)
A	0	08 : 00	08 : 15
B	120	11 : 15	11 : 30
C	180	13 : 00	13 : 15

`Plot and interpret the distance-time graph for the train assuming that its motion between any two siations in uniform.

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11. Feroz and his sister Sania go to school on their bicycle. Both of them start the at the same time from their home but take different times to reach the school although they follow the same route.

The table given below shows the distance travelled by them in different times:

Distance covered by Feroz and Sania at different times on their bicycles		
Time	Distance travelled by Feroz (km)	Distance travelled by Sania (km)
8:00 am	0	0
8:05 am	1.0	0.8
8:10 am	1.9	1.6
8:15 am	2.8	2.3
8:20 am	3.6	3.0
8:25 am	-	3.6

Draw the graph for distance-time graph

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12. Take a piece of thread and tie a small place of stone at one of its ends. Hold the other end of the thread and move the stone to describe a circular path with constant speed.
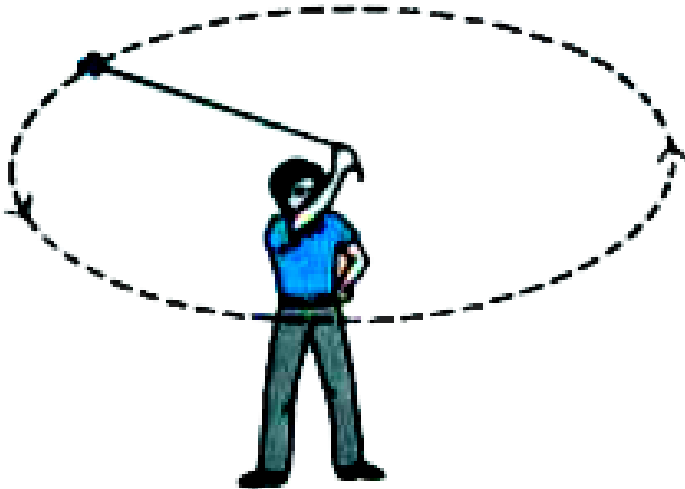
A stone describing a circular path with a velocity of constant magnitude

Now, release the thread.

Can you tell the direction in which the stone moves after it is released ?

13. If n capacitors are connected in series then what is the equivalent capacitance?

14. If n capacitance are connected in parallel and all are equal then find equivalent

capacitance.

15. Take a metre scale and a long rope.

Walk from one corner A of a basketball court to its opposite corner Calong its sides AB and AC.

Measure the distance covered by you and magnitude of the displacement.

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16. If n equal resistance are first connected in series then find the equivalent resistance

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you consider that your average walking speed is $4 kms per hr$ estimate the distance of the bus stop or school from your house.

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▶ **Watch Video Solution**

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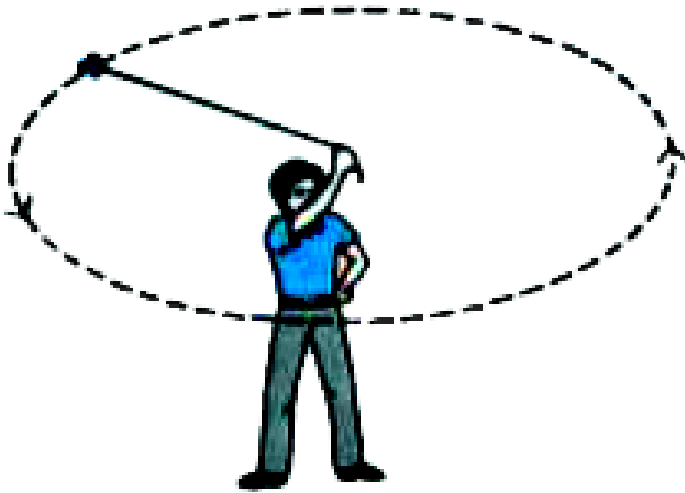
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1. We sometimes are endangered by the motion of objects around us, especially if that motion is erratic and uncontrolled as observed in a flooded river, a hurricane or a tsunami. On the other hand, controlled motion can be a service to human beings such as in the generation of hydroelectric power. Do you feel the necessity to study the erratic motion of some objects and learn to control them?

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Intext Questions And Answers

1. An object has moved through a distance. Can it have zero displacement ? If yes, support your answer with an example.

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2. A farmer moves along the boundry of a square field of side 10M in 40s. What will be the magnitude of displacement of the farmer at the end of 2 minutes 20 seconds from his initial position?

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3. Which of the following is true for displacement ?

(a) It cannot be zero.

(b) Its magnitude is greater than the distance travelled by the object.

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4. Distinguish between speed and velocity.

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5. Under what condition (s) is the magnitude of average velocity of an object is equal to its average speed ?

6. What does the odometer of an automobile

measure ?

7. What does the path of an object look like

when it is in uniform motion ?

8. During an experiment, a signal from spaceship reached the ground station in five minute. What was the distance of the speceship from the ground station ? The signal travels at the speed of light, that is, $3 \times 10^8 ms^{-1}$.

9. When will you say a body is in (i) uniform acceleration ?

(ii) non-uniform acceleration ?

10. A bus decreases its speed from $80 km h^{-1}$ to $60 km h^{-1}$ in 5s. Find the acceleration of the bus.

11. A train starting from a railway station and moving with uniform acceleration attains a

speed of $40km^{-1}$ in 10 minute. Find its acceleration.

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12. What is the nature of the distance-time graphs for uniform and non-uniform motion of an object?

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13. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis ?

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14. What can you say about the motion of an object if its speed-time graph is a straight line parallel to the time axis ?

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15. What is the quantity which is measured by the area occupied below the velocity-time graph ?

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16. A bus starting from rest moves with a uniform acceleration of $0.1ms^{-2}$ for 2 minutes. Find (a) the speed acquiresd (b) the distance travelled.

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17. A train is travelling at a peed of $90 kmh^{-1}$. Breakes are applied so as to produce a uniform acceleration of $-0.5 ms^{-2}$. Find how far the train will go before it is brought to rest.

18. A trolley, while going doen an inclined plance, has an acceleration of $2\ cms^{-2}$. What will be its velocity 3 s after the start ?

19. A racing car has a uniform acceleration of $4ms^{-2}$. What distance will it cover in 10 s after the start ?

20. A stone is throuwn in a vertically upward direction with a velocity of $5ms^{-1}$. If the acceleration of the stone during its motion is $10ms^{-2}$ in the downword direction, what will

be the height attained by the stone and how much time will it take to reach there ?

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30. A bus accelerates its speed from $24kmh^{-1}$ to $54kmh^{-1}$ in 5s. Find the acceleration of the bus.

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1. What is motion ?

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2. What is uniform motion ?

3. What is displacement ?

4. Is it possible that displacement is greater than the distance travelled by an object ?

5. Define : Speed

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6. State the units of speed

Watch Video Solution

7. Define : Average speed

Watch Video Solution

8. Can the average speed of an object in motion be zero ?

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9. What is displacement of an object in motion in unit time called ?

▶ **Watch Video Solution**

10. Define : Accelaration

11. What is the SI unit of acceleration ?

12. A train starting from a railway station attains a velocity of $30ms^{-1}$ in one minute. What is its acceleration ?

13. Give an example of uniform acceleration.

14. Give an example of negative acceleration.

15. Name two quantities which you can calculate from speed-time graph.

16. What do the following distance-time graphs indicate ?
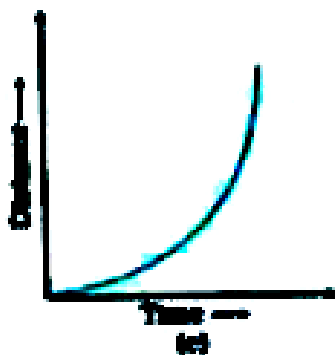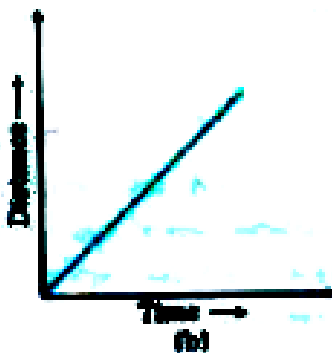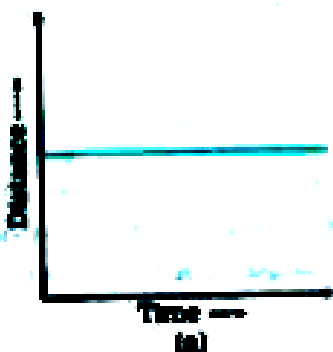
17. What does the area under velocity-time graph and the time axis represent ?

▶ **Watch Video Solution**

18. Define : Uniform circular motion

▶ **Watch Video Solution**

19. What type of motion does an athlete moving along a circular path with constant speed execute ?

20. A driver decreases the speed of a car from

$25ms^{-1}$ to $10ms^{-1}$ in 5 second. Find the

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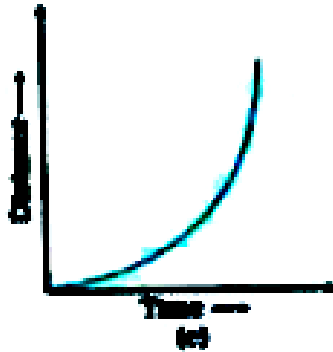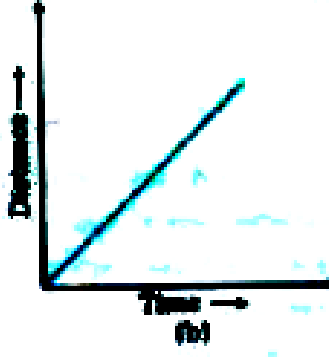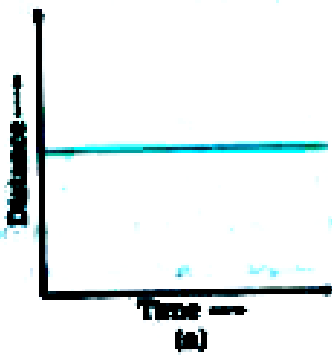
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40. A driver decreases the speed of a car from $25ms^{-1}$ to $10ms^{-1}$ in 5 second. Find the acceleration of the car.

