YAKEEN NEET 2.0

2026

Motion in a Straight Line

Physics | Assignment Solution 01

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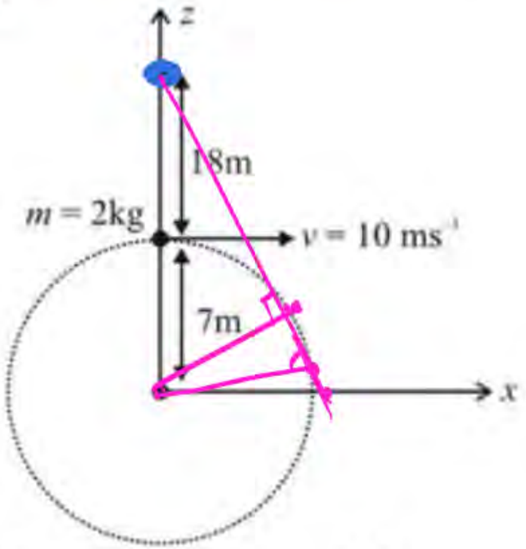
1. A particle of mass m is moving with constant speed in a vertical circle in x-z plane. There is a small bulb at some distance on z-axis. The maximum distance of the shadow of the particle on x-axis from origin equal to

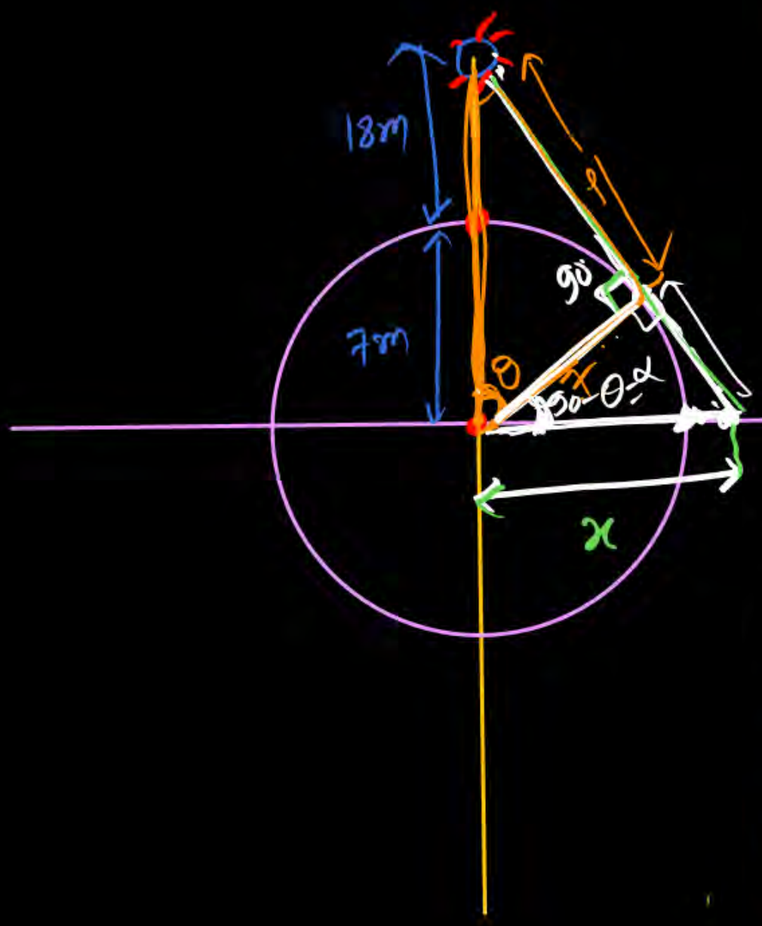


(1) $\frac{175}{24}$ m (2) $\frac{125}{24}$ m

(3) 25 m (4) 24 m

$P = \sqrt{H-B^2} = 24$

$\cos\theta = \frac{7}{25} = \frac{B}{H}$



$\cos\alpha = \frac{7}{x}$

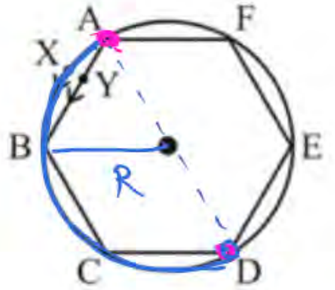
$\cos(90-\theta) = \frac{7}{x}$

$x = \frac{7}{\sin\theta}$

$x = \frac{7}{\frac{24}{25}} = \frac{7\times25}{24}$

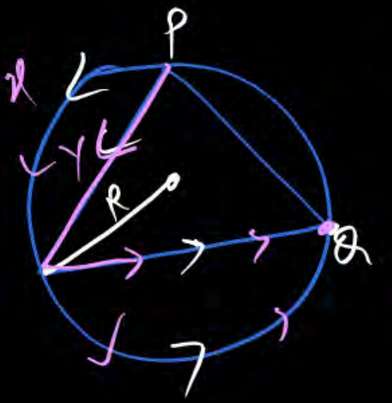
A

2. Two particles X and Y are respectively moving on the circular path and regular hexagon as shown. O is centre of circle and hexagon both. When both X and Y have moved from point A to point D, the ratio of distance moved by X to magnitude of displacement of Y is



