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C.U.Q

DISTANCE AND DISPLACEMENT

1. **The numerical ratio of displacement to distance is**
   1) always less than 1 2) always greater than 1
   3) always equal to 1
   4) may be less than 1 or equal to one
2. **The location of a particle is changed. What can we say about the displacement and distance covered by the particle?**
   1) Both cannot be zero
   2) One of the two may be zero
   3) Both must be zero 4) Both must be equal
3. **Consider the motion of the tip of the minute hand of a clock. In one hour**
   a) the displacement is zero
   b) the distance covered is zero
   c) the average speed is zero
   d) the average velocity is zero
   1) a & b are correct 2) a,b & c are correct
   3) a & d are correct 4) b,c & d are correct

SPEED AND VELOCITY

4. **The numerical value of the ratio of average velocity to average speed is**
   1) always less than one 2) always equal to one
   3) always more than one
   4) equal to or less than one.
5. **If a particle moves in a circle describing equal angles in equal intervals of time, then the velocity vector**
   1) remains constant. 2) changes in magnitude.
   3) changes in direction.
   4) changes both in magnitude and direction.
6. **In which of the following examples of motion, can the body be considered approximately a point object**
   a) a railway carriage moving without jerks between two stations.
   b) a monkey sitting on top of a man cycling smoothly on a circular track
   c) a spinning cricket ball that turns sharply on hitting the ground
   d) a trembling beaker that has slipped off the edge of a table
   1) a,b 2) b,c 3)a,c 4)b,d

7. **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.
1) a,b & c are correct 2) b & d are correct
3) a,b & d are correct 4) a & d are correct

8. **The distance travelled by a particle in a straight line motion is directly proportional to $t^{1/2}$, where t = time elapsed. What is the nature of motion ?**
1) Increasing acceleration
2) Decreasing acceleration
3) Increasing retardation
4) Decreasing retardation

ACCELERATION

9. **If a body starts from rest, then the time in which it covers a particular displacement with uniform acceleration is**
1) inversely proportional to the square root of the displacement
2) inversely proportional to the displacement
3) directly proportional to the displacement
4) directly proportional to the square root of the displacement

10. **Check up only the correct statement in the following.**
1) A body has a constant velocity and still it can have a varying speed
2) A body has a constant speed but it can have a varying velocity
3) A body having constant speed cannot have any acceleration.
4) None of these.

11. **When the speed of a car is u, the minimum distance over which it can be stopped is s. If the speed becomes nu, what will be the minimum distance over which it can be stopped during the same time ?**
1) s/n 2) ns 3) s/n^2 4) n^2s.

12. **The distance covered by a moving body is directly proportional to the square of the time. The acceleration of the body is**
1) increasing 2) decreasing
3) zero 4) constant

13. **Mark the incorrect statement for a particle going on a straight line.**
1) If the velocity and acceleration have opposite sign, then the object is slowing down.
2) If the position and velocity have opposite sign, then the particle is moving towards the origin.
3) If the velocity is zero at an instant, then the acceleration should also be zero at that instant.
4) If the velocity is zero for a time interval,then the acceleration is zero at any instant within the time interval.

MOTION UNDER GRAVITY

14. **B_1, B_2 and B_3 are three balloons ascending with velocities v, 2v and 3v, respectively. If a bomb is dropped from each when they are at the same height, then**
1) bomb from B_1 reaches ground first
2) bomb from B_2 reaches ground first
3) bomb from B_3 reaches ground first
4) they reach the ground simultaneously

15. **The distances moved by a freely falling body during 1st, 2nd, 3rd,......nth second of its motion are proportional to**
1) even numbers 2) odd numbers
3) all integral numbers
4) squares of integral numbers

16. **To reach the same height on the moon as on the earth, a body must be projected up with**
1) higher velocity on the moon.
2) lower velocity on the moon.
3) same velocity on the moon and earth.
4) it depends on the mass of the body.

17. **At the maximum height of a body thrown vertically up**
1) velocity is not zero but acceleration is zero.
2) acceleration is not zero but velocity is zero.
3) both acceleration and velocity are zero.
4) both acceleration and velocity are not zero.

