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PHYSICS

BOOKS - CENGAGE PHYSICS

DESCRIPTION OF MOTION

Worked Examples

1. The velocity of a car increases from $5ms^{-1}$ to $17ms^{-1}$ in a period of 6s. Then , the velocity of the car reduces to $5ms^{-1}$ in a further period of

8s. Calculate the acceleration and retardation of the car.

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2. A car acquires a velocity of $72kmh^{-1}$ in 10 s starting from rest. Calculate

(i) the acceleration

(ii) the average velocity

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3. A body is moving with an initial velocity u and a uniform acceleration a. Find the distance covered by the body in nth second.

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4. A stone thrown vertically upwards takes 3 s to attain maximum height. Find the

(i) initial velocity of the stone

(ii) maximum height attained by the stone $\left(g = 9.8ms^{-2}\right)$

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5. Light travels at a speed of $3 \times 10^8 ms^{-1}$. How long does light take to reach the earth from the sun, which is 1.5×10^{11} m away?

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6. A body moving with uniform acceleration, travels 24 m in the 6th second and 44 m in the 11th second. At the nth second, find

(i) the acceleration and

(ii) the initial velocity of the body

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7. A body travels with a speed of v_1 from A to B and returns with a speed of v_2 from B to A. Derive an expression for the average speed of the body. What will be the average velocity of the body?

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8. A body starts from rest with a uniform acceleration 'a'. Find the distance covered by the

body in nth second.

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Mandatory Exercise Exercise Set I

1. In which of the following examples of motion can the body be considered a particle?

(i) A monkey sitting on the shoulders of a man who is cycling

(ii) A tumbling beaker that has slipped off the edge of a table.

(iii) A cricket ball thrown by a bowler to a batsman 20 m away.

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2. A stone is thrown vertically upwards and after ascending a height 'h' it comes back to the hands of the thrower. What is the (i) total distance covered and the (ii) net displacement of the stone?

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3. Can a body have a constant velocity but a varying speed?

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4. Are the magnitudes of average velocity and average speed equal?

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5. Under what condition is the average velocity equal to instantaneous velocity?

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6. Light takes $81/2$ min to travel from the Sun to the Earth. The velocity of light is $3,00,000 kms^{-1}$. Find the distance of the Sun from the Earth.

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7. A train travels a distance of 8 km in 4 min. Determine its average speed during that time.

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8. A point moves quarter of a circle on the circumference of a circle of radius R. Find the distance travelled and displacement in terms of R.

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9. A train travels with a speed of $60kmh^{-1}$ from station A to station B and returns with a speed of $80kmh^{-1}$ from station B to station A. Find (i)

the average speed and (ii) the average velocity of the train.

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10. Two bodies of masses m_1 and $m_2(m_1 = 2m_2)$ are dropped from a height. The ratio of time taken by them to reach the ground is _____.

A. $2:1$

B. $1:2$

C. $1:1$

D. $1:1$

Answer: C

11. The velocity of a body starting from rest is directly proportional to time. Which of these is uniform?

A. Velocity

B. Acceleration

C. Both velocity and acceleration

D. Neither velocity nor acceleration

Answer: B

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12. If a stone and a pencil are dropped simultaneously in vacuum from the same height, which of the two will reach the ground first?

A. Pencil

B. Stone

C. Both will reach the ground simultaneously

D. Either stone or pencil depending on which is heavier

Answer: C

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13. In which condition the magnitude of average speed is equal to the magnitude of average velocity?

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14. If a particle is moving with a constant velocity, what is its acceleration?

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15. Write down the three equations of motion for a particle moving with constant acceleration.

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16. Derive an expression to find out the maximum height reached by a particle when it is thrown upward with a velocity u.

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17. What does the slope of displacement-time graph give?

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18. Is it possible for a particle to have varying velocity but constant speed? Explain.

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19. What do you mean by uniform circular motion?

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20. Give the expression to find out the displacement of a particle in nth second.

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21. What do you mean by time of flight?

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22. When a ball is thrown upwards. What will be its velocity and acceleration at the topmost

point?

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Mandatory Exercise Exercise Set Ii

1. Give an example of motion with

(i) acceleration $a = 0$ and velocity $v \neq 0$

(ii) displacement = 0 and distance travelled = 0

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2. Is it possible to have (i) $v = 0$ and $a \neq 0$? (ii) distance travelled=0 but displacement $\neq 0$? If yes, give an example for each.