(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$

(3) π (4) 2π

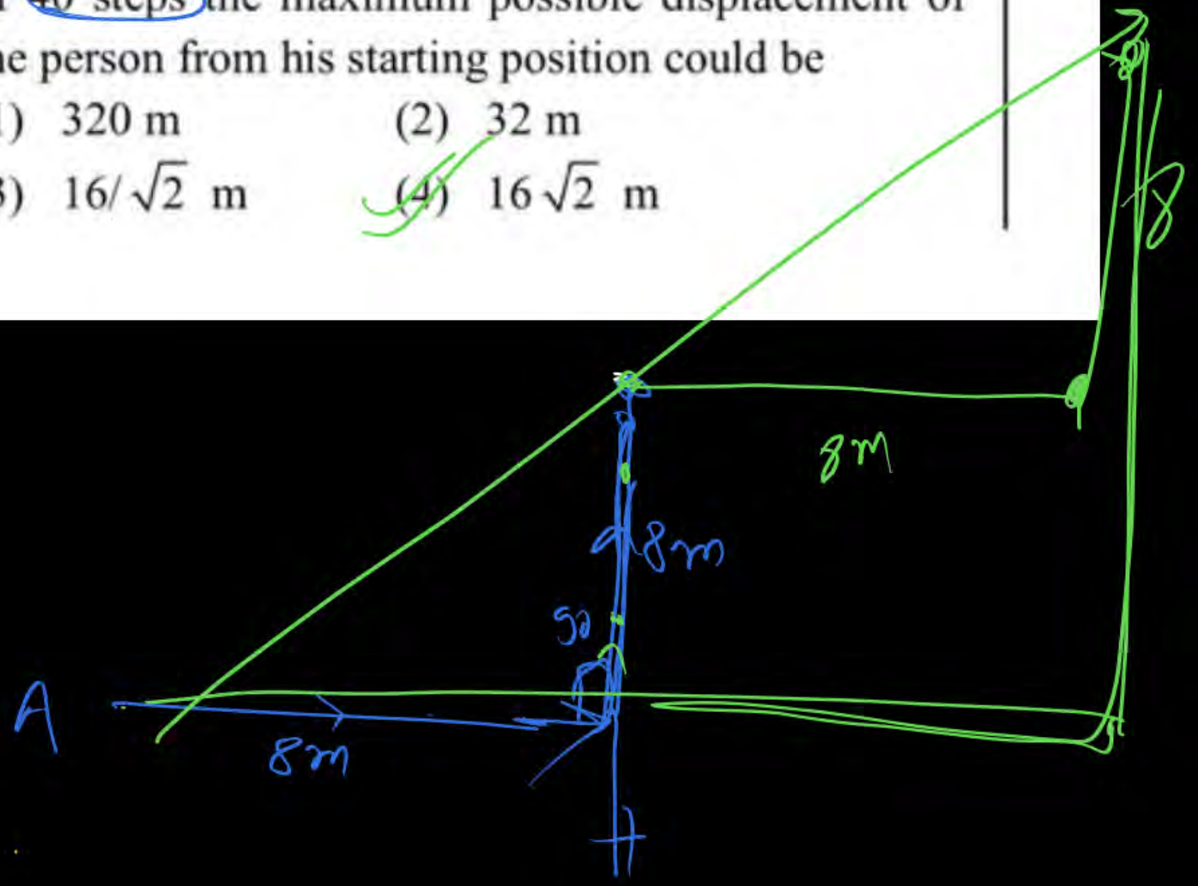


3. A blind person after walking 10 steps in one direction, each of length 80 cm, turns randomly to the left or to the right by 90°. After walking a total of 40 steps the maximum possible displacement of the person from his starting position could be

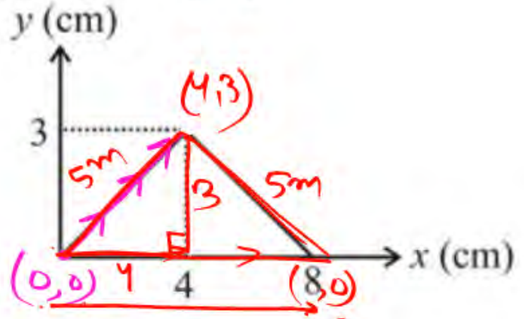
(1) 320 m (2) 32 m

(3) $16/\sqrt{2}$ m (4) $16\sqrt{2}$ m

6.



4. 'y-x' curve of the particle moving in plane is given below. If the graph shows the motion of a particle for 2 sec. Find the ratio of magnitude of average velocity and average speed?



(1) 1 (2) $\frac{4}{5}$

(3) $\frac{3}{4}$ (4) $\frac{1}{2}$

$\frac{\text{dist}^n}{\text{disp}} = \frac{10m}{8}$

MRP x/t graph v-t graph रास्ता नहीं बताता but y/x graph रास्ता हि है!