18. **A ball is dropped freely while another is thrown vertically downward with an initial velocity 'v' from the same point simultaneously. After 't' second they are separated by a distance of**
1) $\frac{vt}{2}$ 2) $\frac{1}{2}gt^2$ 3) vt 4) $vt+\frac{1}{2}gt^2$

19. **The average velocity of a freely falling body is numerically equal to half of the acceleration due to gravity. The velocity of the body as it reaches the ground is**

1) g 2) $\frac{g}{2}$ 3) $\frac{g}{\sqrt{2}}$ 4) $\sqrt{2}g$

20. **Two bodies of different masses are dropped simultaneously from the top of a tower. If air resistance is proportional to the mass of the body, then,**

1) the heavier body reaches the ground earlier.
2) the lighter body reaches the ground earlier.
3)both the bodies reach the ground simultaneously.
4) cannot be decided.

21. **A man standing in a lift falling under gravity releases a ball from his hand. As seen by him, the ball**

1) falls down 2) remains stationary
3) goes up 4) executes SHM

22. **A particle is dropped from certain height. The time taken by it to fall through successive distances of 1 m each will be**

1) all equal, being equal to $\sqrt{2/g}$ second
2) in the ratio of the square roots of the integers 1,2, 3, ...
3) in the ratio of the difference in the square roots of the integers, i.e.,
$\sqrt{1},\left(\sqrt{2}-\sqrt{1}\right),\left(\sqrt{3}-\sqrt{2}\right),\left(\sqrt{4}-\sqrt{3}\right),......$
4) in the ratio of the reciprocals of the square roots of the integers, i.e., $\frac{1}{\sqrt{1}},\frac{1}{\sqrt{2}},\frac{1}{\sqrt{3}},......$

23. **A body, freely falling under gravity will have uniform**

1)speed 2)velocity 3)momentum 4)acceleration

24. **A person standing near the edge of the top of a building throws two balls A and B. The ball A is thrown vertically upward and B is thrown vertically downward with the same speed, The ball A hits the ground with a speed V_A and the ball B hits the ground with a speed V_B. then**

1) $V_A < V_B$ 2) $V_A < V_B$ 3) $V_A = V_B$
4) the relation between V_A and V_B depends on height of the building above the ground

25. **A lift is coming from 8^{th} floor and is just about to reach 4^{th} floor. Taking ground floor as origin and positive direction upwards for all quantities, which one of the following is correct?**

1) x<0, v<0, a>0 2) x>0, v<0, a<0
3) x>0, v<0, a>0 4) x>0, v>0, a<0

GRAPHS

26. **Choose the correct statement :**

1) The area of displacement - time graph gives velocity.
2) The slope of velocity - time graph gives acceleration.
3) The slope of displacement - time graph gives acceleration.
4) The area of velocity - time graph gives average velocity.

27. **Velocity-time graph of a body thrown vertically up is**

1) a straight line 2) a parabola
3) a hyperbola 4) circle

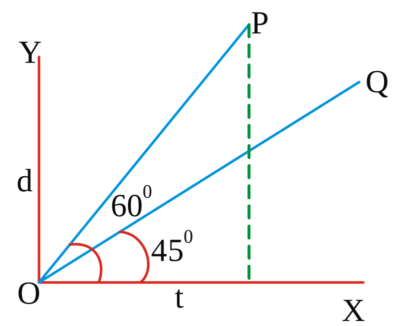
28. **Velocity - displacement graph of a freely falling body is**

1) straight line passing through the origin
2) straight line intersecting 'x' and 'y' axes
3) parabola 4) hyperbola

29. **Displacement - time graph of a body projected vertically up is**

1) a straight line 2) a parabola
3) a hyperbola 4) a circle

30. **The displacement - time graphs of two bodies A and B are OP and OQ respectively. If $\angle$POX is 60^0 and $\angle$QOX is 45^0, the ratio of the velocity of A to that of B is**



1) $\sqrt{3}:\sqrt{2}$ 2) $\sqrt{3}:1$ 3) $1:\sqrt{3}$ 4) 3:1

31. **If the distance travelled by a particle and corresponding time be laid off along y and x axes respectively, then the correct statement of the following is**

1) the curve may lie in fourth quadrant
2) the curve lies in first quadrant
3) the curve exhibits peaks corresponding to maxima
4) the curve may drop as time passes

32. In relation to a velocity - time graph

1) the curve can be a circle
2) the area under the curve and above the time axis between any two instants gives the average acceleration
3) the slope at any instant gives the rate of change of acceleration at that instant
4) the area under the curve and above the time axis gives the displacement

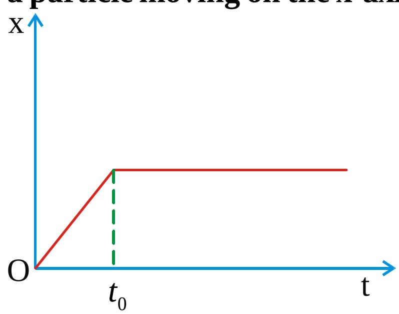
33. The displacement - time graph of a particle moving with respect to a reference point is a straight line