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3. If the displacement-time graph of a body is a straight line parallel to the time axis, what is the nature of motion of the body?

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4. What does the slope of a displacement-tine graph represent? Can displacement-time graph be parallel to the displacement axis? Give reason for your answer.

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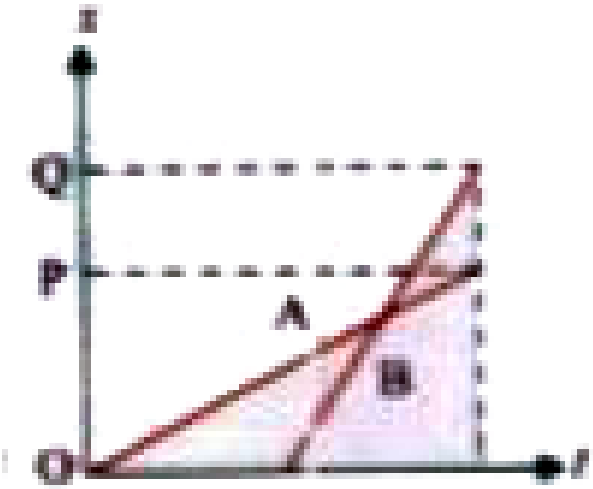
5. The position-time (x-t) graphs for two children A and B returning from their school O to their homes P and Q, respectively, are shown in figure. P Choose the correct answer.



(i) A and B reach home at the (same/different) time.

(ii) A or B overtakes on the road (once/twice).

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6. The following table represents the position of a car with time in a fixed direction.

Time (s)	0	1	2	3	4
Position (m)	0	10	20	30	40

Plot displacement-time graph and find graphically

(i) the velocity of the car

(ii) the displacement of the car at 3.5 s and 4.5 s

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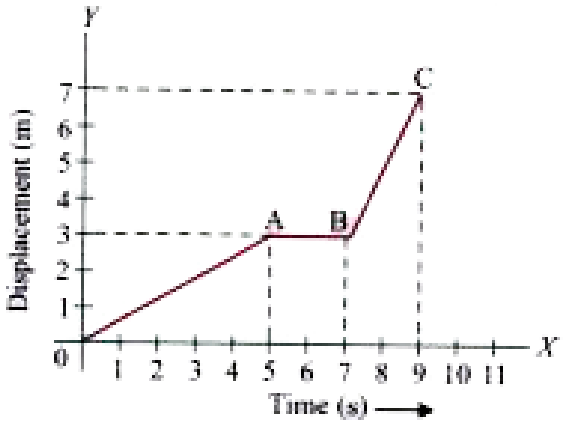
7. In the figure, the displacement of a body is shown at different instants of time.

(i) Calculate the velocity of the body as it moves for (a) 0s to 5 s, (b) 5 s to 7 s, and (c) 7 s to 9 s.

(ii) Also, calculate the average velocity during the time interval 7 s to 9 s.



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Mandatory Exercise Exercise Set Iii

1. A bullet moving with an initial velocity of $20ms^{-1}$, strikes a target and comes to rest after penetrating the target to a distance of 10 cm. Calculate the retardation caused by the target.

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2. A ball is thrown vertically upwards. It returns 6 s later. Calculate (i) the greatest height reached by the ball and (ii) the initial velocity of the ball.

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3. A ball 'A' is thrown upwards from ground level with a velocity of $20ms^{-1}$. Another ball 'B' is thrown downwards from a height of 40 m with the same speed. Find the height at which the two balls meet (take $g = 10ms^{-2}$).

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4. The velocity of a car changes from $-5ms^{-1}$ to $-7ms^{-1}$ in 2 s. What is the acceleration of

the car? What does the negative sign suggest?

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5. A parachutist drops freely from an aero plane for 10 s before the parachute open out. Then he descends with a net retardation of $2.5ms^{-2}$. If he bails out of the plane at a height of 2495 m and $g = 10ms^{-2}$, what is his velocity on reaching the ground?

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6. A ball is thrown from the top of a building with a velocity of 10 m/s and returns with a velocity of 30 m/s to the ground. Find the height of the building.