$V_{Av} = \frac{8}{t} = \frac{8}{10} = \frac{4}{5}$

$S_{Av} = \frac{10}{t}$

5. A man starts from his house with uniform speed. After taking a few turns, he reaches his house. There are two ways to reach house:

(A) Take left turn after 4 min, again left turn after 3 min, again left turn after 6 min, one more left turn after 3 min, finally move 2 min to reach house.

(B) Take right turn after 3 min, left turn after 2 min, right turn after 3 min, again right turn after 1 min, again right turn after 6 min. Finally move 3 min to reach house.

All turns are at 90°. Which of the following is correct:

(1) Distance travelled in (A) path is more than (B)

(2) Distance travelled in (B) path is more than (A)

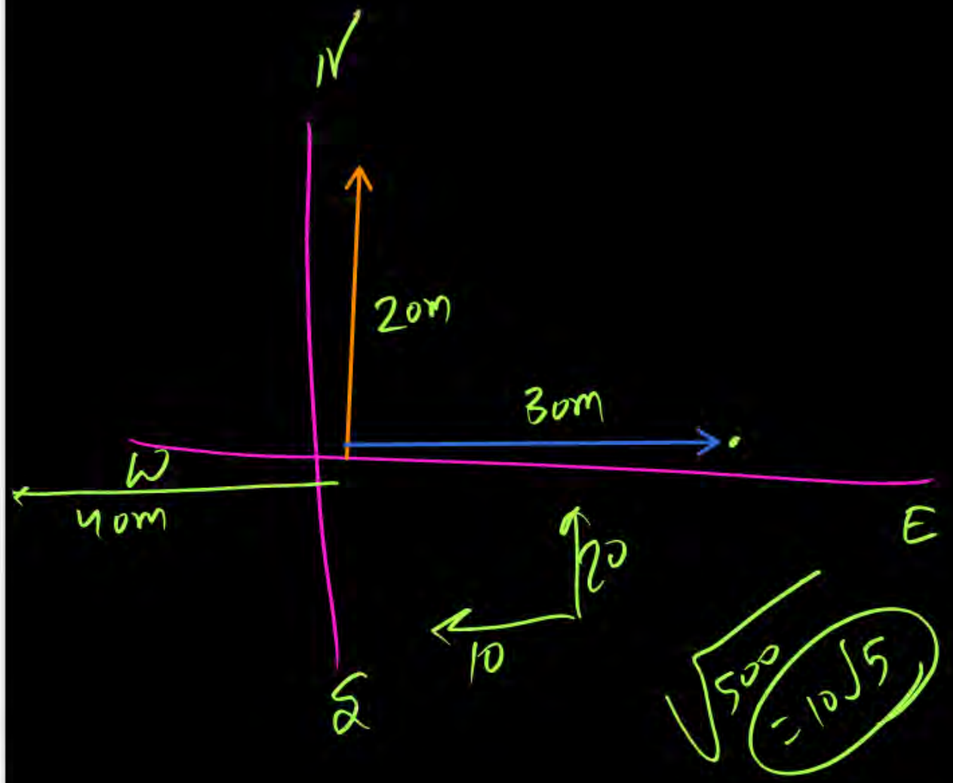
(3) Distance travelled in (A) and (B) both path is same