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Choose Corect Option

1. For which of the following physical quantities it is necessary to indicate direction along with its magnitude ?

A. Speed

B. Path length

C. Displacement Temperature

D. Temperature

Answer: C

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2. A sprinter completes a round on a circular path of circumference 400 m, what is his displacement ?

A. 400 m

B. 200 m

C. 100 m

D. zero

Answer:

3. Constant speed oof a train is $54 kimh^{-1}$.

What is its speed in unit $'ms^{-1}$. ?

A. $15 ms^{-1}$

B. $90 ms^{-1}$

C. $1.5 ms^{-1}$

D. $9 ms^{-1}$

Answer: A

4. A scooterist travels at $30 kmh^{-1}$ along a stright path for 20 min. How much distance has he travelled ?

A. $1.5km$

B. $6km$

C. $10km$

D. $90km$

Answer: A

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5. A cyclist travels 5km in the east direction.

Then he travels 12km in the south direction.

What is the magnitude of displacement of the cyclist ?

A. 17 km

B. 13 km

C. 7km

D. zero

Answer: B

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6. If velocity-time graph for a body in motion is a straight line parallel to time axis, what type of motion is the body performing ?

    A. would be stationary

    B. non-uniform motion

    C. motion with constant acceleration

    D. motion with constant velocity

Answer: A::C

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7. Which type of motion is described by a graph in figure?
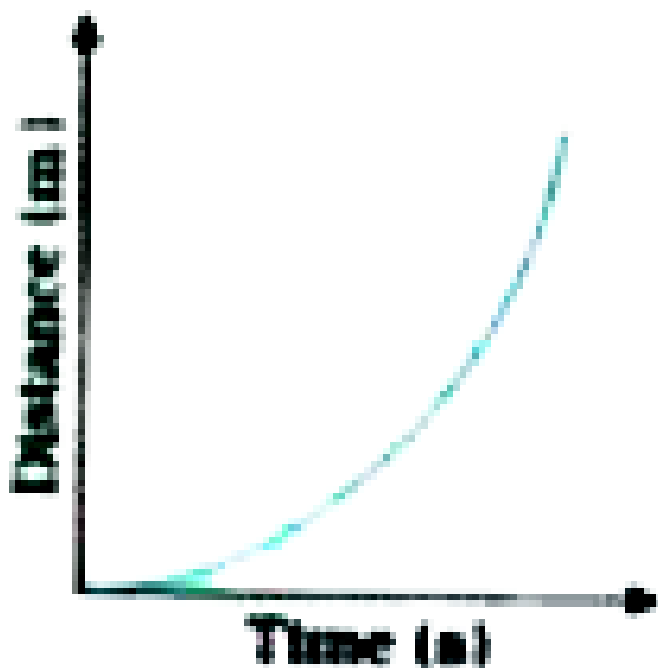
A. uniform motion

B. uniformly accelerated motion

C. non-uniform acce lerated motion

D. body is in stationary state

Answer: B

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8. Velocity of a vehicle increases from 5ms to $15ms^{-1}$ in 5 s. What is the magnitude of acceleration ?

A. $4ms^{-2}$

B. $4ms^{-1}$

C. $2ms^{-1}$

D. $2ms^{-2}$
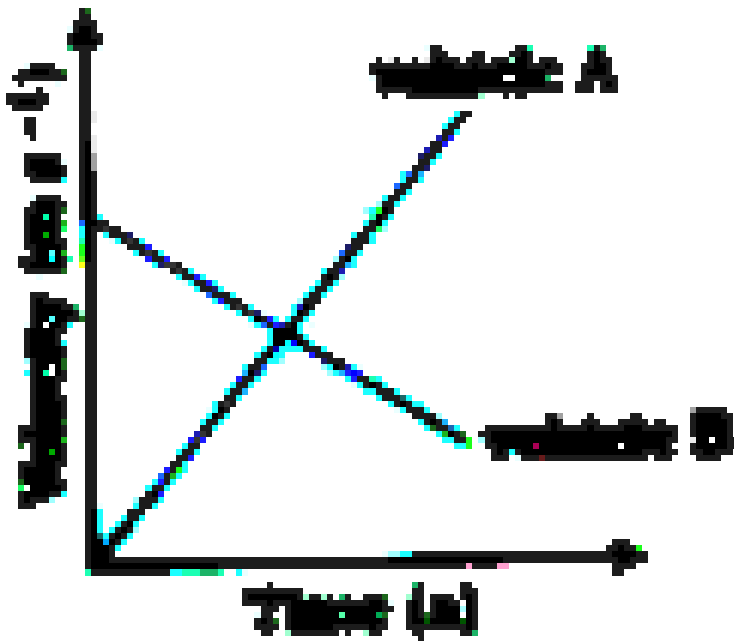
Answer: B

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9. Velocity-time graphs vehicle A for vehicles A and B are shown in figure Which vehicle has accelerated motion vehicle B and which vehicle

has retarded motion ?

A. Vehicle A retardation, vehicle B acceleration

B. Vehicle A acceleration, vehicle B retardation

C. Both vehicles A and B acceleration

D. Both vehicles A and B retardation

Answer: B

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10. Acceleration of a car in motion is $1.5ms^{-2}$. How much is the increase in velocity in 4s?

A. $6ms^{-1}$

B. $4ms^{-1}$

C. $4ms^{-1}$

D. $2.66ms^{-1}$

Answer: A

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11. For which physical quantity from the following, direction is not required to be mentioned with its magnitude ?

A. Speed

B. Displacement

C. Velocity

D. Acceleration

Answer: D

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12. When is it said that the object performs uniform motion?

A. Covers different distances in equal intervals of time.

B. Covers equal distances in different time intervals.

C. Covers equal distances in equal time intervals.

D. Covers different distances in different time intervals.

Answer: C

13. A person walks distance of 4 km from his home in the north direction. Then he covers distance of 3 km in west direction. Now t from this place he direction walks toward home on the path of minimum distance between that place and home. What would be the total

Home distance covered by this person?

A. 5 km

B. 7 km

C. 12 km

D. zero

Answer: C

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14. A vehicle covers certain distance at constant speed of $20 kmh^{-1}$ in time interval 't' on linear path. Then it covers certain distance at constant speed of $30 kmh^{-1}$ in the same time interval. What is the average speed of the vehicle ?

A. $25 kmh^{-1}$

B. $24 kmh^{-1}$

C. $50 kmh^{-1}$

D. $12 kmh^{-1}$

Answer: A

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15. What is acceleration?

A. Rate of position changing with time

B. Rate of velocity changing with time

C. Rate of speed changing with time

D. Rate of displacement changing with time

Answer: B

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16. Which of the following relations is correct for a vehicle performing uniform accelerated motion?

A. $v = \dfrac{a}{t}$

B. $u = \dfrac{a}{t}$

C. $t = -\dfrac{(v - u)}{a}$
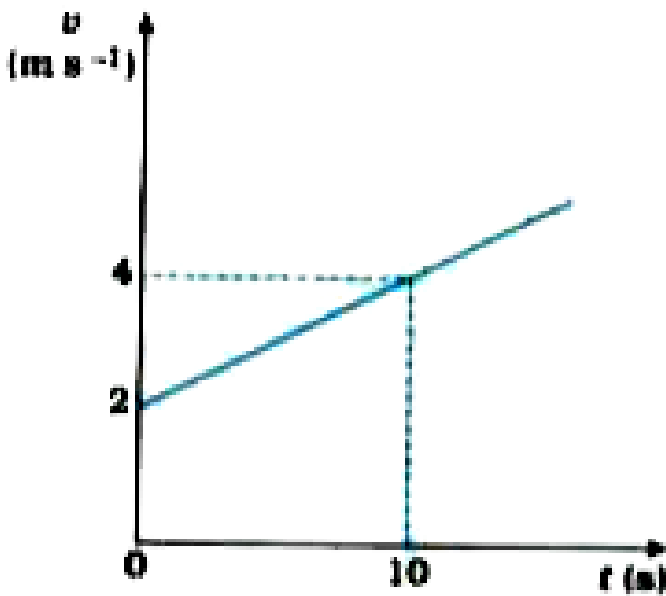
D. $v = u + at$

Answer: A

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17. A graph of velocity versus time (v - t) for an object performing motion with uniform acceleration is shown

What would be the velocity of the object at time t= 0?

A. 0

B. $2ms^{-1}$

C. $4ms^{-1}$

D. $10ms^{-1}$

Answer: B

18. What is constant for an object performing uniform circular motion ?

    A. Acceleration

    B. Velocity

    C. Displacement

    D. Speed

Answer: D

19. What value is given by the area of a region surrounded below the graph of v-t of a moving object in the given time period ?

    A. Distance

    B. Velocity

    C. Acceleration

    D. Force

Answer: A::C::D

20. Velocity of a moving car goes on increasing with time. In which direction would the acceleration of this car be?

    A. in direction of velocity

    B. in opposite direction to velocity

    C. in perpendicular direction to velocity

    D. in any direction

Answer: A

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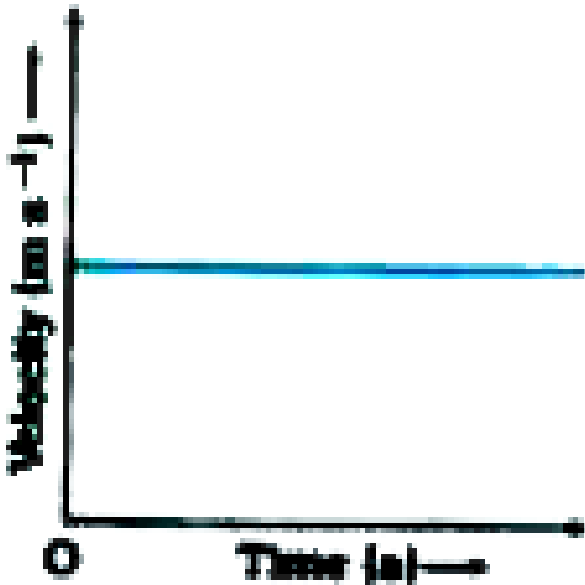
21. A graph of velocity-time (v-t) for an object performing motion is shown, what would you

conclude about motion of the object?

