PHYSICS

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KINEMATICS

Textbook Questions Answers I Multiple Choice Questions

1. Which one of the following Cartesian coordinate systems is not follwed in physics?

A.

B.

C.

D.

Answer: D

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2. Identify the unit vector in the following .

A. $\hat{i} + \hat{j}$

B. $\dfrac{\hat{i}}{\sqrt{2}}$

C. $\hat{k} - \dfrac{\hat{j}}{\sqrt{2}}$

D. $\dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$

Answer: D

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3. A particle moves in a straight line according to the relation:

$$x = t^3 - 4t^2 + 3t$$

Find the acceleration of the particle at displacement equal to zero.

A. (-8,-2,10)

B. (-1,-2,10)

C. (8,2,10)

D. (1,2,10)

Answer: A

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4. Two objects of masses m_1 and m_2 fall from the heights h_1 and h_2 respectively. The ratio of the magntidue of their momenta when they hit the ground is

A. $\sqrt{\dfrac{h_1}{h_2}}$

B. $\sqrt{\dfrac{m_1 h_1}{m_2 h_2}}$

C. $\dfrac{m_1}{m_2}\sqrt{\dfrac{h_1}{h_2}}$

D. $\dfrac{m_1}{m_2}$

Answer: C

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5. What is Trajectory of a projectile ?

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6. If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\vec{k}$, then the magnitude of acceleration at t = 0 . 5 s is :

A. $1ms^{-2}$

B. $2ms^{-2}$

C. zero

D. $-1ms^{-2}$

Answer: A

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7. What determines the nature of path followed by the particle?

A. Speed

B. Velocity

C. Acceleration

D. Both (2) and (3)

Answer: D

8. A ball is projected vertically upwards with a velocity v . It comes back to ground in time t. which v-t graph shows the motion correctly ?

A.

B.

C.

D.

Answer: C

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9. A point travelled half of the distance with velocity v_0. The half of remaining part of the distance was covered with velocity v_1 & second half of remaining part by v_2 velocity. The mean value of the point averaged over the whole time of motion is

A. $\dfrac{v_0 + v_1 + v_2}{3}$

B. $\dfrac{2v_0 + v_1 + v_2}{3}$

$$\text{C. } \frac{v_0 + 2v_1 + 2v_2}{3}$$

$$\text{D. } \frac{2v_0(v_1 + v_2)}{(2v_0 + v_1 + v_2)}$$

Answer: D

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10. A ball is dropped from some height towards the ground :

Which one of the following represents the correct motion of

the ball ?

A.

B.

C.

D.

Answer: A

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11. If a particle executes uniform circular motion in the xy plane in clock wise direction, then the angular velocity is in :

    A. $+ y$ direction

    B. $+ z$ direction

    C. $- z$ direction

    D. $- x$ direction

Answer: C

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12. If a particle executes uniform circular motion, choose the correct statement

A. The velocity and speed are constant

B. The acceleration and speed are constant

C. The velocity and acceleration are constant

D. The speed and magnitude of acceleration are constant

Answer: D

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13. If an object is thrown vertically up with initial speed u from the ground, then the time taken by the object to return back to ground is

A. $\dfrac{u^2}{2g}$

B. $\dfrac{u^2}{g}$

C. $\dfrac{u}{2g}$

D. $\dfrac{2u}{g}$

Answer: D

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14. Two objects are projected at angles $30°$ and $60°$ respectively with respect to the horizontal direction. The range of two objects are denoted as $R_{30°}$ and $R_{60°}$. Choose the correct relation from the following.

A. $R_{30°} = R_{60°}$

B. $R_{30°} = 4R_{60°}$

C. $R_{30°} = \dfrac{R_{60°}}{2}$

D. $R_{30°} = 2R_{60°}$

Answer: A

15. An object is dropped is an unknown planet from height 50 m, it reaches the ground is 2 s. The acceleration due to gravity in this unknwon planet is

A. $g = 20ms^{-2}$

B. $g = 25ms^{-2}$

C. $g = 15ms^{-2}$

D. $g = 30ms^{-2}$

Answer: B

16. Which one of the following Cartesian coordinate systems is not follwed in physics?

A.