(4) Insufficient information

6. A person moves northwards 20 m, eastward 30 m and finally towards west 40 m. What is his distance and displacement?

(1) 90 m, $10\sqrt{5}$ m (2) 90 m, $20\sqrt{2}$ m

(3) 90 m, $10\sqrt{13}$ m (4) 90 m, 70 m



7. A monkey walks 40 m east, 30 m south and finally climbs up on a pole of height 120 m. What is the displacement of monkey?

(1) 190 m (2) 130 m

(3) 150 m (4) 170 m

8. A wheel is rolling on a floor, the displacement of the point of contact after the wheel has completed 2 revolutions, is

(1) πR (2) $2\pi R$

(3) $4\pi R$ (4) $8\pi R$

9. A person moves 20 m towards north then 30 m towards east and finally $40\sqrt{2}$ m south-west. His displacement is

(1) $10\sqrt{5}$ m, $\tan^{-1}(2)$ S of W

(2) $20\sqrt{5}$ m, $\tan^{-1}(2)$ W of S

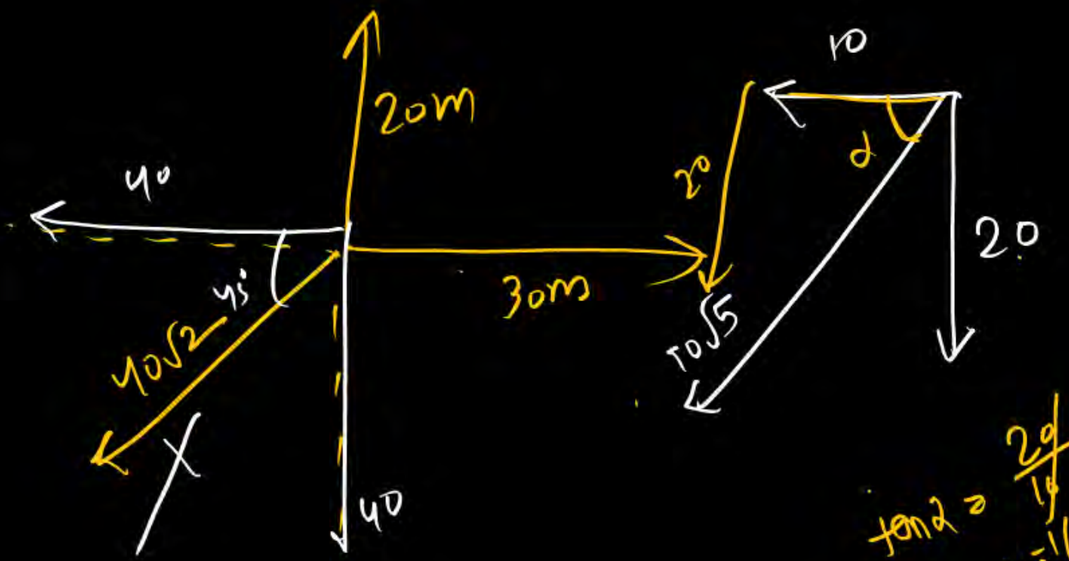
(3) 20 m, S – W

(4) $10\sqrt{5}$ m, S – W

13.

14.

15.