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7. A ball is dropped from the top of a tower of height 100 m and another ball is thrown vertically upward at the same instant with a velocity of 10 m/s. Find the time after which the ball will be at same level.

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8. A ball is dropped from a balloon rising up with a velocity of 50 m/s. When the ball is dropped the balloon was at a height of 100 m. Find the time taken by the ball to reach the ground.

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9. A bullet loses $1/20^{th}$ of its velocity in passing through a plank. Find the least numbers of such

planks required just to stop the bullet.

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10. The displacement-time graph of two particles A and B are straight line making angle of 60° and 45° with x-axis respectively. Then find the ratio of velocity of A and velocity of B.

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11. A particle is thrown vertically upward with a velocity of u. Find its time of flight.

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12. Two trains 100 m long are moving opposite to each other with a speed of 50 m/s each. Find the time taken by the train to cross each other.

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Consolidated Exercise Comprehension

1. A particle moves along the X-axis. Its X-coordinate varies with time according to the expression $x = 4t + 2r^2$, where x is in meters and t is in seconds. The position-time graph for this motion is shown in the figures previously. Note that the particle moves in the negative X-direction for the first second of motion, is at rest at the moment $t = 1s$, and then heads back in the positive X-direction for $t > 1s$.

Find the displacement of the particle in the time interval $t = 0$ s to $t = 1$ s.

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2. A particle moves along the X-axis. Its X-coordinate varies with time according to the expression $x = 4t + 2r^2$, where x is in metres and t is in seconds. The position-time graph for this motion is shown in the figures previously. Note that the particle moves in the negative X-direction for the first second of motion, is at rest at the moment $t = 1s$, and then heads back in the positive X-direction for $t > 1s$.

What is the average velocity of the particle in the time interval $t = 0$ s to $t = 1$ s?

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3. A particle moves along the X-axis. Its X-coordinate varies with time according to the expression $x = 4t + 2r^2$, where x is in meters and t is in seconds. The position-time graph for this motion is shown in the figures previously. Note that the particle moves in the negative X-direction for the first second of motion, is at rest at the moment $t = 1s$, and then heads back in the positive X-direction for $t > 1s$.

Find the displacement of the particle in the time interval $t = 1s$to $t = 3s$.

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4. A particle moves along the X-axis. Its X-coordinate varies with time according to the expression $x = 4t + 2r^2$, where x is in meters and t is in seconds. The position-time graph for this motion is shown in the figures previously. Note that the particle moves in the negative X-direction for the first second of motion, is at rest at the moment $t = 1s$, and then heads back in the positive X-direction for $t > 1s$.

What is the average velocity of the particle in the time interval $t = 1s$ to $t = 3s$?

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5. A particle moves along the X-axis. Its X-coordinate varies with time according to the expression $x = 4t + 2r^2$, where x is in meters and t is in seconds. The position-time graph for this motion is shown in the figures previously. Note that the particle moves in the negative X-direction for the first second of motion, is at rest at the moment $t = 1s$, and then heads

back in the positive X-direction for $t > 1s$.

Find the instantaneous velocity of the particle at $t = 2.5s$.

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6. A ball is dropped from a building. Height of the building is 45 m. The ball moves under the effect of gravity.

How much time will it take to reach the ground?

A. 3s

B. 6s

C. 5s

D. none

Answer: A

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7. A ball is dropped from a building. Height of the building is 45 m. The ball moves under the effect of gravity.

How much time will the ball take to reach

ground if it is dropped from a height of 20 m from the ground?

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Consolidated Exercise Match The Columns

1. Match the following:

A		B	
(1)	Particle	(a)	negative acceleration
(2)	Retardation	(b)	$m\ s^{-1}$
(3)	Acceleration due to gravity	(c)	g
(4)	Velocity	(d)	mass point

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2. Match the following:

A		B	
(1)	u	(a)	$(v-u)/t$
(2)	v	(b)	$ut+\frac{1}{2}at^2$
(3)	s	(c)	Initial velocity
(4)	a	(d)	$u+at$

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3. Match the following:

A		B	
(1)	Area under a-t graph	(a)	Acceleration
(2)	Area under u-t graph	(b)	Change in velocity
(3)	Slope of v-t graph	(c)	Velocity
(4)	Slope of s-t graph	(d)	Displacement

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Consolidated Exercise Multiple Choice Questions With One Correct Answer

1. What is the average velocity of a man who travels the first-half time with a velocity v_1 and the second-half time with a velocity v_2 ?

