



# PHYSICS

## BOOKS - MBD -HARYANA BOARD

### MOTION

#### Example

1. 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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2. Distinguish between speed and velocity.



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



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4. What does the odometer of an automobile measure ?



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5. What does the path of an object look like when it is in uniform motion ?



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6. During an experiment, a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station ? The signal travels at the speed of light, that is,  $3 \times 10^8 \text{ m/s}$ .



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7. When will you say a body is in (i) uniform acceleration ? (ii) non-uniform acceleration ?



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8. When will you say a body is in :

(i) uniform acceleration ?

(ii) non-uniform acceleration ?



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9. A bus decreases its speed from  $80\text{km}/\text{h}$  to  $60\text{km}/\text{h}$  in  $5\text{s}$ . Find the acceleration of the bus.



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**10.** A train starting from a railway station and moving with uniform acceleration attains a speed  $40\text{km}/\text{h}$  in 10 minutes. Find its acceleration.



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



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**12.** 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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**13.** What can you say about the motion of a body if its speed-time graph is a straight line parallel to the time axis ?

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



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15. A bus starting from rest moves with a uniform acceleration of  $0.1m/s^2$  for 2 minutes. Find



(a) the speed acquired, (b) the distance travelled.



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**16.** A bus starting from rest moves with a uniform acceleration of  $0.1m/s^2$  for 2 minutes. Find

(a) the speed acquired, (b) the distance travelled.



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17. A train is travelling at a speed of  $90\text{km} / \text{h}$ . Brakes are applied so as to produce a uniform acceleration of  $-0.5\text{m} / \text{s}^2$ . Find how far the train will go before it is brought to rest.



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18. A trolley, while going down an inclined plane, has an acceleration of  $2\text{cm} / \text{s}^2$  starting from rest. What will be its velocity  $3\text{s}$  after the start ?



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**19.** A racing car has a uniform acceleration of  $4m / s^2$ . What distance will it cover in  $10s$  after start ?



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**20.** A stone is thrown in a vertically upward direction with a velocity of  $5m / s$ . If the acceleration of the stone during its motion is  $10m / s^2$  in the downward direction, what will

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



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**21.** An athlete completes one round of circular track of diameter 300 m road in 2 minute 50 second and than turns around and jogs 100m back to point C in another 1 minute. What are joseph's average speeds and velocities in jogging (a) from A and B (b) from A to C?



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**22.** Abdul while driving to school, computes the average speed for his trip to be  $20\text{kmh}^{-1}$ . On his return trip along the same route, there is less traffic and the average speed is  $40\text{kmh}^{-1}$ . What is the average speed for Abdul's trip ?



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**23.** A motorboat starting from rest on a lake acceleration line at a constant rate of

$3.0m/s^2$  for  $8.0s$ . How far does the boat travel during this time ?



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**24.** a driver of a car travelling at  $52km/h$  applies the brakes and acceleration uniformly in the opposite direction. The car stops in  $5s$ . Another driver going at  $34km/h$  in another car applies his brakes slowly and stops in  $10s$ . On the same graph paper, plot the speed versus time graphs for the two cars. Which of

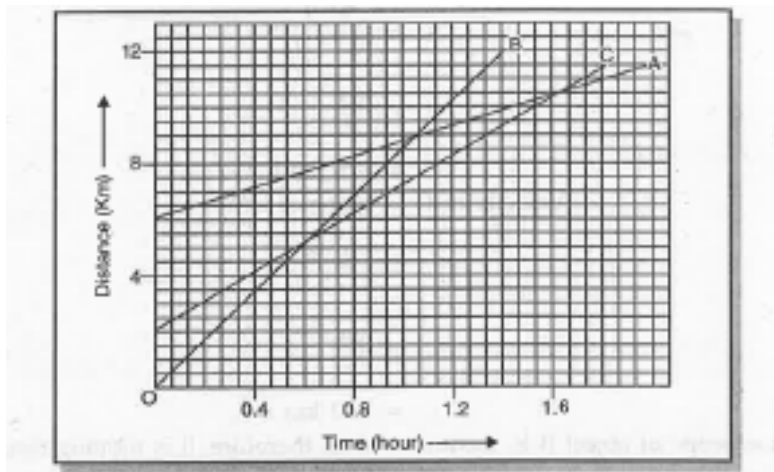
the two cars travelled farther after the brakes were applied ?