B.

C.

D.

Answer: D

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17. Identify the unit vector in the following .

A. $\hat{i} + \hat{j}$

B. $\dfrac{\hat{i}}{\sqrt{2}}$

C. $\hat{k} - \dfrac{\hat{j}}{\sqrt{2}}$

D. $\dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$

Answer: D

18. Which one of the following physical quantities cannot be represented by a scalar?

A. mass

B. length

C. momentum

D. magbutude of acceleration

Answer: C

19. Two objects of masses m_1 and m_2 fall from the heights h_1 and h_2 respectively. The ratio of the magntidue of their momenta when they hit the ground is

A. $\sqrt{\dfrac{h_1}{h_2}}$

B. $\sqrt{\dfrac{m_1 h_1}{m_2 h_2}}$

C. $\dfrac{m_1}{m_2}\sqrt{\dfrac{h_1}{h_2}}$

D. $\dfrac{m_1}{m_2}$

Answer: C

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20. If a particle has negative velocity and negative acceleration, its speed

A. increases

B. decreases

C. remains same

D. zero

Answer: A

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21. If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\vec{k}$, then the magnitude

of acceleration at t = 0 . 5 s is :

A. $1ms^{-2}$

B. $2ms^{-2}$

C. zero

D. $-1ms^{-2}$

Answer: A

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22. If an object is dropped from the top of a building and it reaches the ground at t = 4s, then the height of the building is (ignoring air resistance) $\left(g = 9.8ms^{-2}\right)$

    A. 77.3 m

    B. 78.4 m

    C. 80.5 m

    D. 79. 2 m

Answer: B

23. A ball is projected vertically upwards with a velocity v . It comes back to ground in time t. which v-t graph shows the motion correctly ?

A.

B.

C.

D. _____

Answer: C

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24. If one object is dropped vertically downward and another object is thrown horizontally from the same height, then the ratio of vertical distance covered by both objects at any instant t is

A. 1

B. 2

C. 4

D. 0. 5

Answer: A

25. A ball is dropped from some height towards the ground :

Which one of the following represents the correct motion of

the ball ?

A.

B.

C.

D.

Answer: A

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26. If a particle executes uniform circular motion in the xy plane in clock wise direction, then the angular velocity is in :

A. + y direction

B. + z direction

C. $-$ z direction

D. $-$ x direction

Answer: C

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27. If a particle executes uniform circular motion, choose the correct statement

A. The velocity and speed are constant

B. The acceleration and speed are constant

C. The velocity and acceleration are constant

D. The speed and magnitude of acceleration are constant

Answer: D

28. If an object is thrown vertically up with initial speed u from the ground, then the time taken by the object to return back to ground is

A. $\dfrac{u^2}{2g}$

B. $\dfrac{u^2}{g}$

C. $\dfrac{u}{2g}$

D. $\dfrac{2u}{g}$

Answer: D

29. Two objects are projected at angles $30°$ and $60°$ respectively with respect to the horizontal direction. The range of two objects are denoted as $R_{30°}$ and $R_{60°}$. Choose the correct relation from the following.