A. $v_1 v_2$

B. $\frac{v_1 + v_2}{2}$

C. $\frac{2v_1 v_2}{v_1 + v_2}$

D. none

Answer: B

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2. A body starting from rest and moving with uniform acceleration will have

A. $v \propto t$

B. $v \propto s$

C. $v \propto t$

D. $v \propto \sqrt{t}$

Answer: A

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3. The minimum distance to stop a car is x when it is moving with a velocity v, then what will be the minimum distance to stop it in the same time when it will move with a velocity mv.

A. $m^2 x$

B. mx

C. x / m^2

D. x / m

Answer: B

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4. If a body moving with an initial velocity of 3 m/s and an acceleration of $2m / s^2$. Then what will be the distance travelled by the body in 4th second.

A. 6 m

B. 7 m

C. 10 m

D. 28 m

Answer: C

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5. If a ball is thrown up with a velocity v from the top of a building the ball reaches the ground with a velocity 3u. Find the height of the building.

A. $9u^2/g$

B. $6u^2/g$

C. $4u^2/g$

D. $3u^2/g$

Answer: C

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6. A particle moves from A to B with a uniform velocity v_1 and from B to A with a velocity v_2. If

it moves along a straight line between A and B, then the average velocity of the particle is

A. $\frac{v_1 v_2}{2}$

B. $\frac{v_1 + v_2}{2}$

C. $\frac{2v_1 v_2}{v_1 + v_2}$

D. zero

Answer: D

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7. When a ball is released from a top of building the distance covered by it in 4 sec will be

A. 20 m

B. 40 m

C. 80 m

D. None

Answer: C

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8. The ratio of the height from which two bodies are dropped is 3:7 respectively. The ratio of their final velocities is

A. $7:3$

B. $9:49$

C. $13:17$

D. $17:13$

Answer: C

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9. The velocity of a particle at an instant is 10 m/s. After 5 s, the velocity of the particle is 20 m/s. The velocity at 3 s before the instant when the velocity of the particle was 10 m/s is

A. 8 m/s

B. 6 m/s

C. 4 m/s

D. 7 m/s

Answer: C

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10. A car starts from rest and moves with a uniform acceleration for 2 s. After that it starts to move with a uniform deceleration of $4m/s^2$. The acceleration of the body if it takes 3 s for the car to stop is

A. $4m/s^2$

B. $6m/s^2$

C. $12m/s^2$

D. none

Answer: B

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11. A stone when thrown with a velocity of 5 m/s attains a maximum height of H_1 and when thrown with a velocity of 10 m/s attains a maximum height of H. Find the correct relation between H_1 and H_2

A. $H_1 = H_2$

B. $H_1 = H_2/3$

C. $H_1 = 2H_1$

D. $H_1 = H_2/4$

Answer: D

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12. An ant moves along a circular track of 6 m radius such that the arc of the circular track subtends an angle of 30° at the centre. The distance covered by the ant is

A. π

B. 13π

C. 6π

D. 4π

Answer: A

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13. A ball is dropped from a balloon which is rising up with a speed of 2 m/s. After 2 s the velocity of the packet is

A. 20 m/s

B. 18 m/s

C. 22 m/s

D. none

Answer: B

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14. If a car travels 30 m and 26 m in its 7^{th} and 6th second of its travel respectively, then the initial velocity and acceleration of the body is

A. $4m/s, 4m/s^2$

B. $6m/s, 4m/s^2$

C. $0m/s, 4m/s^2$

D. $10m/s, 8m/s^2$

Answer: A

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15. If a ball is thrown upward with a velocity of 6 m/s. The maximum height attained by the particle is

A. 1.8 m

B. 3.6 m

C. 5.4 m

D. none

Answer: A

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16. If a body is thrown in air with an angle with horizontal. Then the path followed by the body will be

A. linear

B. elliptical

C. parabolic

D. none

Answer: C

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17. A ball is thrown vertically upward in air. When the particle is at a height half of its maximum height its speed is 10 m/s. Then the maximum height attained by the particle is

A. 20 m

B. 15 m

C. 10 m

D. 8 m

Answer: C

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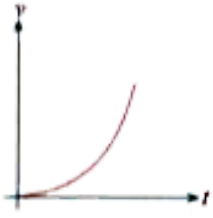
18. Which of the graph shows that the particle is at rest .