15.

10. A particle is moving along a path in X-Y plane described as $X^2 + Y^2 = 16$. What will be the ratio of his distance and displacement when his position vector rotates by 60°.

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$

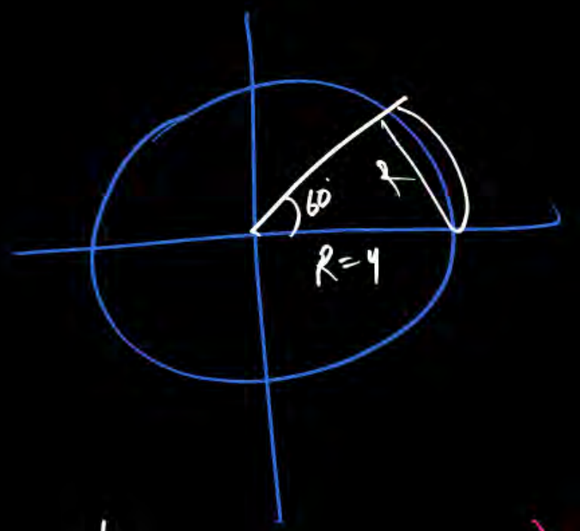
(3) $\frac{3}{\pi}$ (4) $\frac{6}{\pi}$

11. Ram is moving on a path given by the equation $y = \sqrt{9 - x^2}$. What would be the ratio of his distance to displacement when he travels from $x = -3$ to $x = +3$

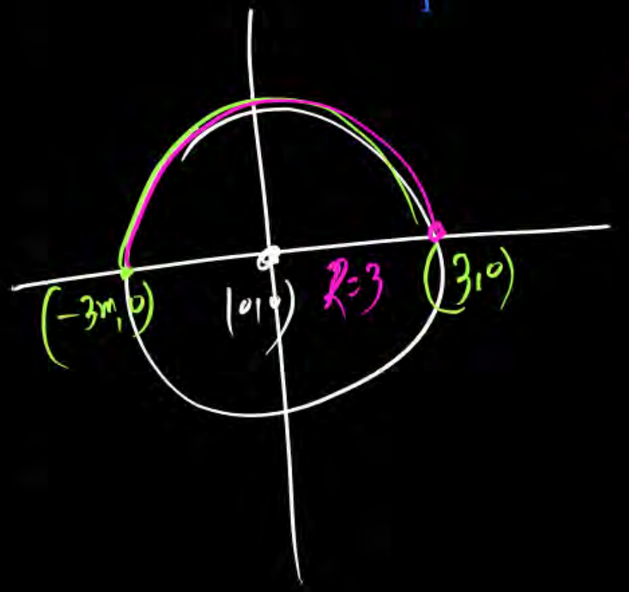
(1) $\frac{\pi}{2}$ (2) π

(3) $\frac{2}{\pi}$ (4) $\frac{1}{\pi}$

16.