A. $R_{30°} = R_{60°}$

B. $R_{30°} = 4R_{60°}$

C. $R_{30°} = \dfrac{R_{60°}}{2}$

D. $R_{30°} = 2R_{60°}$

Answer: A

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30. An object is dropped is an unknown planet from height 50 m, it reaches the ground is 2 s. The acceleration due to gravity in this unknwon planet is

A. $g = 20ms^{-2}$

B. $g = 25ms^{-2}$

C. $g = 15ms^{-2}$

D. $g = 30ms^{-2}$

Answer: B

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Textbook Questions Answers Ii Short Answer Questions

1. What is meant by Cartesian coordinate system?

2. Define a vector. Give examples.

3. Define a scalar. Give examples

4. A particle has an initial velocity $2\hat{i} + 3\hat{j}$ and acceleration $0.3\hat{i} + 0.2\hat{j}$. The magnitude of velocity after 10 seconds will

be:

A. $9\sqrt{2}$ units

B. $5\sqrt{2}$ units

C. 5 units

D. 9 units

Answer: B

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5. Write a short note on vector product between two vectors.

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6. How do you deduce that two vectors are perpendicular?

7. Define displacement and distance.

8. A bird flies for 4s with a velocity of |t-2| m/s in a straight line, where time, t in seconds. It covers a distance of

    A. 2m

    B. 4m

    C. 6m

    D. 8m

Answer: B

9. A body starts from rest with constant acceleration. What is the ratio of the distance travelled by the body during the 4th and 3rd seconds ?

A. 7/5

B. 5/7

C. 7/3

D. 3/7

Answer: A

10. A balloon starts rising from the ground with an acceleration of 1.25 m/s^2. A stone is released from the balloon after 10s. Determine

(i) maximum height of stone from the ground.

(ii) time taken by stone to reach the ground.

(Assume, g = 10 m/s^2)

11. A car covers a distance of 80 km at a speed of 60 km/hr and another 140 km at a speed of 70 km/hr. What is the average speed of the journey ?

12. A boy can throw a stone up to a maximum height of 10 m. The maximum horizontal distance that the boy can throw the same stone up to will be :

A. $20\sqrt{2}$ m

B. 10 m

C. $10\sqrt{2}$ m

D. 20 m

Answer: D

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13. If $\vec{A} = 4\hat{i} - 3\hat{j}$ and $\vec{B} = 6\hat{i} + 8\hat{j}$. Find out the magnitude and direction of $\vec{A} - \vec{B}$

14. A balloon starts rising from the ground with a constant acceleration of 1.25 m/s^2. After 8s, a stone is released from the balloon. Find the time taken by the stone to reach the ground. (Assume, g = 10m/s^2)

15. Write down the expression for angle made by resultant acceleration and radius vector in the non uniform circular motion.

16. What is meant by Cartesian coordinate system?

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17. Define a vector. Give examples.

▶ **Watch Video Solution**

18. Define a scalar. Give examples

▶ **Watch Video Solution**

19. Write a short note on the scalar product between two vectors.

20. Write a short note on vector product between two vectors.

▶ **Watch Video Solution**

21. How do you deduce that two vectors are perpendicular?

▶ **Watch Video Solution**

22. Define displacement and distance.

▶ **Watch Video Solution**

23. Define velocity and speed.

▶ Watch Video Solution

24. Define acceleration.

▶ Watch Video Solution

25. What is the difference between velocity and average velocity?

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26. Define a radian.

27. Define angular displacement and angular velocity.

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28. What is non uniform circular motion?

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29. Write down the Kinematic equations for Angular motion.

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30. Write down the expression for angle made by resultant acceleration and radius vector in the non uniform circular motion.

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1. If $\vec{A} = 8\hat{i} + 6\hat{j}$ and $\vec{B} = 4\hat{i} + 2\hat{j}$. Then find $\left| \vec{A} + \vec{B} \right|$

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2. Discuss the properties of scaiar and vector

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3. Derive the kinematic equations of motion for constant acceleration .

▶ View Text Solution

4. Derive the equations of motion for a particle

Falling vertically

▶ View Text Solution

5. Derive the equations of motion for a particle (a) falling vertically (b) projected vertically.

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6. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

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7. Derive the expression for centripetal acceleration.

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8. Derive the expression for total acceleration in the non-uniform circular motion.

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9. Explain in detail the triangle law of addition.