A. 

B. 

C. 

D. 

Answer: D

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19. A particle travels half of the circle of radius r. Then the displacement and distance of the particle are respectively.

A. $2\pi r, 0$

B. $2r, \pi r$

C. $\frac{\pi r}{2}, 2r$

D. $\pi r, r$

Answer: B

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20. A ball is dropped from a certain height to fall under gravity. After 1 sec another ball is dropped from the same point. What is the distance between them after 3 s from the dropping of second ball?

A. 35 m

B. 25 m

C. 50 m

D. none

Answer: A

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21. The ratio of maximum height reached by two bodies projected vertically upward with speed ratio x, y is

A. $x^2 : y^2$

B. $x : y$

C. $\sqrt{x} : \sqrt{y}$

D. none

Answer: A

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22. Two trains 1000 m long are moving parallel to each other at a speed of 100 m/s and 150 m/s respectively. After what time they pass each other?

A. 4s

B. 20 s

C. 8 s

D. 40 s

Answer: C

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23. A car travels the first $1/3^{rd}$ distance at a speed of 30 km/h, the next $1/3^{rd}$ distance at a speed of 20 km/h and the last $1/3^{rd}$ distance at a speed of 10 km/h. The average speed of the car is

A. 30 m/s

B. $\frac{180}{11}$ m/s

C. $\frac{50}{11}$ m/s

D. none

Answer: B

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24. A bus starts moving with an acceleration $2m/s^2$. A cyclist 96 m behind the bus starts simultaneously in the direction of the bus at a speed of 20 m/s. After what time the cyclist will overtake the bus?

A. 16 s

B. 8 s

C. 12 s

D. 4s

Answer: C

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25. The velocity of car changes from 40 m/s to 10 m/s in 10 s. The acceleration produced in it is

A. $3m/s^2$

B. $-3m/s^2$

C. $5m/s^2$

D. $-5m/s^2$

Answer: B

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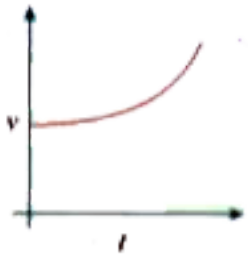
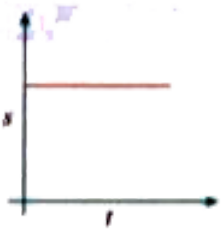
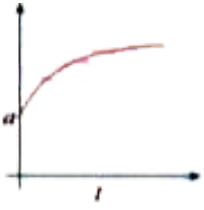
26. Which of the graph shows a particle with retardation?

A. 

B. 

C. 

D. 

Answer: C

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27. Speed of two identical cars are u and 4u at the instant. The ratio of the respective distances in which the two cars are stopped from the instant is

A. $1:1$

B. $1:8$

C. $1:4$

D. $1:16$

Answer: D

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28. A ball is released from the top of a tower to height h. It takes T seconds to reach the ground. What is the position of ball in T/3 seconds?

A. h/9 metres from the ground

B. 7h/9 metres from the ground

C. 8h/9 metres from the ground

D. 17h/18 metres from the ground

Answer: C

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29. A car is standing 100 m behind a bus. The bus and the car both start moving simultaneously with acceleration of $4m/s^2$ and $2m/s^2$ respectively. Find the time after which the car will be able to catch the bus.

A. 10 s

B. 20 s

C. 15 s

D. none

Answer: A

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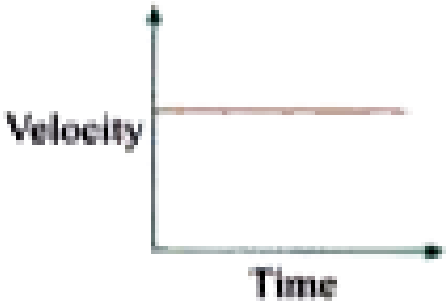
30. Which of the following is correct about the given graph?