1)the reference point is stationary with zero velocity
2) the acceleration of the object is zero
3) body moves with uniform velocity
4) all the above

34. For a uniform motion

1) the velocity - time graph is a straight line parallel to time axis
2) the position - time graph is a parabola
3) the acceleration - time graph is a straight line inclined with time axis
4) the position - time graph is a straight line

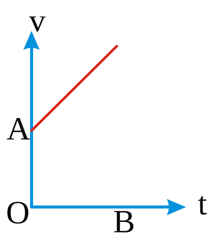
35. Figure shows the displacement- time graph of a particle moving on the x-axis



1) the particle is continuously going in positive X direction
2) the particle is at rest
3) the velocity increases up to a time t_0 and then becomes constant.
4) the particle moves at constant velocity up to a time t_0 and then stops.

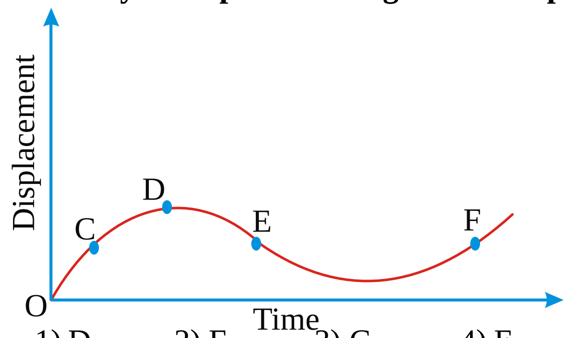
36. The variation of quantity A with quantity B. plotted in the Fig. describes the motion of a particle in a straight line.

a) Quantity B may represent time.
b) Quantity A is velocity if motion is uniform.
c) Quantity A is displacement if motion is uniform.
d) Quantity A is velocity if motion is uniformly accelerated.



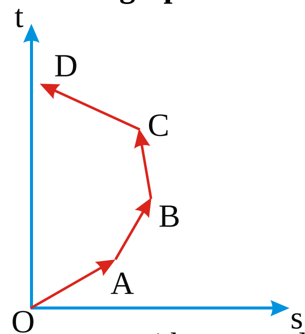
1) a,c,d 2) b,c,d 3) a,b 4) c,d

37. The displacement-time graph of a moving particle is shown in Fig. The instantaneous velocity of the particle is negative at the point



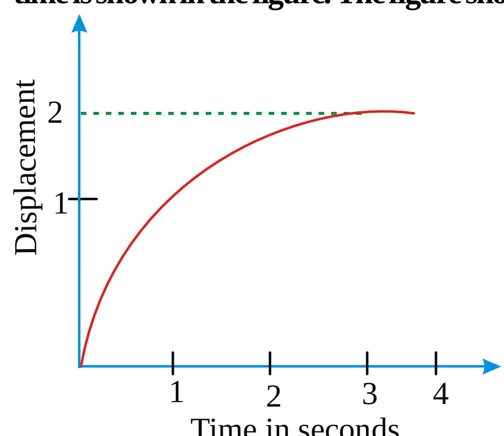
1) D 2) F 3) C 4) E

38. Which of the following option is correct for having a straight line motion represented by displacement-time graph.



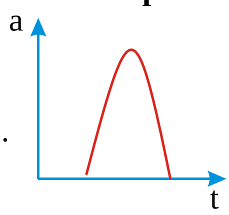
1) The object moves with constantly increasing velocity from O to A then it moves with constant velocity.
2) Velocity of the object increases uniformly.
3) Average velocity is zero.
4) The graph shown is impossible.

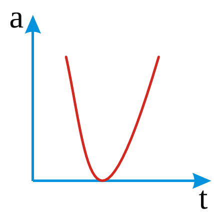
39. The displacement of a particle as a function of time is shown in the figure. The figure shows that

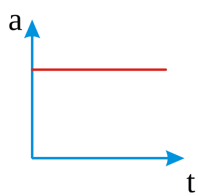


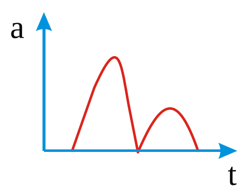
1) the particle starts with certain velocity but the motion is retarded and finally the particle stops
2) the velocity of the particle is constant through out
3) the acceleration of the particle is constant throughout
4) the particle starts with constant velocity, then motion is accelerated and finally the particle moves with another constant velocity.