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10. Discuss the properties of scalar and vector

> ▶ **Watch Video Solution**

11. Derive the kinematic equations of motion for constant acceleration.

> ▶ **Watch Video Solution**

12. Derive the equations of motion for a particle (a) falling vertically (b) projected vertically.

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13. Derive the equations of motion for a particle (a) falling vertically (b) projected vertically.

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14. The maximum height attained by a projectile when thrown at an angle θ with the horizontal is found to be half the horizontal range.Then $\theta =$

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15. Derive the expression for centripetal acceleration.

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16. Derive the expression for total acceleration in the non-uniform circular motion.

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Textbook Questions Answers Iv Numerical Problems

1. The position vectors particle has length 1m and makes $30°$ with the x-axis. What are the lengths of the x and y components of the position vector?

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2. A particle has its position moved from $\overrightarrow{r_1} = 3\hat{i} + 4\hat{j}$ to $\overrightarrow{r_2} = \hat{i} + 2\hat{j}$. Calculate the displacment vector $\left(\Delta\overrightarrow{r}\right)$ and draw the $\overrightarrow{r_1}, \overrightarrow{r_2}$ and $\Delta\overrightarrow{r}$ vector in a two dimensional Cartesian coordinate system.

3. Calculate the average velocity of the particle whose position vector changes from $\overrightarrow{r_1} = 5\hat{i} + 6\hat{j}$ to $\overrightarrow{r_2} = 2\hat{i} + 3\hat{j}$ in a tine 5 second.

4. Convert the vector $\vec{r} = 3\hat{i} + 2\hat{j}$ into a unit vector.

5. What are the resultants of the vector product of two given

vectors   given   by

$\vec{A} = 4\hat{i} - 2\hat{j} + \hat{k}$ and $brc(B) = 5\hat{i} + \hat{j} - 4\hat{k}$?

6. An object at an angle such that the horizontal range is 4

time of the maximum height. What is the angle of projection

of the object?

7. The following graphs represent velocity- time graph. Identify what kind of motion a particle undergoes in each graph

(a)

(b)

(c)

(d)

8. The following velocity-time graph represents a particle moving in the positive x-direction . Analyse its motion from 0 to 7s . Calculate the displacement covered and distance

travelled by the particle from 0 to 2s

9. A particle is projected at an angle of θ with respect to the horizontal direction. Match the following for the above motion.

(a) V_x — decrease and increases

(b) V_y — remains constant

(c) Acceleration - varies

(d) Position vector — remains downward

10. A water fountain on the ground sprinkles water all around it. If the speed of the water coming out of the fountain is v. Calculate the total area around the fountain that gets wet.

11. The following table gives the range of a particle when thrown on different planets. All the particles are thrown at the same angle with the horizontal and with the same initial speed . Arrange the planets in ascending order according to

their acceleration due to gravity (g value)

Planet	Range
Jupiter	$50m$
Earth	$75m$
Mars	$90m$
Mercury	$95m$

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12. The resultant of two vectors A and B is perpendicular to vector A and its magnitude is equal to half of the magnitude of vector B.

Then the angle between A and B is

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13. Compare the components for the following vector equations

(a) $T\hat{j} - mg\hat{j} = ma\hat{j}$, (b) $\overrightarrow{T} + \overrightarrow{F} = \overrightarrow{A} + \overrightarrow{B}$

(c) $\overrightarrow{T} - \overrightarrow{F} = \overrightarrow{A} - \overrightarrow{B}$, (d) $T\hat{j} + mg\hat{j} = ma\hat{j}$

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14. Calculate the area of the triangle for which two of its sides

are given by the vectors

$\overrightarrow{v} = 5\hat{i} - 3\hat{j}, \overrightarrow{B} = 4\hat{i} + 6\hat{j}$

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15. If Earth completes one revolution in 24 hours, what is the

angular displacement made by Earth in one hour? Express

your answer in both radian and degree.