A. It would be performing uniform motion.

B. It would be performing non-uniform

   motion.

C. It would be in steady state.

D. It would be performing constant

accelerated motion,

Answer: A

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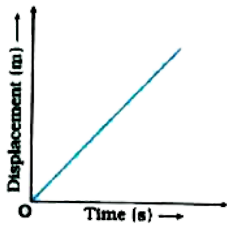**22.** Which of the following graphs represents

uniform motion of an object ?

A.

B.

B.

C.

C.

D.

D.
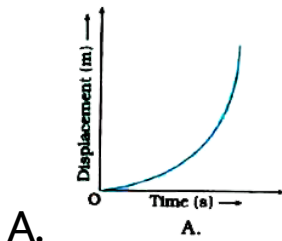
Answer:

23. Four motorcars A, B, C and D are moving on a road in the same direction. Their graphs for distance-time are shown in the same graph paper, which of the following state is true ?
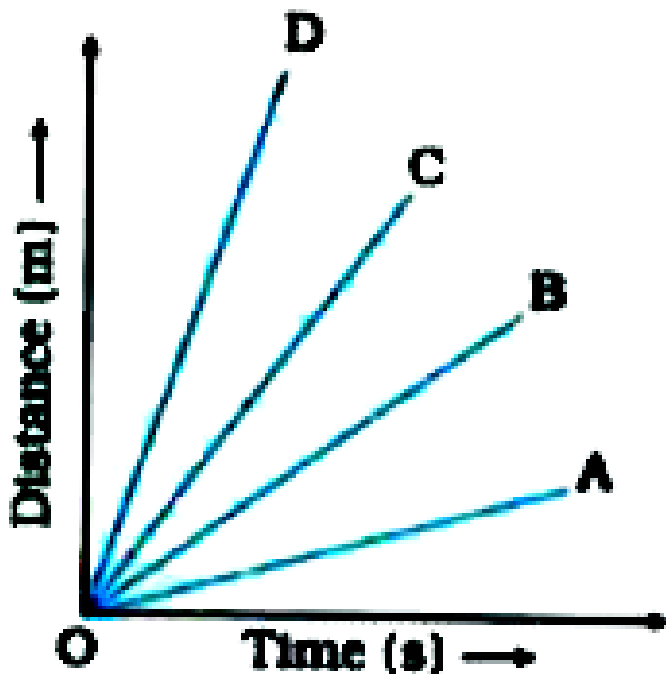
A. Motorcar A is faster than car c.

B. Motorcar D is the fastest.

C. Motorcar B is faster than car D.
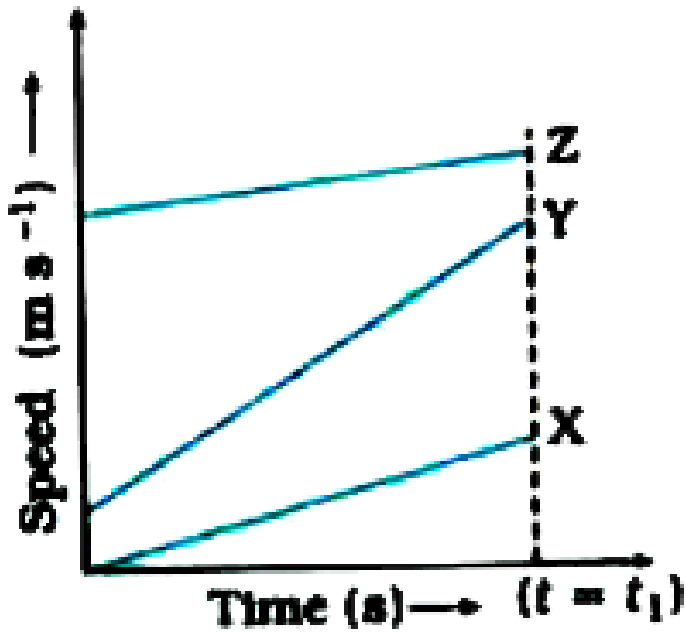
D. Motorcar is slower than car B.

Answer: A::C::D

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24. The speed-time graphs for three objects X, Y and Z are represented on the same graph paper. Which object would cover the highest

distance in given interval of time (t)?

A. Z

B. X

C. Y

D. All three objects would cover the same

(equal) distance

Answer:

25. A particle is moving on a circle of radius r.

The displacement at the end of half revolution

would be ...

A. zero

B. pr

C. $2e$

D. $2\pi r$

Answer: B

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26. An object is thrown in vertical upward direction with velocity 'u' then the maximum height attained by the object would be....

A. $\dfrac{u}{g}$

B. $\dfrac{u^2}{2g}$

C. $\dfrac{u^2}{g}$

D. $\dfrac{u}{2g}$

Answer: B

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27. The numerical ratio of displacement to distance for a moving object is......

A. always less than1

B. always equal to 1

C. always more than 1

D. equal to or less than 1

Answer: A

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28. If the distance (s), covered by an object is directly proportion to the square of time (t). then the object ....

A. would be performing motion with

constant velocity.

B. would be performing motion with

constant acceleration.

C. would be performing motion with

increasing acceleration.

D. would be performing motion with

decreasing acceleration

Answer: B

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29. If a boy is sitting on a merry-go-round, moves with constant speed of 10 ms^{-1} he would be ...

A. in steady state

B. moving with no acceleration

C. performing accelerated motion

D. moving with constant velocity

Answer: C

30. Area under a velocity-time graph represents a physical quantity which has the unit ....

A. m^2

B. m

C. m^3

D. ms^{-1}

Answer:

31. in which of the following cases of motion, the distance covered and magnitude of displacement can be same?

A. If the car performs motion on linear path.

B. If the car performs motion on circular path.

C. If the oscillator oscillates to and fro

about the mean-position.

D. If the earth revolves around the sun.

Answer: A

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32. For which of the following physical

quantities it is necessary to indicate direction

along with its magnitude ?

A. Speed

B. Path length

C. Displacement Temperature

D.

Answer: A::C::D

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33. A sprinter completes a round on a circular

path of circumference 400 m, what is his

displacement ?

A. 400 m

B. 200 m

C. 100 m

D. zero

Answer:

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34. Constant speed oof a train is $54 kimh^{-1}$.

What is its speed in unit $'ms^{-1}$. ?

A. $15 ms^{-1}$

B. $90 ms^{-1}$

C. $1.5 ms^{-1}$

D. $9 ms^{-1}$

Answer: A

▶ **Watch Video Solution**

---

35. A scooterist travels at $30 kmh^{-1}$ along a stright path for 20 min. How much distance has he travelled ?

A. $1.5km$

B. $6km$

C. $10km$

D. $90km$

Answer: A

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36. A cyclist travels 5km in the east direction.

Then he travels 12km in the south direction.

What is the magnitude of displacement of the cyclist ?

A. 17 km

B. 13 km

C. 7km

D. zero

Answer: A::C

> ▶ **Watch Video Solution**

37. If velocity-time graph for a body in motion is a straight line parallel to time axis, what type of motion is the body performing ?

A. would be stationary

B. non-uniform motion

C. motion with constant acceleration

D. motion with constant velocity

Answer: D

38. Which type of motion is described by a graph in figure?
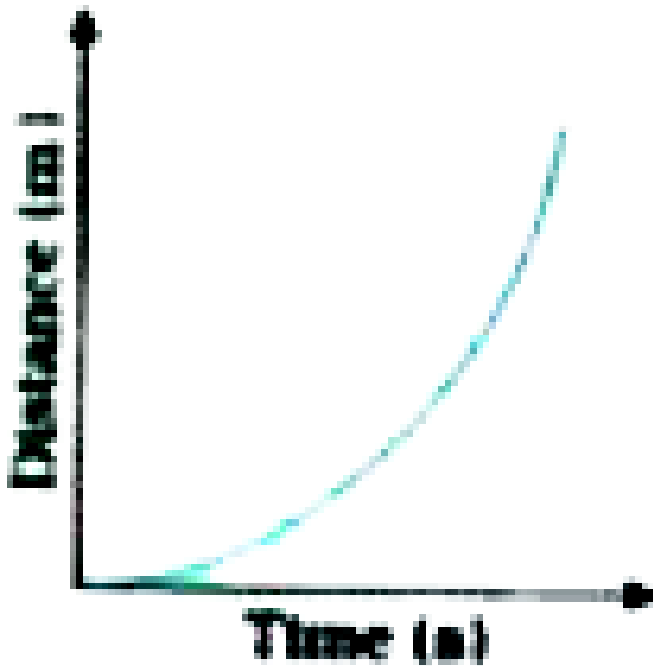
A. uniform motion

B. uniformly accelerated motion

C. non-uniform acce lerated motion

D. body is in stationary state

Answer: B

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39. Velocity of a vehicle increases from 5ms to

$15ms^{-1}$ in 5 s. What is the magnitude of

acceleration ?

A. $4ms^{-2}$

B. $4ms^{-1}$

C. $2ms^{-1}$

D. $2ms^{-2}$

Answer: D

▶ **Watch Video Solution**

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40. Velocity-time graphs vehicle A for vehicles

A and B are shown in figure Which vehicle has

accelerated motion vehicle B and which vehicle

has retarded motion ?

A. Vehicle A retardation, vehicle B acceleration

B. Vehicle A acceleration, vehicle B retardation

C. Both vehicles A and B acceleration

D. Both vehicles A and B retardation

Answer: B

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41. Acceleration of a car in motion is $1.5ms^{-2}$. How much is the increase in velocity in 4s?