40. **A uniform moving cricket ball is turned back by hitting it with a bat for a very short time interval. Show the variation of its acceleration with time. (Take acceleration in the back ward direction as positive)**

1. 

2. 

3. 

4. 

RELATIVE VELOCITY

41. **A small body is dropped from a rising balloon. A person A stands on ground, while another person B is on the balloon. Choose the correct statement : Immediately, after the body is released.**

1) A and B, both feel that the body is coming (going) down.

2) A and B, both feel that body is coming up.

3) A feels that the body is coming down, while B feels that the body is going up

4) A feels that the body is going up, while B feels that the body is going down.

42. **Seeta is moving due east with a velocity of $v_1\ m/s$ and Geeta is moving due west with a velocity of $v_2\ m/s$. The velocity of Seeta with respect to Geeta is**

1) $v_1 + v_2$ due east 2) $v_1 - v_2$ due east

3) $v_1 - v_2$ due west 4) $v_1 + v_2$ due west

C.U.Q - KEY

1) 4	2) 1	3) 3	4) 4	5) 3	6) 1
7) 2	8) 4	9) 4	10) 2	11) 4	12) 4
13) 3	14) 1	15) 2	16) 2	17) 2	18) 3
19) 1	20) 3	21) 2	22) 3	23) 4	24) 3
25) 1	26) 2	27) 1	28) 3	29) 2	30) 2
31) 2	32) 4	33) 4	34) 1	35) 4	36) 1
37) 4	38) 3	39) 1	40) 1	41) 4	42) 1

LEVEL - I (C.W)

DISPLACEMENT AND DISTANCE

1. **A body is moving along the circumference of a circle of radius 'R' and completes half of the revolution. Then, the ratio of its displacement to distance is**

1) $\pi : 2$ 2) 2:1 3) $2 : \pi$ 4) 1:2

2. **A body completes one round of a circle of radius 'R' in 20 second. The displacement of the body after 45 second is**

1) $\frac{R}{\sqrt{2}}$ 2) $\sqrt{2}\,R$ 3) $2\sqrt{R}$ 4) 2R

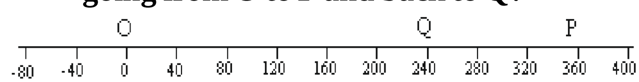
SPEED AND VELOCITY

3. **If a body covers first half of its journey with uniform speed v_1 and the second half of the journey with uniform speed v_2, then the average speed is**

1) $v_1 + v_2$ 2) $\frac{2v_1v_2}{v_1 + v_2}$

3) $\frac{v_1v_2}{v_1 + v_2}$ 4) v_1v_2

4. **A car is moving along a straight line, say OP in figure. It moves from O to P in 18 s and return from P to Q in 6 s. What are the average velocity and average speed of the car in going from O to P and back to Q?**



1) $10\,m s^{-1}, 20\,m s^{-1}$ 2) $20\,m s^{-1}, 10\,m s^{-1}$

3) $10\,m s^{-1}, 10\,m s^{-1}$ 4) $20\,m s^{-1}, 20\,m s^{-1}$

5. **For a body moving with uniform acceleration 'a', initial and final velocities in a time interval 't' are 'u' and 'v' respectively. Then, its average velocity in the time interval 't' is**

1) $(v + at)$ 2) $\left(v - \frac{at}{2}\right)$ 3) $(v - at)$ 4) $\left(u - \frac{at}{2}\right)$

ACCELERATION

6. **A body moves with a velocity of 3m/s due east and then turns due north to travel with the same velocity. If the total time of travel is 6s, the acceleration of the body is**

1) $\sqrt{3}\ m/s^2$ towards north west

2) $\frac{1}{\sqrt{2}}\ m/s^2$ towards north west

3) $\sqrt{2}\ m/s^2$ towards north east 4) all the above

7. If a body travels 30m in an interval of 2s and 50m in the next interval of 2s, then the acceleration of the body is

1) 10 m/s^2 2) 5 m/s^2 3) 20 m/s^2 4) 25 m/s^2

8. A bullet travelling horizontally looses 1/20th of its velocity while piercing a wooden plank. Then the number of such planks required to stop the bullet is

1) 6 2) 9 3) 11 4) 13

9. If $S_n = 2 + 0.4n$ find initial velocity and acceleration

1) 2.2 units, 0.4 units 2) 2.1 units, 0.3 units
3) 1.2 units, 0.4 units 4) 2.2 units, 0.3 units