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16. An object is thrown with initial speed $5ms^{-1}$ with an angle of projection $30°$. What is the maximum height and range reached by the particle?

17. A foot - ball player hits tha ball with speed $20ms^{-1}$ with angle $30°$ with respect to horizontal direction as shown in the figure. The goal post is at distance of 40 m from him. Find

out whether ball reaches the goal post

18. If an object is thrown horizontally with an initial speed 10 ms^{-1} from the top of a building of height 100 m. What is the horizontal distance covered by the particle.

19. An object is executing uniform circular motion with an angular speed of $\dfrac{\pi}{12}$ radian per second. At $t = 0$, the object starts at an angle$\theta = 0$. What is the angular displacement of the particle after 4s?

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20. Consider the x - axis as representing east, the y - axis as north and z - axis as vertically upwards. Give the vector representing each of the following points and the direction is of 45°.

a) 5 m north east and 2 m up

b) 4 m south east and 3 m up

c) 2 m north west and 4 m up

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(b)

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Mars	90m
Mercury	95m

36. The resultant of two vectors A and B is perpendicular to vector A and its magnitude is equal to half of the magnitude of vector B . Then the angle between A and B is :

(a) $30°$ (b) $45°$

(c) $150°$ (d) $120°$

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37. If $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$, find the value of $\left(\vec{a} + 3\vec{b}\right).\left(2\vec{a} - \vec{b}\right).$

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38. Calculate the area of the triangle for which two of its sides

are given by the vectors

$\vec{A} = 5\hat{i} - 3\hat{j}, \vec{B} = 3\hat{i} + 5\hat{j}$

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42. If an object is thrown horizontally with an initial speed $10 \ \mathrm{ms}^{-1}$ from the top of a building of height 100 m. What is the horizontal distance covered by the particle.

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44. Consider the x-axis as representing east, the y-axis as north and z-axis as vertically upwards. Give the vector representing each of the following points .

5 m north east and 2 m up,

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45. Consider the x - axis as representing east, the y - axis as north and z - axis as vertically upwards. Give the vector representing each of the following points and the direction is of 45º.

a) 5 m north east and 2 m up

b) 4 m south east and 3 m up

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46. Consider the x - axis as representing east, the y - axis as north and z - axis as vertically upwards. Give the vector representing each of the following points and the direction is of 45º.

a) 5 m north east and 2 m up

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47. The moon is orbiting the Earth approximately in 27 days, what is the angle transversed by the Moon per day?

48. An object of mass m has angular acceleration $\alpha = 0.2 \ \mathrm{rad\,s^{-2}}$. What is the angular displacement covered by the object after 3 second ? (Assume that the object started with angle zero with angular velocity).

1. Kinematics is the branch of mechanics which delas with the motion of objects without taking _____ into account

    A. mass

    B. force

    C. velocity

    D. all the above

Answer: B

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2. Which of the following statements is an incorrect statement ?

A. Kinematics deals with the motion of objects .

B. Kinematics deals with the equilibrium of objects .

C. Kinema means motion.

D. The conceptof root and motion can be understood in

kinematics .

Answer: B

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3. A person performing a somersault is an example of . . . . .

Motion.

A. circular

B. vibratory

C. linear

D. rotational

Answer: D

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4. A motion of a shell fired from the gun is an example for . . . .
. Dimensional motion.

A. two

B. three

C. one

D. both (a) and (b)

Answer: A

5. Match the following :

Column I	Column II
1. Work	(i) Supplementary unit in SI system
2. Torque	(ii) Kinematics
3. Plane angle	(iii) Motion
4. Meaning of Kinema	(iv) Vector
	(v) Scalar

A. 1 - (i) , 2 - (iii), 3- (iv), 4 - (v)

B. 1 - (iv), 2 - (iii), 3 - (i), 4 - (ii)

C. 1 - (v), 2 - (iv), 3 - (i), 4- (ii)

D. 1 - (iv), 2 -(iii), 3 - (ii), 4 - (v)

Answer: C

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6. The length of a vector is _____