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**25.** Fig 1.11 show the distance - time graphs of three A,B and C. Study the graph and answer the following question : Which of the three is

travelling the fastest ?

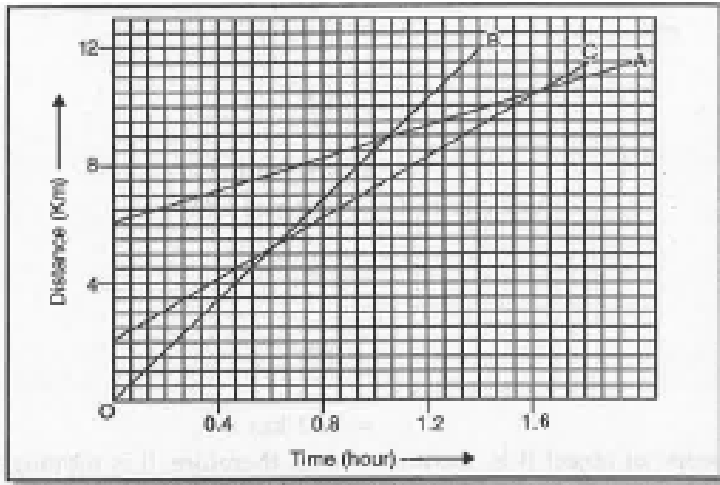


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**26.** Fig 1.11 show the distance - time graphs of three A,B and C. Study the graph and answer the following question : Are all three ever at



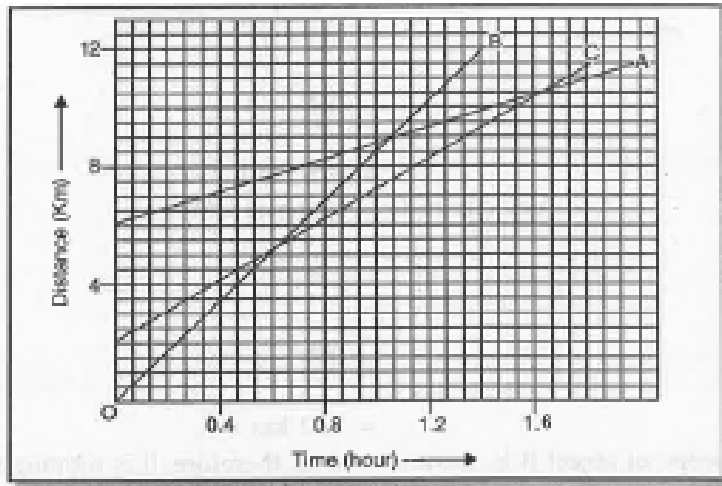
the same point on the road ?



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27. Fig 1.11 show the distance - time graphs of three A,B and C. Study the graph and answer the following question : How far has C

travelled when B passes A ?



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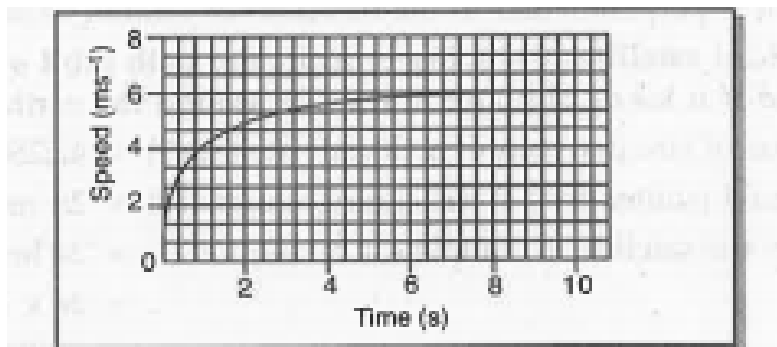
**28.** A ball is gently dropped from a height of  $20m$ . If its velocity increases uniformly at the rate of  $10m / s^2$ , with what velocity will it strike

the ground ? After what time will it strike the ground ?



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29. Speed - time graph for a car is show in the fig 1.13: Which part of the graph represents uniform motion of the car ?



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**30.** state which of the following situations are possible and give an example for each of these :

(a) a body with a constant acceleration but with zero velocity.