A. $6ms^{-1}$

B. $4ms^{-1}$

C. $4ms^{-1}$

D. $2.66ms^{-1}$

Answer: A

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42. For which physical quantity from the following, direction is not required to be mentioned with its magnitude ?

A. Speed

B. Displacement

C. Velocity

D. Acceleration

Answer: D

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43. When is it said that the object performs uniform motion?

A. Covers different distances in equal intervals of time.

B. Covers equal distances in different time intervals.

C. Covers equal distances in equal time intervals.

D. Covers different distances in different time intervals.

Answer: A::C::D

44. A person walks distance of 4 km from his home in the north direction. Then he covers distance of 3 km in west direction. Now t from this place he direction walks toward home on the path of minimum distance between that place and home. What would be the total

Home distance covered by this person?

A. 5 km

B. 7 km

C. 12 km

D. zero

Answer: C

45. A vehicle covers certain distance at constant speed of $20 kmh^{-1}$ in time interval 't' on linear path. Then it covers certain distance at constant speed of $30 kmh^{-1}$ in the same time interval. What is the average speed of the vehicle ?

A. $25 kmh^{-1}$

B. $24 kmh^{-1}$

C. $50 kmh^{-1}$

D. $12 kmh^{-1}$

Answer: A

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46. What is acceleration?

A. Rate of position changing with time

B. Rate of velocity changing with time

C. Rate of speed changing with time

D. Rate of displacement changing with time

Answer: A::C

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47. Which of the following relations is correct for a vehicle performing uniform accelerated motion?

A. $v = \dfrac{a}{t}$

B. $u = \dfrac{a}{t}$

C. $t = -\dfrac{(v - u)}{a}$

D. $v = u + at$

Answer: A

▶ **Watch Video Solution**

---

48. A graph of velocity versus time (v - t) for an object performing motion with uniform acceleration is shown

What would be the velocity of the object at time t= 0?

A. 0

B. $2ms^{-1}$

C. $4ms^{-1}$

D. $10ms^{-1}$

Answer: B

49. What is constant for an object performing uniform circular motion ?

A. Acceleration

B. Velocity

C. Displacement

D. Speed

Answer: D

50. What value is given by the area of a region surrounded below the graph of v-t of a moving object in the given time period ?

A. Distance

B. Velocity

C. Acceleration

D. Force

Answer: A

---

51. Velocity of a moving car goes on increasing with time. In which direction would the acceleration of this car be?

    A. in direction of velocity

    B. in opposite direction to velocity

    C. in perpendicular direction to velocity

    D. in any direction

Answer: A

52. A graph of velocity-time (v-t) for an object

performing motion is shown, what would you

conclude about motion of the object?

A. It would be performing uniform motion.

B. It would be performing non-uniform motion.

C. It would be in steady state.

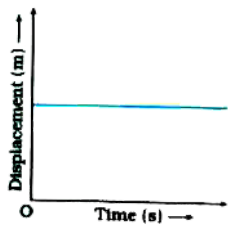D. It would be performing constant accelerated motion,

Answer: A

> ▶ **Watch Video Solution**

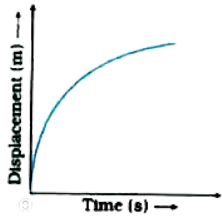**53.** Which of the following graphs represents uniform motion of an object ?
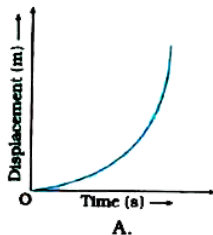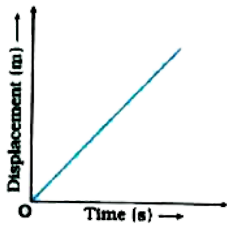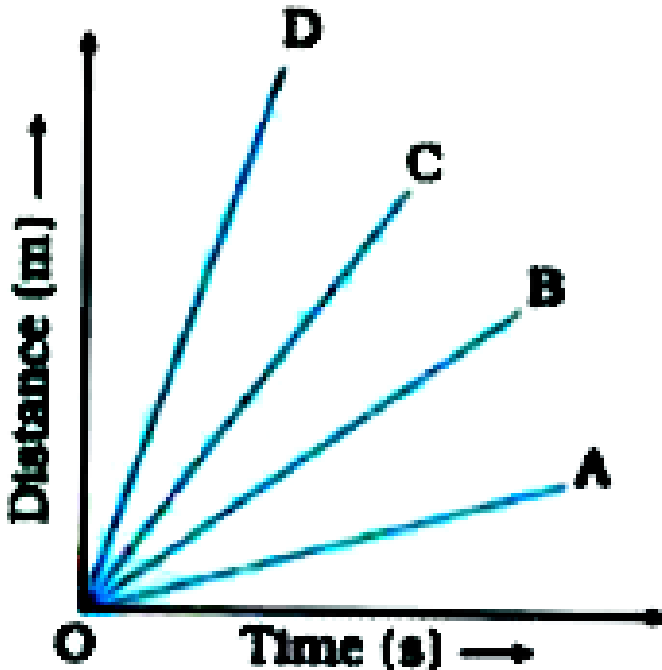

A.

B.

B.

C.

C.

D.

D.

Answer:

▶ **Watch Video Solution**

54. Four motorcars A, B, C and D are moving on a road in the same direction. Their graphs for distance-time are shown in the same graph paper, which of the following state is true ?

A. Motorcar A is faster than car c.

B. Motorcar D is the fastest.

C. Motorcar B is faster than car D.
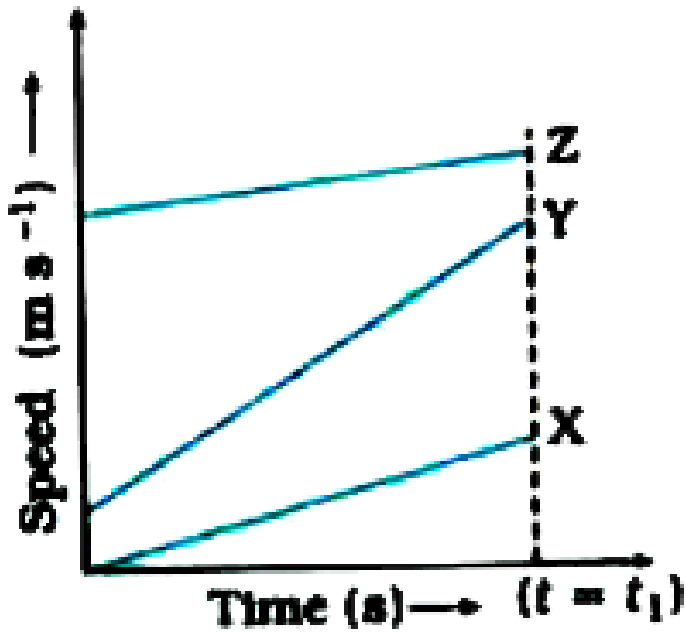
D. Motorcar is slower than car B.

Answer: A::C::D

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55. The speed-time graphs for three objects X, Y and Z are represented on the same graph paper. Which object would cover the highest

distance in given interval of time (t)?

A. Z

B. X

C. Y

D. All three objects would cover the same

(equal) distance

Answer:

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56. A particle is moving on a circle of radius r.

The displacement at the end of half revolution

would be ...

A. zero

B. pr

C. $2e$

D. $2\pi r$

Answer: B

▶ **Watch Video Solution**

57. An object is thrown in vertical upward direction with velocity 'u' then the maximum height attained by the object would be....

A. $\dfrac{u}{g}$

B. $\dfrac{u^2}{2g}$

C. $\dfrac{u^2}{g}$

D. $\dfrac{u}{2g}$

Answer: B

▶ **Watch Video Solution**

58. The numerical ratio of displacement to distance for a moving object is……

A. always less than1

B. always equal to 1

C. always more than 1

D. equal to or less than 1

Answer: A

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59. If the distance (s), covered by an object is directly proportion to the square of time (t). then the object ....

A. would be performing motion with constant velocity.

B. would be performing motion with constant acceleration.

C. would be performing motion with increasing acceleration.

D. would be performing motion with decreasing acceleration

Answer: B

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60. If a boy is sitting on a merry-go-round, moves with constant speed of 10 ms^{-1} he would be ...

    A. in steady state

    B. moving with no acceleration

    C. performing accelerated motion

    D. moving with constant velocity

Answer: A::C::D

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61. Area under a velocity-time graph represents a physical quantity which has the unit ....

A. m^2

B. m

C. m^3

D. ms^{-1}

Answer:

62. in which of the following cases of motion, the distance covered and magnitude of displacement can be same?

A. If the car performs motion on linear path.

B. If the car performs motion on circular path.

C. If the oscillator oscillates to and fro about the mean-position.

D. If the earth revolves around the sun.

Answer: A::C

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Fill In The Blanks

1. A car moving with constant speed of 72 km h 1 is said to be moving at .... ms^{-1}.

2. The slope given by the line in the x-t graph of an object moving with uniform speed gives the magnitude of ....

3. The formula to find the linear speed of an object performing uniform circular motion is.........

4. Velocity of a bus moving with 36 km h increases to $72 kmh^{-1}$ in 20s, then its acceleration would be .... ms^{-2}

5. A bus is moving with speed of $20s^{-1}$ on a linear path and an acceleration $4ms^{-2}$ is produced in it, then its speed after 2 s would be .... ms^{-1}.

6. An electric train is moving at the constant speed of $120 km h^{-1}$. It would have covered .... km distance in 1 minute.

7. A train takes 2 hour to reach Vadodara from Ahmedabad. The same train take 3 hour while coming back to Ahmedabad. The distance

between Ahmedabad and Vadodara is 100 km. The average speed of this train would be .... km h^{-1}

8. A train covers 's' distance at the constant speed of $30 kmh^{-1}$. Then it covers the same distance in opposite direction at constant speed of $45 kmh^{-1}$, then its average velocity would be .... km h^{-1}.