A. Velocity is zero

B. Displacement is zero

C. Acceleration is zero

D. Acceleration is constant

Answer: C

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Consolidated Exercise Multiple Choice Questions With One Or More Than One Correct Answer

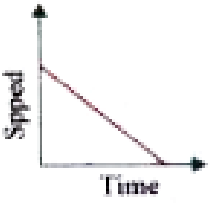
1. Which of the graphs shown below represent the motion with uniform speed?

A.

B.

C.

D.



Answer: A::C

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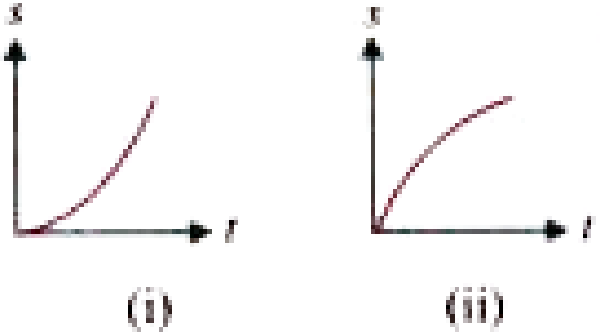
2. Displacement (s)-time (t) graphs of two particles moving in a straight line along the X-axis are shown below: It may be stated that the



A. particle (i) has uniform acceleration

B. particle (i) has non-uniform acceleration

C. particle (ii) has uniform motion

D. particle (ii) has a retarded motion

Answer: A::D

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3. A bullet is fired vertically upwards. After 10 s it returns to the point of firing. Which of the following statements are correct? Take $g = 10ms^{-2}$

A. The net displacement of the bullet in 10 s is zero

B. The total distance travelled by the bullet in 10 s is 250 m

C. The rate of change of velocity with time is constant throughout the motion of bullet

D. The bullet is fired with an initial velocity of $50ms^{-1}$ directly vertically upwards

Answer: A::B::C::D

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4. The speed of a magnetic audio tape is $4.5 cm s^{-1}$. What is the length of the tape in a 60-min cassette?

A. $0.162 \times 10^3 m$

B. $162 cm$

C. $162 m$

D. $1.62 cm$

Answer: A::C

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5. Consider the motion of the tip of the minute hand of a clock. In 1h

A. the displacement is zero

B. the distance covered is zero

C. the average speed is zero

D. the average velocity is zero

Answer: A::D

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6. An object may have

A. varying speed without having varying velocity

B. varying velocity without having varying speed

C. non-zero acceleration without having varying velocity

D. non-zero acceleration without having varying speed

Answer: B::D

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Challenging Exercise

1. A train starts from rest and accelerates uniformly at a rate of $2ms^{-2}$ for 10 s. It then maintains a constant speed for 200 s. The brakes are then applied and the train is uniformly retarded and it comes to rest in 50 s. Find

(i) the maximum velocity reached,

(ii) the retardation in the last 50 s,

(iii) the total distance travelled, and

(iv) the average velocity of the train.

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2. A particle moves along a straight line AB with constant acceleration. Its velocities are u and v at A and B, respectively. Show that its velocity at the mid-point of AB is $\sqrt{\frac{u^2 + v^2}{2}}$.

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3. A woman starts from her home at 9.00 a.m., walks with a speed of $5kmh^{-1}$ on straight road up to her office 2.5 km away, stays at the office up to 5.00p.m. and returns home by an auto with a speed of $25kmh^{-1}$. Choose suitable scales and plot the x-t graph for her motion.

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4. A drunkard walking in a narrow lane takes 5 steps forward and 3 steps backward, and again

takes 5 steps forward and 3 steps backward, and so on. Each step is 1 m long and requires 1 s. Determine how long the drunkard takes to fall into a pit 13 m away from the start.

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5. Which of the following can be a closed curve? Give one example each.

(i) Velocity-time graph

(ii) Displacement-time graph

(iii) Acceleration-time graph

(iv) Velocity-displacement graph

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6. When will the average velocity of many velocities be their arithmetic mean?