10. A particle starts moving from rest under uniform acceleration. It travels a distance 'x' in the first two seconds and a distance 'y' in the next two seconds. If y = nx, then n= (1993 E)

1) 1 2) 2 3) 3 4) 4

11. A particle is moving in a straight line with initial velocity 'u' and uniform acceleration 'a'. If the sum of the distances travelled in tth and (t+1)th second is 100cm, then its velocity after 't' seconds in cm/s is

1) 20 2) 30 3) 80 4) 50

12. A particle is moving with uniform acceleration along a straight line ABC. Its velocity at 'A' and 'B' are 6 m/s and 9 m/s respectively. If AB : BC = 5 : 16 then its velocity at 'C' is

1) 9.6 m/s 2) 12 m/s 3) 15 m/s 4) 21.5 m/s

13. A car moving on a straight road accelerates from a speed of 4.1 m/s to a speed of 6.9 m/s in 5.0 s. Then its average acceleration is

1) 0.5m/s^2 2) 0.6m/s^2 3) 0.56m/s^2 4) 0.65m/s^2

MOTION UNDER GRAVITY

14. A body projected vertically upwards with a velocity of 19.6 m/s reaches a height of 19.8 m on earth. If it is projected vertically up with the same velocity on moon, then the maximum height reached by it is

1) 19.18 m 2) 3.3 m 3) 9.9 m 4) 118.8 m

15. A ball is thrown straight upward with a speed v from a point h meter above the ground. The time taken for the ball to strike the ground is

1) $\frac{v}{g}\left[1+\sqrt{1+\frac{2hg}{v^2}}\right]$ 2) $\frac{v}{g}\left[1-\sqrt{1-\frac{2hg}{v^2}}\right]$

3) $\frac{v}{g}\left[1-\sqrt{1+\frac{2hg}{v^2}}\right]$ 4) $\frac{v}{g}\left[2+\frac{2hg}{v^2}\right]$

16. A ball is dropped on the floor from a height of 10m. It rebounds to a height of 2.5m. If the ball is in contact with the floor for 0.01 s, then the average acceleration during contact is nearly

1) $500\sqrt{2} m/s^2$ upwards
2) $1800\sqrt{2} m/s^2$ downwards
3) $1500\sqrt{2} m/s^2$ upwards
4) $1500\sqrt{2} m/s^2$ downwards

17. A body falling from rest has a velocity 'v' after it falls through a distance 'h'. The distance it has to fall down further, for its velocity to become double, is ..... times 'h'.

1) 5 2) 1 3) 2 4) 3

RELATIVE VELOCITY

18. A ball is dropped from a building of height 45m. Simultaneously another ball is thrown up with a speed 40m/s. The rate of change of relative speed of the balls is

1) 20 ms^{-1} 2) 40 ms^{-1} 3) 30 ms^{-1} 4) 0 ms^{-1}

19. Two cars 1 & 2 starting from rest are moving with speeds v_1 and v_2 m/s $(v_1 > v_2)$. Car 2 is ahead of car '1' by s meter when the driver of the car '1' sees car '2'. What minimum retardation should be given to car '1' to avoid collision. (2002 A)

1) $\frac{v_1 - v_2}{s}$ 2) $\frac{v_1 + v_2}{s}$

3) $\frac{(v_1 + v_2)^2}{2s}$ 4) $\frac{(v_1 - v_2)^2}{2s}$

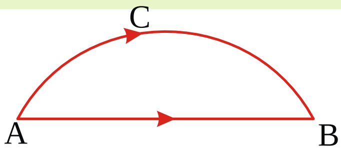
20. Two cars are travelling towards each other on a straight road at velocities 15 m/s and 16 m/s respectively. When they are 150m apart, both the drivers apply the brakes and the cars decelerate at 3 m/s^2 and 4 m/s^2 until they stop. Separation between the cars when they come to rest is

1) 86.5 m 2) 89.5 m 3) 85.5 m 4) 80.5 m

LEVEL - I (C.W) - KEY

01) 3	02) 2	03) 2	04) 1	05) 2	06) 2
07) 2	08) 3	09) 1	10) 3	11) 4	12) 3
13) 3	14) 4	15) 1	16) 3	17) 4	18) 4
19) 4	20) 4				

LEVEL - I (C.W) - HINTS

1. 