9. The distance covered by a car is known by the instrument .... fitted in the car.

> ▶ Watch Video Solution

10. The speed of a motorcycle is $40 kmh^{-1}$ for first 10 minute and $50 kmh^{-1}$ for the next 10 minute, then the average speed of this motorcycle during the 20 minute would be .... km h^{-1}.

> ▶ Watch Video Solution

11. Acceleration of an object moving with constant velocity is .... (positive, negative, zero)

▶ Watch Video Solution

12. The speed of a scooter moving with constant speed $10ms^{-1}$ is .... km h^{-1}. (600, 36, 30)

▶ Watch Video Solution

13. The ratio of displacement and distance travelled for a moving body is (always more than 1, always less than 1, less than 1 or equal to 1)

14. If the distance (s), covered by an object is directly proportion to the square of time (t). then the object ....

15. A boy is running on a circular path of radius r at the constant speed $20 ms^{-1}$, then he is said to perform motion .... (with constant velocity, with acceleration, with constant acceleration)

16. The slope of graph y-t give the magnitude of .... (displacement, speed, acceleration)

17. If for a moving object, the distance-time graph is (half) parabola, then the object would be performing .... motion. (uniform, with constant acceleration, non-uniform)

18. A scooterist is moving with speed 36 km h. When breaks are applied, it stops after 10 s,

hence the acceleration of the scooter would

be .... ms^{-2} (-10, -3.6, -1)

19. The odometer of a car reads 2000 km at the start of a trip and 2400 km at the end of the trip. If the trip took 8 hours, then the average of the car would be .... kmh^{-1}.

20. A train covers 's' distance at the constant speed $30kmh^{-1}$ Then it covers the same distance in opposite direction at constant speed $45kmh^{-1}$, then its average speed would be .... km h^{-1}. (37.5, 36, 25)

**21.** A free falling ball is an example of motion. (constant velocity, constant acceleration, uniform)

22. An object travels 25 m in 4s on a linear path and then another 50 m in 6 s. The average speed of this object is ....ms^{-1}.

23. Mahesh goes for morning walk along a semicircular path of 70 m radius. He starts from eastern end and reaches western end, then his displacement is said to be .... m.

(220, 140, 70)
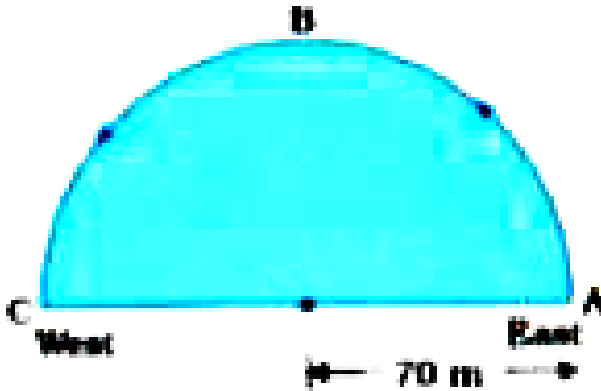
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24. .... is not a vector quantity. (Speed, Velocity, Displacement)

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25. Velocity of a bus moving on a linear path with $10ms^{-1}$ increases to $18ms^{-1}$ in 2 s, then the acceleration of this bus would be .... ms^{-2} (5, 9, 4)

26. A car moving with constant speed of 72 km h 1 is said to be moving at .... ms^{-1}.

27. The slope given by the line in the x-t graph of an object moving with uniform speed gives the magnitude of ....

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37. The speed of a scooter moving with constant speed $10ms^{-1}$ is .... km h^{-1}. (600, 36, 30)

38. The ratio of displacement and distance travelled for a moving body is (always more than 1, always less than 1, less than 1 or equal to 1)

39. A stationary object starts moving. Its displacement is directly proportional to the square of the time, hence this object is said to perform motion .... (with constant velocity, with constant acceleration, uniformly)

40. A boy is running on a circular path of radius r at the constant speed $20ms^{-1}$, then he is said to perform motion .... (with constant velocity, with acceleration, with constant acceleration)

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the start of a trip and 2400 km at the end of

the trip. If the trip took 8h, calculate the

average   speed   of   the   car   in

kmh^{-1} and ms^{-1}.

45. A train covers 's' distance at the constant speed of $30 kmh^{-1}$. Then it covers the same distance in opposite direction at constant speed of $45 kmh^{-1}$, then its average velocity would be .... km h^{-1}.

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▶ Watch Video Solution

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50. Velocity of a bus moving on a linear path with $10ms^{-1}$ increases to $18ms^{-1}$ in 2 s, then the acceleration of this bus would be .... ms^{-2} (5, 9, 4)

1. Motion is an absolute concept.

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2. For both the distance and displacement SI unit is metre.

▶ **Watch Video Solution**

3. The magnitude of the displacement of an object is 20 m, then it can be said that the distance covered by it is also 20 m.

▶ **Watch Video Solution**

4. The distance covered by an object in the given time duration may be positive, negative or zero.

▶ **Watch Video Solution**

5. The displacement of an object in a given time interval may be zero.

6. Average speed is an average of different speeds.

7. An object performs motion with constant speed along a circular path, then it is said that its velocity is constant (uniform).

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8. An object performing uniform circular motion performs accelerated motion.

▶ Watch Video Solution

9. An object had covered 120 km distance, half of this distance was covered at 20 km h^{-1} speed and the remaining distance at 30 km h^{-1}. Then its average speed is said to be $25 kmh^{-1}$,

10. A train travels with speed $40 kmh^{-1}$ for first 15 minutes and then 60 km h for next 15

minutes, hence its average speed during this time interval is 50 km h^{-1}.

11. The slope of the distance-time (xt) graph gives the magnitude of acceleration.

12. The unit of retardation is ms^{-2}.

13. The direction of acceleration of an object performing uniform circular motion is towards the centre.

14. If the final velocity of an object is less than the initial velocity, then it performs accelerated motion.

15. The SI unit of speed is km h^{-1}.

> ▶ Watch Video Solution

16. Motion is a relative concept.

> ▶ Watch Video Solution

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▶ **Watch Video Solution**

Question In Short

1. The displacement of a moving object in a given interval of time is zero. Is the distance travelled by the object zero? Comment

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2. What is uniform motion ?

3. Explain non-uniform motion.

4. The velocity-time graph shows the motion of a cyclist. Find (i) acceleration (ii) its velocity (iii) the distance covered by the cyclist in 15

second
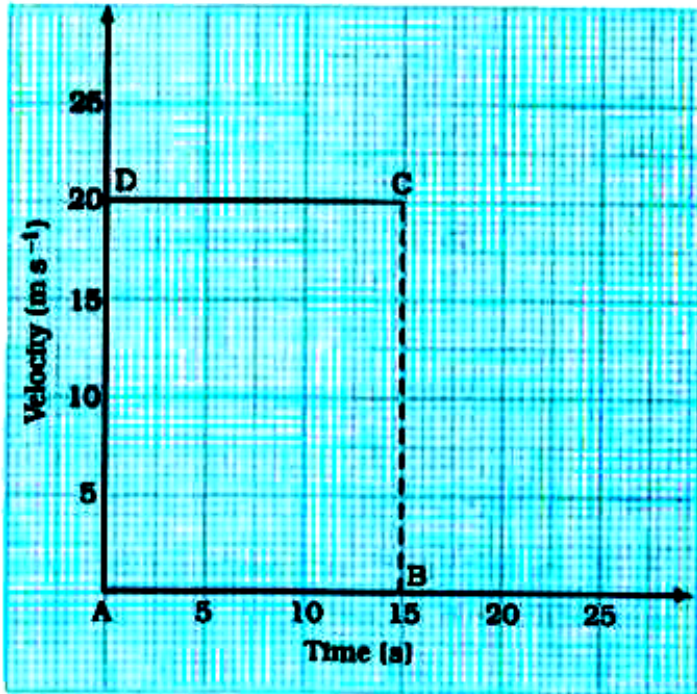
5. State which of the following situations are

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.

6. An artificial satellite is moving in a circular orbit of radius 42,250 km. Calculate its speed if it takes 24 hour to revolve around the earth.

7. A motorboat starting from rest on a lake accelerates in a straight line at a constant rate of $3.0ms^{-2}$ for $8.0s$. How far does the boat travel during this time?

8. An object starting from rest undergoes an acceleration of $8ms^{-2}$ for 10 second. Find (a) the speed (b) the distance travelled.

9. A motorcycle moving with a speed of $5ms^{-1}$ is subjected to an acceleration of $0.2ms^{-2}$ for 10 second. Calculate (a) the speed (b) the distance travelled.

10. The displacement of a moving object in a given interval of time is zero. Is the distance

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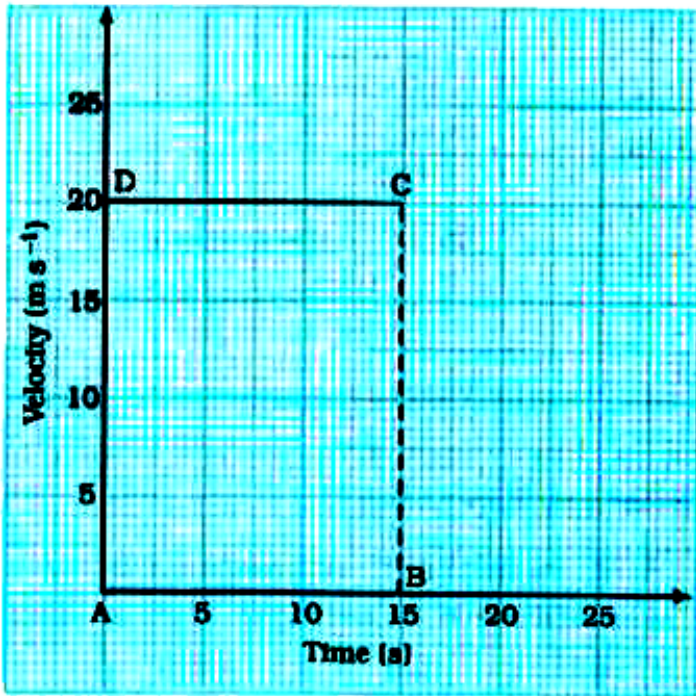
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1. Motion is a relative concept.