(b) an object moving in a certain direction with an acceleration in the perpendicular direction.



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**31.** state which of the following situations are possible and give an example for each of these :

(a) a body with a constant acceleration but with zero velocity.

(b) an object moving in a certain direction with an acceleration in the perpendicular direction.



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**32.** An artificial satellite is moving in a circular orbit of radius  $42250\text{km}$ . Calculate its speed if it takes  $24\text{hours}$  to revolve around the Earth.



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**33.** Write and derive all the three equations of motion analytically.



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**34.** For uniform accelerated motion, draw by graphical method establish the following equations of motion :  $v = u + at$



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**35.** Equations of Motion by Graphical Method



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**36.** Equations of Motion by Graphical Method



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**37.** Draw the velocity-time graph for an object in uniform motion. Show that the area under the velocity-time graph gives the displacement of the object in the given time interval.



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**38.** What is meant by Angular velocity ? How is it related to linear velocity ? Derive the



relation



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**39.** Define the terms rest and motion. Show that rest and motion are relative terms.



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**40.** Write three difference between distance and displacement.



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**41.** Can an object be at rest as well as in motion at the same time ? Explain with illustration.



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**42.** Write three difference between distance and displacement.



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**43.** What is meant by uniform motion ?



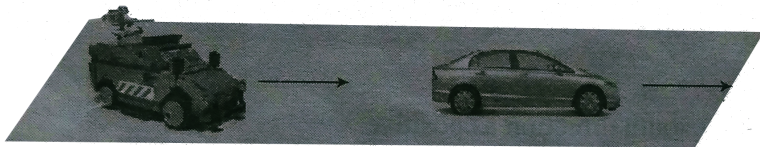
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**44.** Define the term velocity. Is it a scalar or vector quantity ? Give its units and dimensions.



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45. A police van moving on a highway with a speed of  $30\text{kmh}^{-1}$  Fires a bullet at a thief's car speeding away in a same direction with a speed of  $192\text{kmh}^{-1}$ . If the muzzle speed of the bullet is  $150\text{ms}^{-1}$ , with what speed does the bullet hit thief's car? .



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**46.** A train 50 m long travels on a plain and level track and reached a post in 5 secs. Find (i) speed of the train (ii ) the time train will take to cross 450 m long bridge.



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**47.** A cheetah is the fastest land animal and can achieve a peak velocity of  $100\text{km} / \text{h}$  upto distances less than 500 m. If a cheetah spots his prey at a distance of 100 m. What is the

minimum time it will take to get its prey, if the average velocity attained by it is  $90\text{km} / \text{h}$ .



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**48.** A car travels a certain distance with a speed of  $50\text{km} / \text{h}$  and returns with a speed of  $40\text{km} / \text{h}$ . Calculate the average speed for the whole journey.



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**49.** On a 100km track, a train travels the first 30 km at a uniform speed of  $30\text{kmh}^{-1}$ . How fast must the train travel the next 70 km so as to average the next  $40\text{kmh}^{-1}$  for entire trip.



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**50.** A railway train 50 m long passes over a bridge 250 m long with uniform velocity of  $10\text{ms}^{-1}$ . How long will it take to completely pass over the bridge ?





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51. What is REST ? What is Motion ?#!#Are we always moving?



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52. What is displacement of object ?



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**53.** Which device shows the speed of vehicles ?



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**54.** what is uniform motion ?



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**55.** Give two examples of non-uniform motion.



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**56.** Define speed of the object.



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**57.** What is the SI unit of speed ?



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**58.** How is average speed obtained ?



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**59.** What is velocity ?



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**60.** What is acceleration ?



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**61.** SI unit of acceleration is



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**62.** A cricket player tosses the ball upward and again catches it. What is the total displacement ?



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**63.** Is displacement a scalar or a vector quantity?



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**64.** What would be acceleration of a body if its velocity-time graph is line parallel to the time axis ?



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**65.** A body is moving along the boundary of a square plot of land with constant speed. Does its velocity remain unchanged ?



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**66.** What will be the position-time graph of a city bus standing at rest at a depot ?



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**67.** What is the nature of the distance time graph for an object moving uniformly along a straight long road ?



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**68.** Does the speedometer of a car measure its average speed ?



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