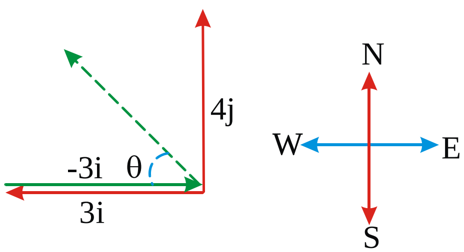
Displacement : Distance $= \pi R : 2R$

2. In 40sec body completes two revolutions.
In 5 sec it covers 1/4 th of the circle and angle traced is $\frac{\pi}{2}$. So displacement $s = 2R\sin\frac{\theta}{2}$

3. Average speed $= \frac{s_1 + s_2}{t_1 + t_2} \Rightarrow v = \frac{2v_1v_2}{v_1 + v_2}$

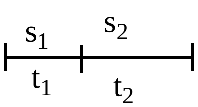
4. $v_{avg} = \frac{\text{total displacement}}{\text{total time}} = \frac{s_1 + s_2}{t_1 + t_2}$

5. $v_{avg} = \frac{v+u}{2} = \frac{v+v-at}{2}$

6. 

$a = \frac{v-u}{t}$; $\bar{v}_i = v_1\hat{i}, \bar{v}_f = v_2\hat{j}$

$\Delta\bar{v} = \bar{v}_f - \bar{v}_i = v_2\hat{j} - v_1\hat{i}$; $\tan\theta = \frac{v_2}{v_1}$

7. 

; $s_1 = ut_1 + \frac{1}{2}t_1^2$

$s_1 + s_2 = u \times t_1 + t_2 + \frac{1}{2}a(t_1 + t_2)^2$

8. $\frac{1}{n} = \frac{1}{20} \Rightarrow n = 20$; no. of planks $= \frac{n^2}{2n-1}$

9. $s_n = u + an - \frac{1}{2}a = \left(u - \frac{1}{2}a\right) + an$ ....(1)

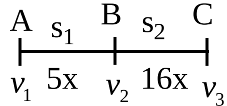
$s_n = 2 + 0.4n$ ....(2)

from (1) and (2) $0.4n = an$; $u - \frac{1}{2}a = 2$

10. $x = \frac{1}{2}a(2)^2$; $(x+y) = \frac{1}{2}a(4)^2$

11. $s_t = u + \frac{t}{2}(2t-1)$; $s_{t+1} = u + \frac{t}{2}(2t+1)$

$s_t + s_{t+1} = 100$; $v = u + ft$

12. 

; $a = \frac{v_2^2 - v_1^2}{2s_1} = \frac{v_3^2 - v_2^2}{2s_2}$

13. $a = \frac{v-u}{t}$

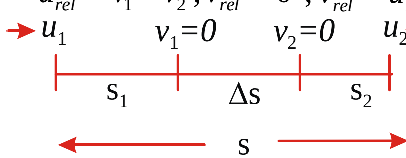
14. $h = \frac{u^2}{2g}$; $h \alpha \frac{1}{g} \Rightarrow \frac{h_E}{h_M} = \frac{g_M}{g_E}$

15. $h = -vt + \frac{1}{2}gt^2$; $gt^2 - 2vt - 2h = 0$

16. $a = \frac{\sqrt{2gh_2} - \left(-\sqrt{2gh_1}\right)}{\Delta t}$ 17. $v^2 = 2gh$; $4v^2 = 2gx$

18. Relative acceleration is zero as 'g' is downwards for the both the bodies.

19. $u_{rel} = v_1 - v_2$; $v_{rel} = 0$; $v_{rel}^2 = u_{rel}^2 = 2as$

20. 

$v_1^2 - u_1^2 = 2a_1s_1$; $v_2^2 - u_2^2 = 2a_2s_2$

$\Delta s = s - (s_1 + s_2)$.

LEVEL - I (H.W)

DISPLACEMENT AND DISTANCE

1. A body moves from one corner of an equilateral triangle of side 10 cm to the same corner along the sides. Then the distance and displacement are respectively

1) 30 cm & 10 cm 2) 30 cm & 0 cm
3) 0 cm & 30 cm 4) 30 cm & 30 cm.

SPEED AND VELOCITY

2. For a train that travels from one station to another at a uniform speed of 40 kmh^{-1} and returns to final station at speed of 60 kmh^{-1}, then its average speed is

1) 98 km/hr 2) 0 km/hr
3) 50 km/hr 4) 48 km/hr

3. If the distance between the sun and the earth is 1.5×10^{11} m and velocity of light is 3×10^8 m/s, then the time taken by a light ray to reach the earth from the sun is

1) 500 s 2) 500 minute 3) 50 s 4) 5×10^3s

ACCELERATION

4. A body is moving with velocity $30ms^{-1}$ towards east. After 10s its velocity becomes $40ms^{-1}$ towards north. The average acceleration of the body is [AIPMT 2011]
1) $7\,ms^{-2}$ 2) $\sqrt{7}\,ms^{-2}$ 3) $5\,ms^{-2}$ 4) $1\,ms^{-2}$