$\frac{R \times \pi}{3 \quad R} = \frac{\pi}{3}$



$\frac{\pi R}{2R}$

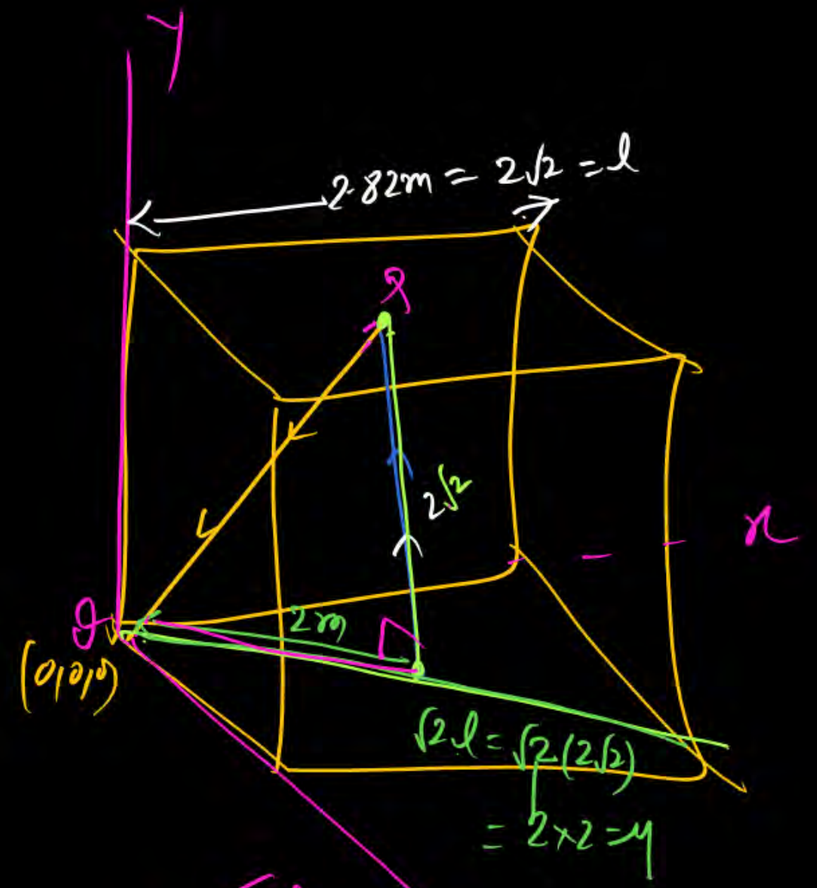
$y^2 + x^2 = 3^2$

eqn of circle

12. A person sitting on the floor of a cubical room of side 2.82 m at the centre. He throws a ball towards the roof and the ball after striking the roof, rebounds to hit one of the corner of floor. The distance traversed by the ball is

(1) $(2\sqrt{2}+2\sqrt{3})$ m (2) 4m

(3) 2m (4) $4\sqrt{3}$ m



$PQ = \sqrt{(2\sqrt{2})^2 + (2)^2}$

$= \sqrt{4\times2+4}$

$= \sqrt{12}$

$= \sqrt{4\times3} = 2\sqrt{3}$

13. A particle moves along a straight line such that is position is given by $x = t^2 - 4t + 6$. Find magnitude displacement particle from $t = 0$ to $t = 3$ sec.

(1) $x = 3$m (2) $x = 4$m

(3) $x = 5$m (4) $x = 6$m

14. **Assertion (A):** For any particle moving between two fixed point, infinite distances are possible.

Reason (R): There can be only one displacement between two fixed points.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

$x = t^2 - 4t + 6$

$\frac{dx}{dt} = v = 2t - 4 \times 1 + 0$

$v = 2t - 4$

$0 = 2t - 4$

$2t = 4$

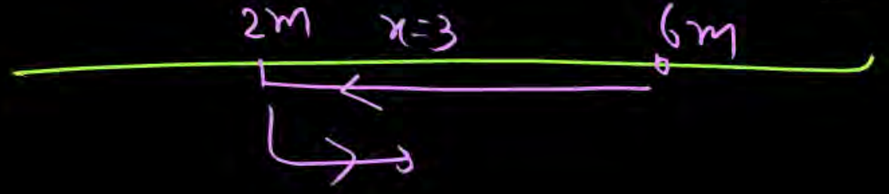
$t = 2$sec, $v = 0$, U-turn

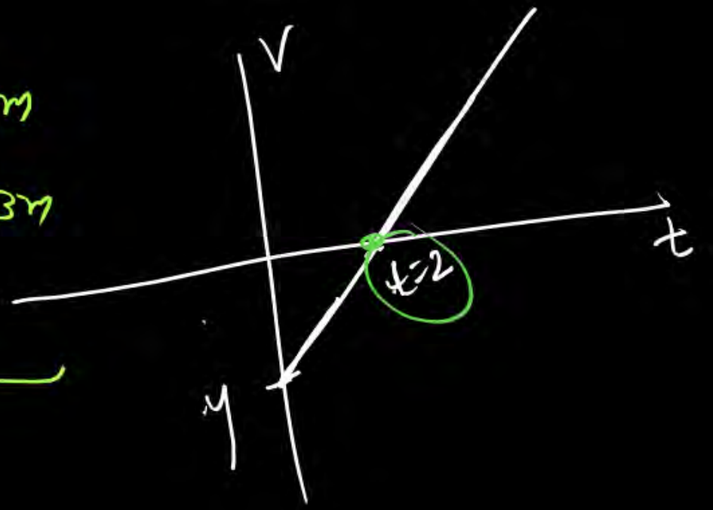
$x = t^2 - 4t + 6$

$x(t=0) = 6$m

$x(t=2) = 4 - 8 + 6 = 2$m

$x(t=3) = 9 - 12 + 6 = 3$m





16. **Assertion (A):** Distance is a actual length of the path but displacement is a shortest distance between initial and final position.