▶ **Watch Video Solution**

2. An object performing uniform circular motion performs accelerated motion.

▶ **Watch Video Solution**

3. In rainy season flashes of lightning is seen at first, but the sounds piercing the sky are heard afterwards.

▶ **Watch Video Solution**

4. Objects of different masses falling freely from top of a tower, reach surface of the earth simultaneously.

▶ **Watch Video Solution**

5. Area of the region under graph of velocity-time for an object performing uniform motion on a linear path, suggests distance covered by the object during given time interval

▶ **Watch Video Solution**

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▶ Watch Video Solution

Match The Following

1.

Column I	Column II
1. Uniform circular motion	a. Constant retardation
2. Motion of a free falling stone	b. Constant acceleration
3. Motion of a stone thrown upward	c. Constant speed
	d. Constant velocity

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2.

Column I	Column II
1. Speed	a. km
2. Velocity	b. $m s^{-2}$
3. Unit of acceleration	c. vector quantity
	d. scalar quantity

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3.

Column I	Column II
1. Unit of rate of change of velocity	a. ms^{-1}
2. Unit of slope of the graph $x-t$	b. m
3. Unit of the area covered by the graph of $v-t$	c. ms^{-2}

4.

(4)

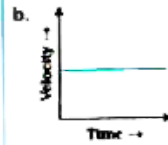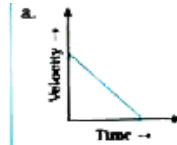| Column I	Column II
1. Negative acceleration	a. The car starts from the stationary position and obtains velocity 60 km h^{-1} in 10 s.
2. Positive acceleration	b. The car moves with velocity $15\,m\,s^{-1}$.
3. Zero acceleration	c. The car moving with velocity $10\,m\,s^{-1}$ becomes stationary after 10 s.

Ans. (1 - c), (2 - a), (3 - b).

1.

Distance (m) → vs Time (s) →

2.

Distance (m) → vs Time (s) →

3.

Distance (m) → vs Time (s) →

a.

Velocity → vs Time →

b.

Velocity → vs Time →

c.

Velocity → vs Time →

5.

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Column I	Column II
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2. Motion of a free falling stone	b. Constant acceleration
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7.

Column I	Column II
1. Speed	a. km
2. Velocity	b. m s^{-2}
3. Unit of acceleration	c. vector quantity
	d. scalar quantity

(1 - d) (2 - c) (3 - b)

8.

Column I	Column II
1. Unit of rate of change of velocity	a. m s^{-1}
2. Unit of slope of the graph $x-t$	b. m
3. Unit of the area covered by the graph of $v-t$	c. m s^{-2}

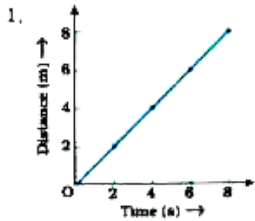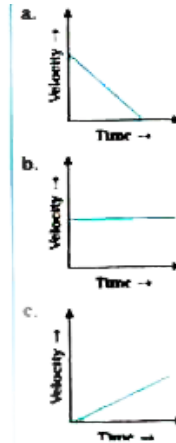| (4)	Column I	Column II
	1. Negative acceleration	a. The car starts from the stationary position and obtains velocity 60 km h^{-1} in 10 s.
	2. Positive acceleration	b. The car moves with velocity 15 m s^{-1}.
	3. Zero acceleration	c. The car moving with velocity 10 m s^{-1} becomes stationary after 10 s.

9.

Ans. (1 – c), (2 – a), (3 – b).

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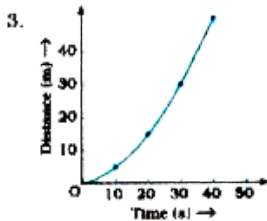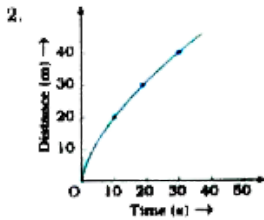
10.

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1. A man travels a distance of 1.5 m towards East, then 2.0 m towards South and finally 4.5 m towards north.

(i) Calculate the total distance travelled.

(ii) Calculate the resultant displacement.

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2. Joseph jogs from one end A to the other end B of a straight 300 m road in 2 minute 30 second and then turns around and jogs 100 m back to point in another 1 minute. What are Joseph's average speeds and velocities in jogging (a) from A to B and (b) from A to C?
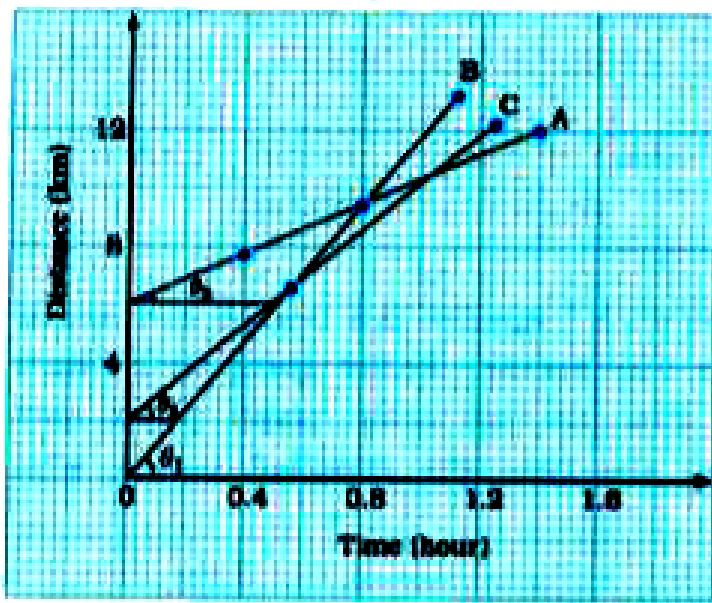
3. Abdul, while driving to school, computes the average speed for his trip to be 20 km h^{-1}.

On his return trip along the same route, there is less traffic and the average speed is $30 kmh^{-1}$. What is the average speed for Abdul's trip?

4. The distance-time graph of three objects A, B and C is shown below. Study the graph and answer the following questions :

: Distance-time graph)

(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 travelled when B passes A?

(d) How far has B travelled by the time it passes C?

5. A train travels at a speed of $60 kmh^{-1}$ for $0.5h$, $24 kmh^{-1}$ for the next 0.25 h and then $72 kmh^{-1}$ for the next 0.75 h. Calculate the total distance covered by the train and its average speed.

6. A ball is gently dropped from a height of 20 m. If its velocity increases uniformly at the rate of $10ms^{-2}$, with what velocity will it strike the ground ? After what time will it strike the ground?

7. (a) A body thrown in the vertically upward direction rises up to a height 'h' and comes back to the position of rest. Calculate the

displacement of the body.

(b) A body starts to slide over a horizontal surface with an initial velocity of $0.5ms^{-1}$. Due to friction, its velocity decreases at the rate of 0.05 ms^{-2}. How much time will it take for the body to stop ?

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8. An athlete completes one round of a circular track of diameter 200 m in 40 s. What will be

the distance covered and the displacement at the end of 2 minute 20 s?
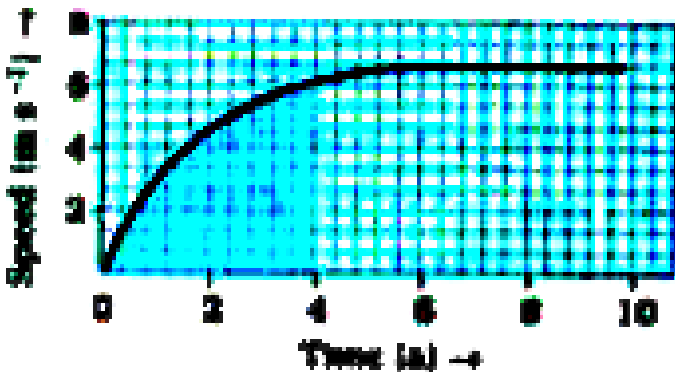
9. A driver of a car travelling at the speed of $52 kmh^{-1}$ applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5 s. Another driver going at $34 kmh^{-1}$ in another car applies his brakes slowly and stops in 10 s. On the same graph paper, plot the speed versus time graphs for the two cars.

Which of the two cars travelled farther after the brakes were applied ?

10. The speed-time graph of a car is shown in figure given below

Speed-time graph]

(a) Find how far does the car travel in the first 4 second. 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 ?

11. Derive graphically $s = ut + \dfrac{1}{2}at^2$, where symbols have their usual meaning.

12. write three equations of motion.

13. A man travels a distance of 1.5 m towards East, then 2.0 m towards South and finally 4.5 m towards north.

(i) Calculate the total distance travelled.

(ii) Calculate the resultant displacement.