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Olympiad And Ntse Level Exercise

1. A point moves with uniform acceleration and v_1, v_2 and v_3 denote the average velocities in the three successive intervals of time

$t_1, t_2,$ and t_3. Which of the following relations is correct

A.

$$(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_2 - t_3)$$

B.

$$(v_1 - v_2) : (v_2 - v_3) = (t_1 + t_2) : (t_2 + t_3)$$

C.

$$(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_1 - t_3)$$

D.

$$(v_1 - v_2) : (v_2 - v_3) = (t_1 - t_2) : (t_2 - t_3)$$

Answer: B

View Text Solution

2. Two cars A and B are travelling in the same direction with velocities v_1 and $v_2(v_1 > v_2)$. When the car A is at a distance d ahead of the car B, the driver of the car A applied the brake producing a uniform retardation a. There will be no collision when

A. $d < \frac{(v_1 - v_2)^2}{2a}$

B. $d < \frac{v_1^2 - v_2^2}{2a}$

C. $d > \frac{(v_1 - v_2)^2}{2a}$

D. $d > \frac{v_1^2 - v_2^2}{2a}$

Answer: C

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3. A particle is dropped vertically from rest from a height. The time taken by it to fall through successive distances of 1 m each will then be

A. All equal, being equal to $\sqrt{2/g}$ second

B. In the ratio of the square roots of the integers 1, 2, 3....

C. In the ratio of the difference in the square roots of the integers i.e.,

$$\sqrt{1}, (\sqrt{2}-\sqrt{1}), (\sqrt{3}-\sqrt{2}), (\sqrt{4}-\sqrt{3}) \ldots.$$

D. In the ratio of the reciprocal of the square roots of the integers i.e.

$$\frac{1}{\sqrt{1}}, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{4}} \ldots..$$

Answer: C

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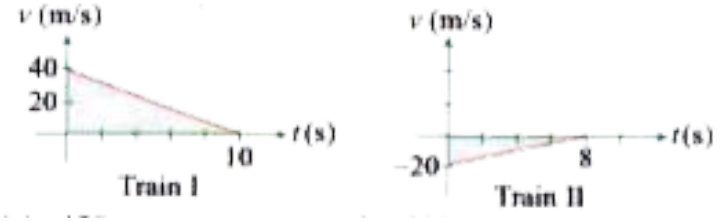
4. Two trains, which are moving along different tracks in opposite directions towards each other, are put on the same track by mistake. Their drivers, on noticing the mistake, start slowing down the trains when the trains are 300 m apart. Graphs given below show their velocities as function of time as the trains slow down. The separation between the trains after

both have stopped, is:



A. 120 m

B. 280 m

C. 60 m

D. 20 m

Answer: D

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5. Each of the three graphs represents acceleration versus time for an object that already has a positive velocity at time t_1. Which graphs show an object whose speed is increasing for the entire time interval between t_1 and t_2?

A. graph I, only

B. graphs I and II, only

C. graphs I and III, only

D. graphs I, II, and III

Answer: D

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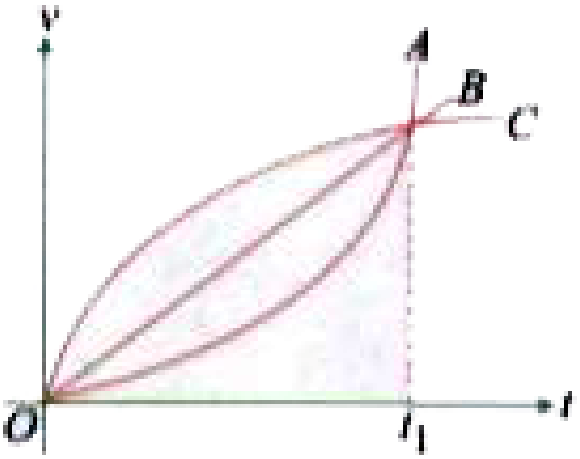
6. v - t graph for rectilinear motion is given as shown in the figure. Match the column on the basis of the v-t graph.



Column I		Column II	
(p)	The magnitude of average velocity from $t = 0$ to $t = t_1$	(a)	Same for A, B, C
(q)	Magnitude of acceleration at $t = t_1$	(b)	Maximum for A
(r)	Magnitude of acceleration at $t = 0$	(c)	Minimum for C
(s)	Speed at t_1	(d)	Maximum for C

A. $p - d, q - b, c, r - d, s - a$

B. $p - a, q - c, d, r - b, s - a$

C. $p - b, q - b, c, r - b, s - a$

D. None of these

Answer: A

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7. The position of a particle moving along the x-axis at certain times is given below:

$t(s)$	0	1	2	3
$x(m)$	-2	0	6	16

Which of the following describes the motion correctly?