Reason (R): Distance is a scalar quantity and it is always positive but displacement is a vector quantity it may be positive, negative or zero.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

17. **Assertion (A):** The displacement of a body may be zero, though its distance can be finite.

Reason (R): If the body moves such that it finally arrives at the initial point, then displacement is zero while distance is finite.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

18. A particle moving along the x-axis travels first 3m distance with velocity 2 ms^{-1} and the second 3m distance with 3 ms^{-1} and the third 3m distance with 6 ms^{-1}. The average velocity of the particle is:

(1) 1 ms^{-1} (2) 5 ms^{-1}

(3) 4 ms^{-1} (4) 3 ms^{-1}

22. A b
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(1)
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$$V_{Avg} = \frac{3}{\frac{1}{2}+\frac{1}{3}+\frac{1}{6}} = \frac{3}{\frac{3+2+1}{6}} < 3$$

19. A body covers first $\frac{1}{3}$ part of its journey duration with a velocity of 2 m/s, next $\frac{1}{3}$ part with a velocity of 3 m/s and rest of the journey with a velocity 6 m/s. The average of the body will be

(1) 3 m/s (2) $\frac{11}{3}$ m/s

(3) $\frac{8}{3}$ m/s (4) $\frac{4}{3}$ m/s

20. A dog runs 120 m away from its master in a straight line in 9.0 s and then runs halfway back in one-third the time. Calculate its average speed and its average velocity.

(1) 15 m/s, 5 m/s (2) 5 m/s, 15 m/s

(3) 5 m/s, 5 m/s (4) 15 m/s, 15 m/s

21. One car moving on a straight road covers one-third of the distance with 20 km/hr and the rest with 60 km/hr. The average speed is:

(1) 40 km/hr (2) 80 km/hr

(3) $46\frac{2}{3}$ km/hr (4) 36 km/hr

24. The

(1)

(3)

25. The

(1)

(3)

26. Ave

(1)

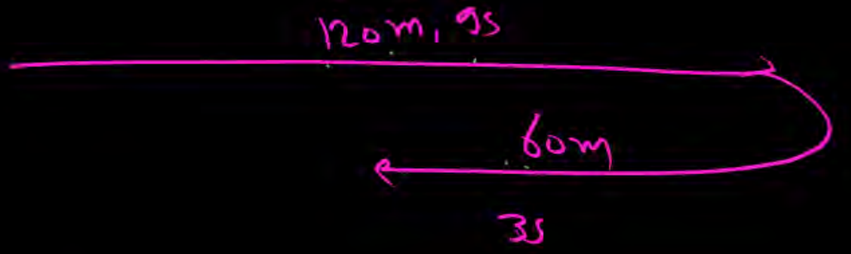
(3)

27. Ave

(1)

(3)

$\frac{S_1+S_2+S_3}{3}$



Avg speed $= \frac{180}{12}$

Avg $= \frac{60}{12} = 5$

$\leftarrow d/3, 20m, \xrightarrow[60]{2d/3}$

$\text{Avg}_{\text{sp}} = \frac{d}{\frac{d}{3\times 2d} + \frac{2d}{3\times 60}}$

22. A body is moving with constant speed 10 m/sec along a circle of radius 14m. Find the average velocity of the body from $t = 0$ to $t = 4.4$ sec.