14. Joseph jogs from one end A to the other end B of a straight 300 m road in 2 minute 30 second and then turns around and jogs 100 m back to point in another 1 minute. What are Joseph's average speeds and velocities in jogging (a) from A to B and (b) from A to C?
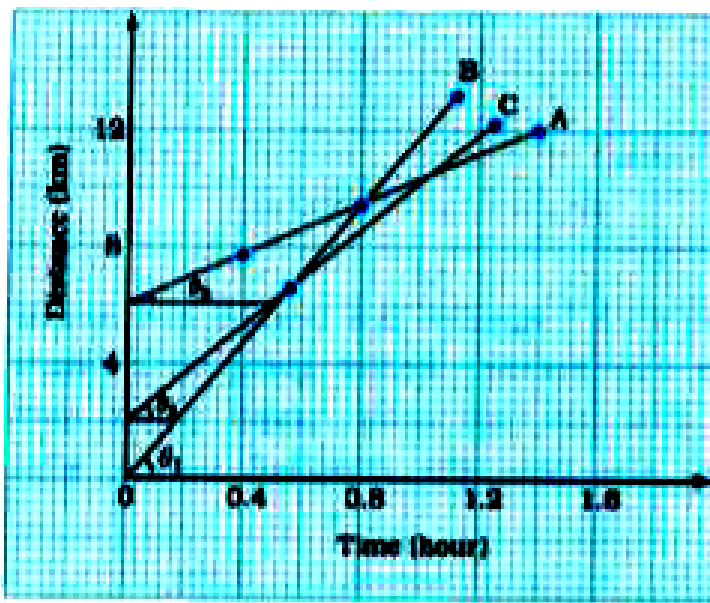
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20. An athlete completes one round of a ciruclar track of radius R in 40 seconds. What

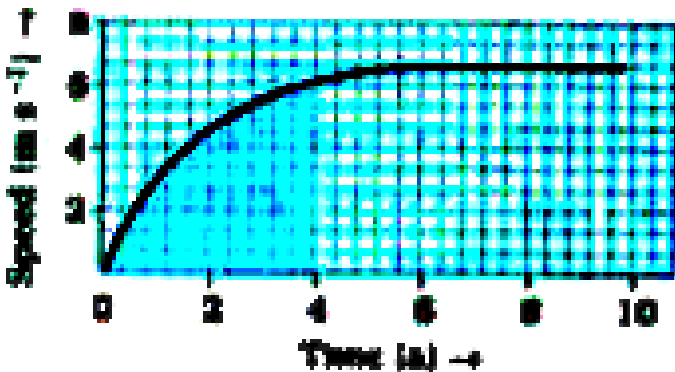will be his diplacement at the end of 2 minute 20 second?

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Speed-time graph]

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(b) Which part of the graph represents uniform motion of the car ?

23. Derive graphically $s = ut + \dfrac{1}{2}at^2$, where symbols have their usual meaning.

24. Derive graphically $v^2 = u^2 + 2as$, where symbols have their usual meaning.

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Textbook Examples Numericals

1. An object travels 16 m in 4s and then another 16 m in 2 s. What is the average speed of the object?

2. The odometer of a car reads 2000 km at the start of a trip and 2400 km at the end of the trip. If the trip took 8h, calculate the average speed of the car in kmh^{-1} and ms^{-1}.

3. Usha swims in a 90 m long pool. She covers 180 m in one minute by swimming from one end to the other and back along the same

straight path. Find the average speed and average velocity of Usha.

4. Starting from a stationary position, Rahul paddles his bicycle to attain a velocity of $6ms^{-1}$ in 30 s. Then he applies brakes such that the velocity of the bicycle comes down to $4ms^{-1}$ in the next 5 s. Calculate the acceleration of the bicycle in both the cases.

5. A train starting from rest attains a velocity of $72 kmh^{-1}$ in 5 minute. Assuming that the acceleration is uniform, find (i) the acceleration and (ii) the distance travelled by the train for attaining this velocity.

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6. A car accelerates uniformly from $18 kmh^{-1}$ to $36 kmh^{-1}$ in 5 s. Calculate (i) the

acceleration and (ii) the distance covered by the car in that time.

7. The brakes applied to a car produce an acceleration of $6ms^2$ in the opposite direction to the motion. If the car takes 2s to stop after the application of brakes, calculate the distance it travels during this time.

8. An object travels 16 m in 4s and then another 16 m in 2 s. What is the average speed of the object?

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the application of brakes, calculate the distance it travels during this time.

Additional Numericals For Practice

1. A person completes 5 rounds (revolutions) on a circular path of radius 50 m. Find out the distance travelled by that person and magnitude (value) of displacement.

2. The distance between Ahmedabad and Vadodara is 100 km. A scooterist travels at the average speed of $50 kmh^{-1}$. If he travels first 60 km at a uniform speed of $45 kmh^{-1}$, what will be his speed for the remaining distance ?

3. The speed of the scooter moving with uniform acceleration of $4 ms^{-2}$ becomes $20 ms^{-1}$ at a certain time. What will be the

speed of the scooter, when it has covered a distance of 112 m after that time?

4. The velocity of a particle performing motion with uniform acceleration on a linear path, at position 'x' is 'v' and $v = \sqrt{196 - 16x}$, where x is in metre. What would be the acceleration of this particle? Take initial velocity of particle

= 14 ms^{-1}

5. A person takes observations from odometer of his own motorcar while starting journey as well as after 40 min of his journey, which are found as 1046 km and 1096 km respectively. What would be the average speed of the motorcar?

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6. A train was moving at the rate of 36 km/h. When brakes are applied to a train running on
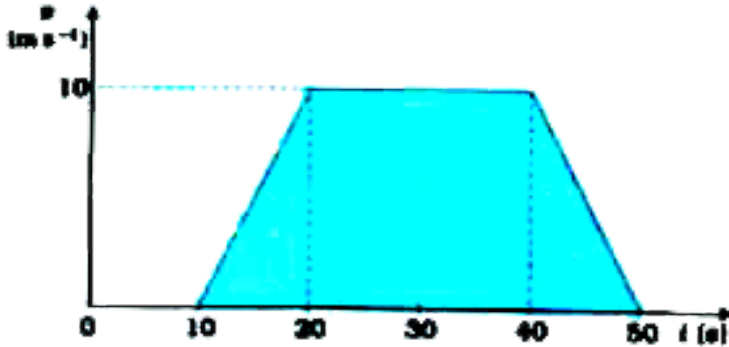
a straight line, it stops after covering 200 m distance. What would be the retardation produced in the train ?

7. A graph of velocity versus time (v - t) for a moving particle on linear path is shown in figure. What would be the displacement of the

particle in first 30 s?

8. An object is allowed to fall freely from the top of a 150 m high tower. At the same time another object is allowed to fall freely from the top of a 100 m high tower. If the acceleration of both the free falling objects is

same, then find the difference between their heights after 2 s from their motion. How does the difference of their heights change with the time?

9. Two stones are thrown vertically upward simultaneously with velocity u_1 and u_2 Prove that ratio of their maximum height attained is $u_1^2 : u_2^2$. (Take -g for acceleration in upward

direction and +g for acceleration in downward direction.)

10. An object is moving on a linear path in definite direction with initial velocity 'u' with constant acceleration. Prove that the distance travelled by it during 'n'th second is $u + \dfrac{a}{2}(2n - 1)$.

11. A stationary object, when starts motion, covers 20 m distance in first 28 and 160 m in next 4 second. Calculate the velocity at the end 7 second from the beginning of the motion.

12. Use the data given in the following table and draw the displacement-time graph for the object :

Time (s)	0	2	4	6	8	10	12	14	16
Displacement (m)	0	2	4	4	4	6	4	2	0

Using the graph, find the average velocity (i) for first 4s (ii) for next 4s and (iii) for last 6 s.

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13. An electron enters in uniform electric field with initial velocity $5 \times 10^4 ms^{-1}$ such that it attains the acceleration $10^4 ms^{-2}$ in the direction of its initial motion.

(i) Calculate the necessary time required for the electron to attain the double velocity as

compared to its initial velocity.

(ii) How much distance the electron would cover during this interval of time?

14. A motorcyclist moves from position A to B at the constant speed $30 kmh^{-1}$, then he returns from it and comes back to original position A at the speed $20\ kmh^{-1}$, final his average speed.

15. A person walks 50 m in the north direction and from there he walks 30 m in the west direction.
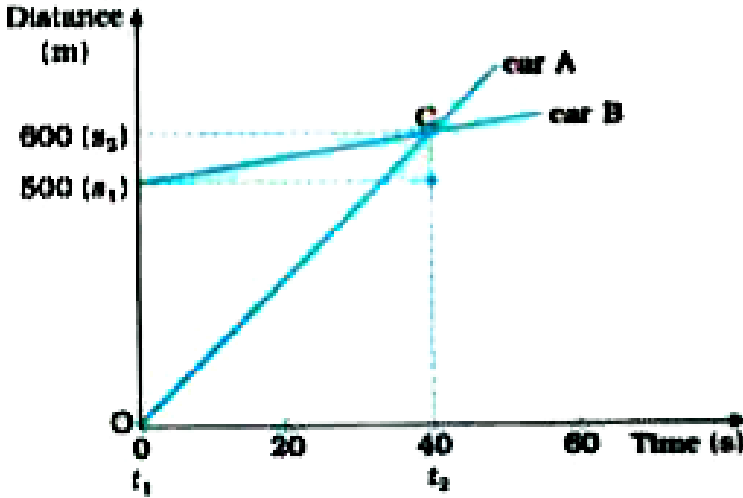
Now, he/she walks 50 m distance in south direction. Find the distance travelled by the person and his/her displacement.

Find out the average speed and average velocity of person if he/she takes 100 s time to move from initial to final position.

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16. For two cars A and B in motion distance time graph is shown:

(a) State initial positions of car A and car B.

(b) When and at what distance from the origin, these two cars would meet?

(c) Find final speed of car A and car B.

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17. When brakes are applied to a car running on a straight road, retardation of $4ms^{-2}$ is produced. It stops after 3 s. Calculate the distance travelled by car after brakes are applied.

18. A particle covers equal distances in same direction on a linear path with different

velocities v_1, v_2 and v_3 find the formula for its average speed.

