PHYSICS

NCERT - NCERT PHYSICS(HINGLISH)

MOTION

Solved Examples

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

A. 5.33 m/s

B. 53.3 m/s

C. 4.20 m/s

D. 4.30 m/s

Answer: 5.33 m/s

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2. The odometer of a car reads $2000km$ at the start of a trip and $2400km$ at the end of the

trip . If the trip took $8h$, calculate the average speed of the car in km/h and m/s.

A. 13.9 m/s

B. 12.9 m/s

C. 10.9 m/s

D. 10 m/s

Answer: 13.9 m/s

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3. Usha swims in a $90m$ long pool. She covers $180m$ in one minute by swimming from one end to the other and back along the same length path. Find the average speed and average velocity of Usha.

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4. Starting from a stationary position , Rahul paddles his bicycle to attain a velocity of $6m/s$ in $30s$. Then he applies brakes such that

the velocity of bicycle comes down to $4m/s$ in the next $5s$. Calculate the acceleration of the bicycle in both the cases.

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5. A train starting from rest attains a velocity of $72km/h$ in 5 minutes . 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 $18km/h$ to $36km/h$ in 5 second. Calculate (i) the acceleration and (ii) the distance covered by the car in that time .

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7. The brakes applied to a car produce an acceleration of $6m/s^2$ 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.

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

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9. A farmer moves along the boundary 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 ?

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10. 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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11. Distinguish between speed and velocity.

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

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13. What does the odometer of an automobile measure ?

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

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15. 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, $3 \times 10^8 m/s$.

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

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17. A bus decreases its speed from $80km/h$ to $60km/h$ in $5s$. Find the acceleration of the bus.

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

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

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20. 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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21. 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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22. What is the quantity which is measured by the area occupied below the velocity-time graph ?

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

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

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24. A train is travelling at a speed of $90 km / h$. Brakes are applied so as to produce a uniform

acceleration of $-0.5m/s^2$. Find how far the train will go before it is brought to rest.

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

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

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27. 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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Exercise

1. An athlete complete one round of a circular track of diameter $200m$ in $40s$. What will be the distance covered and the displacement at the end of 2 minutes $20s$?

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2. Joseph jogs from one end A to other end B of a straight $300m$ road in 2 minutes 30 seconds and then 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 to B and (b) from A to C?

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3. Abdul, while driving to school, computes the average speed for his trip to be $20kmh^{-1}$. On his return trip along the same route, there is less traffic and the average speed is $30kmh^{-1}$. What is the average speed for Abdul's trip ?

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4. A motorboat starting from rest on a lake accelerates in a straight 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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5. A driver of a car travelling at $52km/h$ applies the brakes and accelerates uniformly in the opposite direction. The car stops in $5s$. Another driver going at $3km/h$ 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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6. Figure shows the distance-time graph of three object 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 travelld by when B passes A ?

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

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7. 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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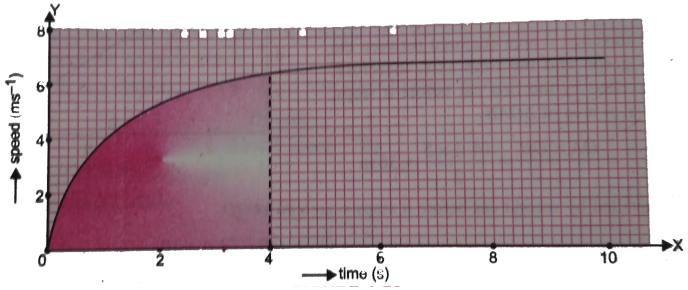
8. The speed-time graph for a car is shown is Figure



(a) Find how far does the car travel in the first 4 seconds. Shade the area on the graph that represents the distance travelled by the car during this period.

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

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9. State which of the following situations are possible and give an example for each of these :

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

(b) An object moving with an acceleration but with uniform speed

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

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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.

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