A. Uniform, accelerated

B. Uniform, decelerated

C. Non-uniform, accelerated

D. There is not enough data for generalization

Answer: C

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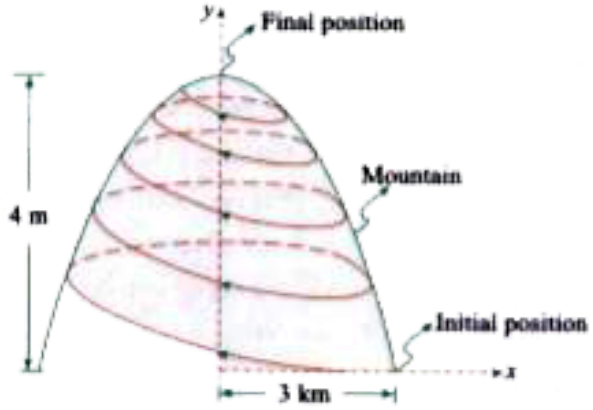
8. Mr. Verma drives his car at uniform speed from bottom of a mountain to the top in 30 minutes along a helical path as shown.



At the beginning the speedometer of his car shows 6225 km, while on reaching the top it reads 6285 km. (Take upward as positive y-axis and positive x-axis towards right)

The total distance covered is

A. 30 km

B. 20 km

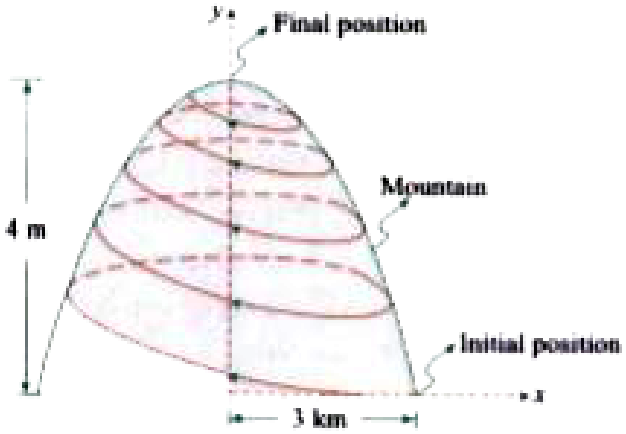
C. 60 km

D. cannot be determined

Answer: C

View Text Solution

9. Mr. Verma drives his car at uniform speed from bottom of a mountain to the top in 30 minutes along a helical path as shown.



At the beginning the speedometer of his car shows 6225 km, while on reaching the top it reads 6285 km. (Take upward as positive y-axis and positive x-axis towards right)

His displacement vector during the journey is

A. $\left(-3\hat{i} + 4\hat{j} \right) km$

B. $3km$

C. $5km$

D. none of these

Answer: A

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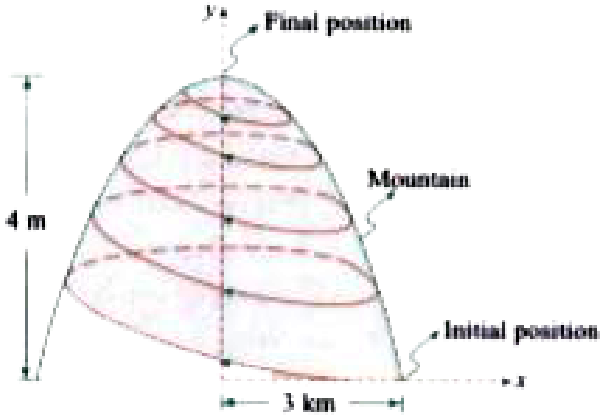
10. Mr. Verma drives his car at uniform speed from bottom of a mountain to the top in 30 minutes along a helical path as shown.



At the beginning the speedometer of his car shows 6225 km, while on reaching the top it reads 6285 km. (Take upward as positive y-axis and positive x-axis towards right)

The average velocity during the journey is

A. $\left(-6\hat{i} + 9\hat{i} \right) km/h.$

B. $\left(-6\hat{i} + 8\hat{j} \right) km/h.$

C. $\left(-9\hat{i} + 12\hat{j} \right) km/h.$

D. none of these

Answer: B

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