5. A body starting with a velocity 'v' returns to its initial position after 't' second with the same speed, along the same line. Acceleration of the particle is
1) $\frac{-2v}{t}$ 2) zero 3) $\frac{v}{2t}$ 4) $\frac{t}{2v}$

6. A body starting from rest moving with uniform acceleration has a displacement of 16 m in first 4 s and 9 m in first 3 s. The acceleration of the body is
1) 1 ms^{-2} 2) 2 ms^{-2} 3) 3 ms^{-2} 4) 4 ms^{-2}

7. A body starts from rest and moves with an uniform acceleration. The ratio of distance covered in the n^{th} second to the distance covered in 'n' second is
1) $\left(\frac{2}{n}-\frac{1}{n^2}\right)$ 2) $\left(\frac{1}{n^2}-\frac{1}{n}\right)$ 3) $\left(\frac{2}{n^2}-\frac{1}{n}\right)$ 4) $\frac{2}{n}+\frac{1}{n^2}$

8. A bus accelerates uniformly from rest and acquires a speed of 36kmph in 10s. The acceleration is
1) 1 m/s^2 2) 2 m/s^2 3) 1/2 m/s^2 4) 3 m/s^2

9. Speeds of two identical cars are U and 4U at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is
1) 1:1 2) 1:4 3) 1:8 4) 1:16

10. A car moving along a straight highway with speed of $126Kmh^{-1}$ is brought to a stop with in a distance of 200m. what is the retardation of the car
1) $3.06ms^{-2}$ 2) $4ms^{-2}$ 3) $5.06ms^{-2}$ 4) $6ms^{-2}$

MOTION UNDER GRAVITY

11. Two balls are projected simultaneously with the same velocity 'u' from the top of a tower, one vertically upwards and the other vertically downwards. Their respective times of the journeys are t_1 and t_2. At the time of reaching the ground, the ratio of their final velocities is
1) 1:1 2) 1:2 3) 2:3 4) 2:1

12. Two bodies are projected simultaneously with the same velocity of 19.6 m/s from the top of a tower, one vertically upwards and the other vertically downwards. As they reach the ground, the time gap is
1) 0 s 2) 2 s 3) 4 s 4) 6 s

13. Two bodies begin to fall freely from the same height. The second one begins to fall τ s after the first. The time after which the 1st body begins to fall, the distance between the bodies equals to l is
1) $\frac{l}{g\tau}+\frac{\tau}{2}$ 2) $\frac{g\tau}{l}+\tau$
3) $\frac{\tau}{lg}+\frac{2}{\tau}$ 4) $\frac{g}{l\tau}+\frac{\tau}{2}$

14. A balloon is going upwards with velocity 12 m/sec. It releases a packet when it is at a height of 65 m from the ground. How much time the packet will take to reach the ground $\left(g=10m/sec^2\right)$
1) 5 sec 2) 6 sec 3) 7 sec 4) 8 sec

15. A body thrown up with some initial velocity reaches a maximum height of 50m. Another body with double the mass thrown up with double the initial velocity will reach a maximum height of
1) 100m 2) 200m 3) 400m 4) 50m

16. The distance moved by a freely falling body (starting from rest) during the 1st, 2nd and 3rd ... nth second of its motion, are proportional to
1) (n-1) 2) (2n-1) 3) (n^2-1) 4) $(2n-1)/n^2$

17. A ball released from a height 'h' touches the ground in 't's. After t/2s since dropping, the height of the body from the ground
1) $\frac{h}{2}$ 2) $\frac{h}{4}$ 3) $\frac{3h}{4}$ 4) $\frac{3h}{2}$

18. A boy standing at the top of a tower of 20 m height drops a stone Assuming $g=10\,ms^{-2}$, the velocity with which it hits the ground is [AIPMT 2011]
1) $20\,ms^{-1}$ 2) $40\,ms^{-1}$ 3) $5\,ms^{-1}$ 4) $10\,ms^{-1}$

19. A ball thrown vertically upwards with an initial velocity of 1.4 m/s returns in 2s. The to-

tal displacement of the ball is

1) 22.4 cm 2) zero 3) 44.8 m 4) 33.6m

20. A stone is dropped from a certain height which can reach the ground in 5s. It is stopped momentarily after 3s and then it is again released. The total time taken by the stone to reach the ground will be

1) 6s 2) 6.5s 3) 7s 4) 7.5s

RELATIVE VELOCITY

21. What are the speeds of two objects if, when they move uniformly towards each other, they get 4 m closer in each second and when they move uniformly in the same direction with the original speeds, they get 4 m closer each 10s?