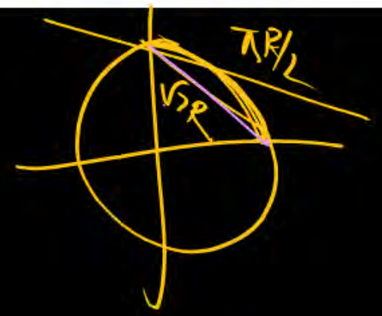
(1) 2.36 (2) 6.36

(3) 3.3 (4) 1.6

23. A body is moving along circular track of radius R then find the ratio of average velocity and average speed when it cover angle 90° in 5 sec.

(1) $\frac{2\sqrt{2}}{\pi}$ (2) $\frac{\pi}{2\sqrt{2}}$

(3) $\frac{\sqrt{2}}{\pi}$ (4) $\frac{\pi}{\sqrt{4}}$



$S = 2\pi R = 2\pi \times 14$

$= 2 \frac{22}{7} \times 14^2$

$= 88m$

$= \frac{2R}{4.4} = \frac{2 \times 14}{4.4 \times 2.2}$

Paragraph (Q.24 to 28): A particle is moving on a circular track with constant speed v. The radius of circle is R. After some time its position vector rotates by an angle 'θ'.

24. The change in position vector of a particle is

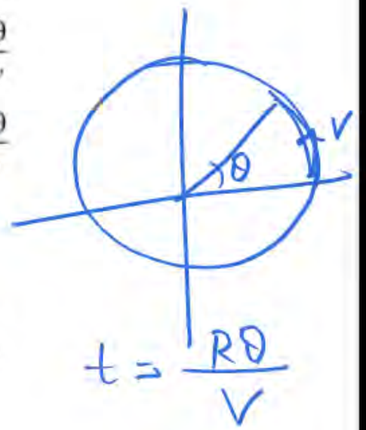
(1) $R \sin\theta$ (2) $2R \sin\theta$

(3) $2R \sin\frac{\theta}{2}$ (4) $R \sin\frac{\theta}{2}$

25. The time taken by the particle is

(1) $\frac{R\theta}{4v}$ (2) $\frac{R\theta}{2v}$

(3) $\frac{R\theta}{3v}$ (4) $\frac{R\theta}{v}$



$t = \frac{R\theta}{v}$

26. Average speed is

(1) $2v$ (2) v

(3) $4v$ (4) $6v$

27. Average velocity is

(1) $\frac{2v\sin\frac{\theta}{2}}{\theta}$ (2) $\frac{\sin\frac{\theta}{2}}{2v}$

(3) $\frac{v\sin\frac{\theta}{2}}{2\theta}$ (4) $\frac{v\sin\theta}{2\theta}$

28. For infinitesimally small angular displacement average velocity is

(1) v (2) $6v$

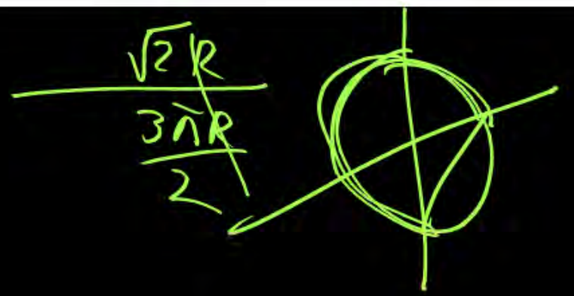
(3) $4v$ (4) $3v$

29. A body is moving along the circumference of a circle of radius 'R' and completes $\frac{3}{4}$ th of the revolution. Then, the ratio of its displacement to distance is:

(1) $2:\pi$ (2) $\sqrt{2}:3\pi$

(3) $\sqrt{8}:3\pi$ (4) $3\sqrt{2}:\pi$

$v_{Av} = v\frac{(\sin\theta/2)}{\theta/2} = \frac{v\,\theta/2}{\theta/2}$



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30. A particle is moving along a circle such that it completes one revolution in 40 seconds. In 2 minutes 20 seconds, the ratio $\frac{|\text{displacement}|}{\text{distance}}$ is

(1) 0

(2) $\frac{1}{7}$

(3) $\frac{2}{7}$

(4) $\frac{1}{11}$

2 mint = 120 sec + 20 sec
= 140 sec
3 Rev + $\frac{1}{2}$ Rev

$\frac{2R}{\pi R}$

$= \frac{2}{\frac{22}{7}} = \frac{7}{11}$

THANK YOU