19. Kalpesh, before going out, takes the reading of the odometer of his motorcycle. It was 8245 km. Driving at uniform velocity of $60 kmh^{-1}$ for 30 min on a straight highway, he reaches his friend's village. What would be the odometer reading of his motorcycle there?
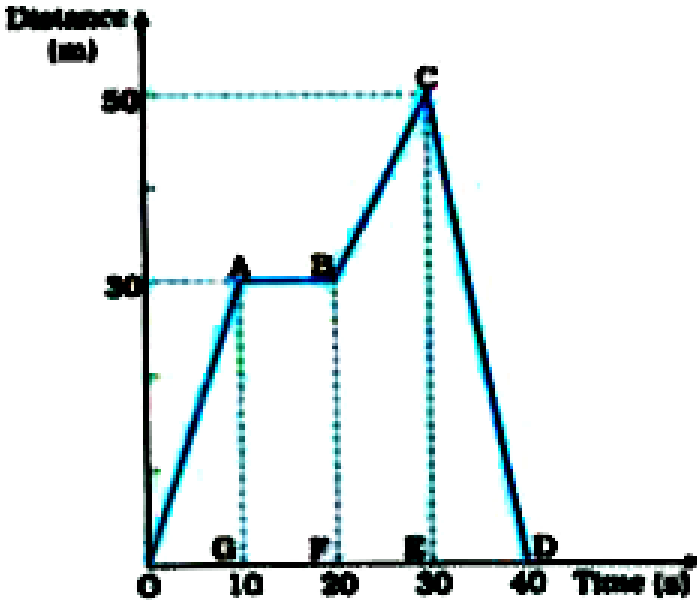
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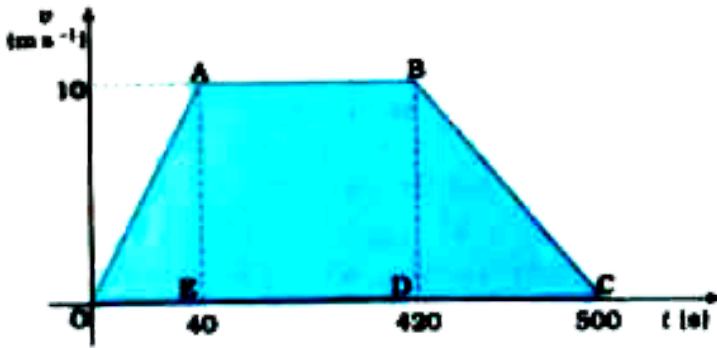(i) During which time period the particle is stationary?

(ii) Find magnitude of velocity in OA, AB and

BC parts.

21. For moving train velocity-time graph is shown in the figure :

(i) What is the maximum speed of the train and how long it is maintained?

(1) What is the maximum speed of the train and how long it is maintained ?

(ii) What are the accelerations of the train in OA, AB and BC parts ? (ii) Find total distance travelled by the train.

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22. A car from stationary state moves in positive X direction with constant acceleration $5ms^{-2}$ for 8 s. Then it moves with constant velocity, then find the total distance covered by car after 12 s from the initial position.
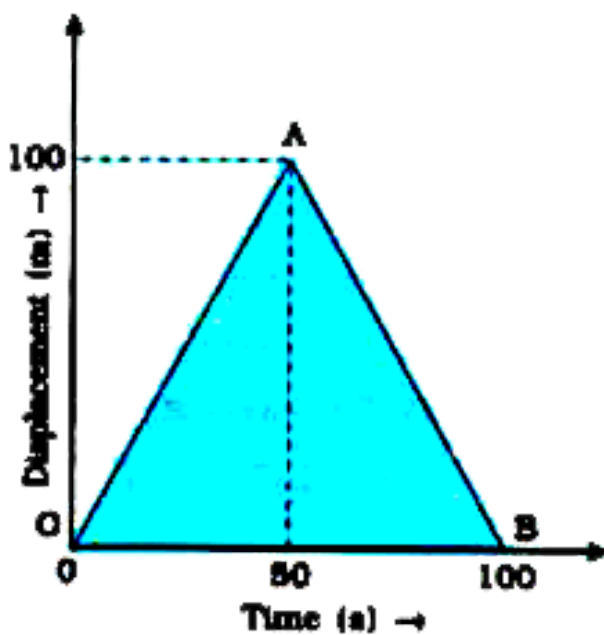
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23. A man walks 1.5 m in the east direction, then he walks 2.0 m in south direction and at last walks 4.5 m in the east direction, then

using appropriate scale (e.g., 1 cm = 1 m) using scale... (i) Calculate the distance covered by the man. (ii) Find the resultant displacement (magnitude) of the man.

24. A girl walks from her house on a straight path to drop a letter in the letter-box. Then she returns to the origin point. Her displacementtime graph is shown in the figure, draw its velocity-time graph.

→ Slope of the graph OA = Velocity

$$= \frac{100 - 0}{50 - 0} = +2ms^{-1}$$

Slope of the graph AB = Velocity

$$= \frac{0 - 100}{100 - 50} = -2ms^{-1}$$

→ It is clear from the given displacement-

time graph that the girl moves with constant

positive velocity v from O to A. At point A for a moment her velocity becomes zero and moves back to origin (her house) at constant negative velocity by changing the

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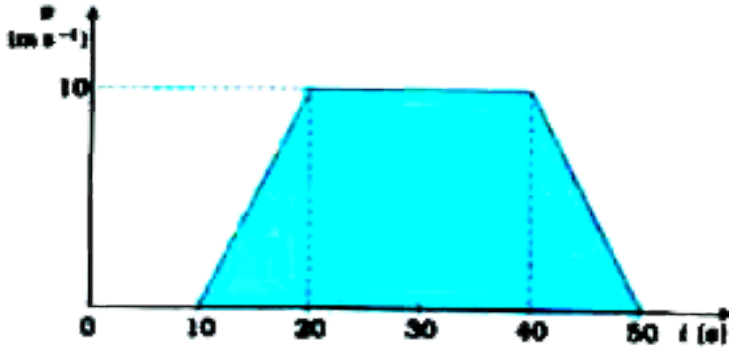
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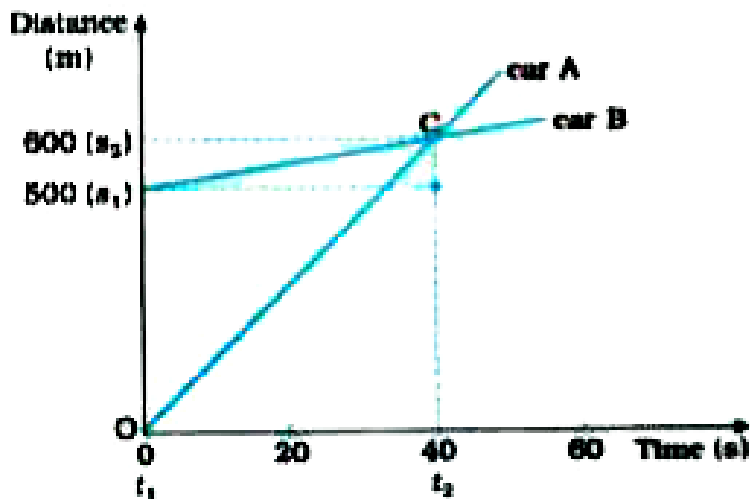
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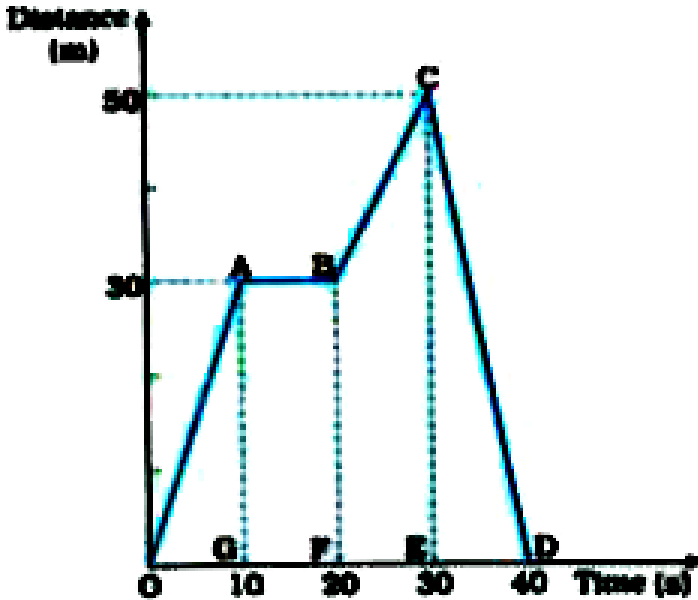
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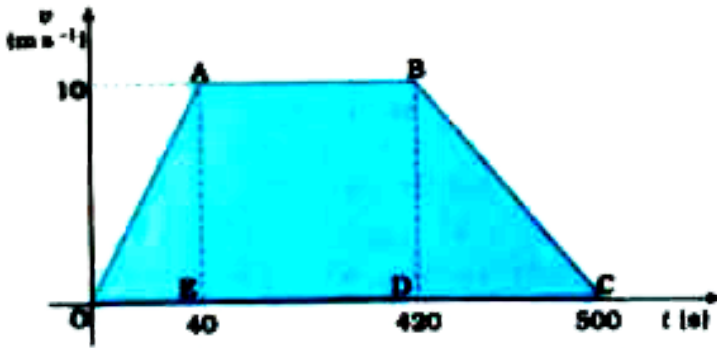(i) During which time period the particle is stationary?

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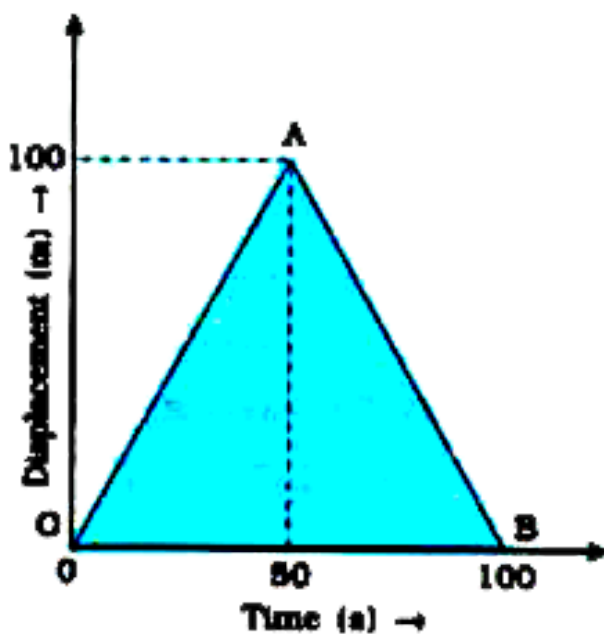**47.** A man travels a distance of 1.5 m towards East, then 2.0 m towards South and finally 4.5 m towards north.

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