1) 2.8 m/s and 12 m/s
2) 5.2 m/s and 4.6 m/s
3) 3.2 m/s and 2.1 m/s
4) 2.2 m/s and 1.8 m/s

22. Two trains are each 50m long moving parallel towards each other at speeds 10 m/s and 15 m/s respectively, at what time will they pass each other?

1) 8 s 2) 4 s 3) 2 s 4) 6 s

23. A ball is dropped from the top of a building 100 m high. At the same instant another ball is thrown upwards with a velocity of $40\,ms^{-1}$ form the bottom of the building. The two balls will meet after.

1) 5 s 2) 2.5 s 3) 2s 4) 3 s

LEVEL - I (H.W) - KEY

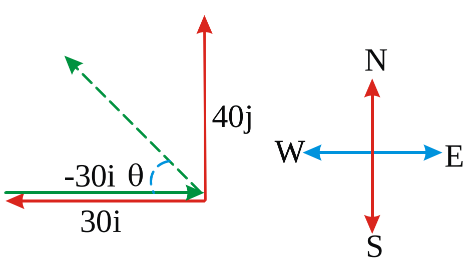
01) 2	02) 4	03) 1	04) 3	05) 1	06) 2
07) 1	08) 1	09) 4	10) 1	11) 1	12) 3
13) 1	14) 1	15) 2	16) 2	17) 3	18) 1
19) 2	20) 3	21) 4	22) 2	23) 2	

LEVEL - I (H.W) -HINTS

1. Displacement = shortest distance between initial point and final point

2. $v_{avg} = \dfrac{2v_1v_2}{v_1+v_2}$ 3. $s = vt$, $t = \dfrac{s}{v}$

4.



$\overline{v}_i = v_1\hat{i}$; $\overline{v}_f = v_2\hat{j}$; $\Delta\overline{v} = \overline{v}_f - \overline{v}_i = v_2\hat{j} - v_1\hat{i}$

$|\Delta\overline{v}| = \sqrt{v_1^2+v_2^2}$; $a = \left|\dfrac{\Delta v}{\Delta t}\right|$

5. $a = \dfrac{v-u}{t}$; 6. $s_n = a\left(n-\dfrac{1}{2}\right)$; $s = \dfrac{1}{2}an^2$

7. $s_n = \dfrac{a}{2}(2n-1)$; $s = \dfrac{a}{2}n^2$; $\dfrac{s_n}{s} = \dfrac{2n-1}{n^2}$

8. $v = u + at$;

9. $v^2 - u^2 = 2as$; $v = 0$ both the cases

$u^2 \propto s$; $\left(\dfrac{u_1}{u_2}\right)^2 = \left(\dfrac{s_1}{s_2}\right)$

10. $v^2 - u^2 = 2as$

11. $v = \sqrt{u^2+2gh}$ is same for both the bodies.

12. $\Delta t = \dfrac{2u}{g}$

13. $H_1 = \dfrac{gt^2}{2}$; $H_2 = \dfrac{g(t-\tau)^2}{2}$; $l = H_1 - H_2$

14. $h = -ut + \dfrac{1}{2}gt^2$ 15. $H_{max} = \dfrac{u^2}{2g}$ (independent of mass)

16. $s_n = g\left(n-\dfrac{1}{2}\right)$; Ratio $= \dfrac{g}{2}:\dfrac{3g}{2}:\dfrac{5g}{2}.....(2n-1)\dfrac{g}{2}$

$s_n \propto (2n-1)$

17. $h = \dfrac{1}{2}gt^2$ 18. $v = \sqrt{2gh}$

19. Since the ball returns back to its initial position, the displacement is zero.

20. $h = h_1 + h_2$, $\dfrac{1}{2}gt^2 = \dfrac{1}{2}gt_1^2 + \dfrac{1}{2}gt_2^2$; $t_{tot} = t_1 + t_2$

21. $v_A + v_B = 4m/s$; $v_A - v_B = \dfrac{4}{10}$ m/s

22. $t = \dfrac{l_1+l_2}{v_r} = \dfrac{l_1+l_2}{v_1+v_2}$

23. $t = \dfrac{d_r}{v_r} = \dfrac{h}{u_1+u_2}$ $[\because a_r = 0]$; $u_1 = 0$