A. negative

B. positive

C. unit

D. zero

Answer: B

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7. Displacement (y) of a body is represented by $y = pt + qt^2 - rt^3$ where p,q and r are constants of motion. The velocity of the body when its acceleration is 0 :

A. $p + \dfrac{q^2}{2r}$

B. $p + \dfrac{q^2}{r}$

C. $p + \dfrac{q^2}{4r}$

D. $p + \dfrac{q^2}{3r}$

Answer: D

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8. What is the resultant vectors , when two vectors are at right angles to each other ?

A. $R = \sqrt{P^2 Q^2}$

B. $R = P + Q$

C. R = P - Q

D. $R = \sqrt{\dfrac{P}{Q}}$

Answer: A

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9. Resultant of the two vector is maximum when angle

between them is :

A. $90°$

B. $180°$

C. $0°$

D. $270°$

Answer: C

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10. Two vectors act along the mutually perpendicular directions are called . . . . . . Vectors .

A. equal

B. opposite

C. orthogonal

D. zero

Answer: D

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11. Choose the correct statement from the following statement ?

    A. The dot product is associative

    B. The dot product is commutative

    C. The dot product is not commutative

    D. The dot product is applied only to unit vectors .

Answer: B

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12. If $\vec{A}$ and $\vec{B}$ are perpendicular then $\vec{A} \cdot \vec{B} = \ldots$

A. $\left|\vec{A}\right|\left|\vec{B}\right|$

B. $\left|\vec{A} \times \vec{B}\right|$

C. $\left|\vec{A}\right|\left|\vec{B}\right|\cos 180°$

D. $\left|\vec{A}\right|\left|\vec{B}\right|\cos 90°$

Answer: D

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13. Which of the following rule is applied to know the diretion of the vectors product ?

A. Fleming's left hand rule

B. Fleming's right hand rule

C. Right handed screw rule

D. Left handed screw rule

Answer: C

14. The parallelogram law of vector addition is equivalent to . . . . Method.

A. polygon

B. coplanar

C. triangle

D. collinear

Answer: C

15. If for two vectors $\vec{A}$ and $\vec{B}$, $\vec{A} \times \vec{B} = 0$ then the vectors are :

    A. perpendicular to each other

    B. parallel to each other

    C. act at an angle $60°$

    D. act at an angle $30°$

Answer: B

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16. Which of the following statements is /are not true ?

A. v,a and s are vectors

B. Mass, energy, work are vectors

C. Vector has only magnitude whereas scalar has both magnitude and direction

D. Both (b) and (c)

Answer: C

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17. If the magnitude of sum of two vectors is equal to the magnitude of difference to two vectors, the angle between these vector is :

A. $0°$

B. $45°$

C. $90°$

D. $180°$

Answer: C

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18. If $\overrightarrow{A}$ and $\overrightarrow{B}$ are two vectors , which of the statement is wrong ?

A. $\overrightarrow{A} + \overrightarrow{B} = \overrightarrow{B} + \overrightarrow{A}$

B. $\overrightarrow{A} - \overrightarrow{B} = -\left(\overrightarrow{B} - \overrightarrow{A}\right)$

C. $\overrightarrow{A} \times \overrightarrow{B} = \overrightarrow{B} \times \overrightarrow{A}$

D. $\overrightarrow{A} . \overrightarrow{B} = \overrightarrow{B} . \overrightarrow{A}$

Answer: C

19. The displacement of a body is given by $x = 2t^3 - 6t^2 + 12t + 6$. The acceleration of body is zero at time ti is equal to :

A. 3s

B. 2s

C. 1s

D. 10s

Answer: C

20. If $\vec{A}$ and $\vec{B}$ are two vectors , $\vec{A} . \vec{B} = \vec{A} \times \vec{B}$ then resultant vector is :

    A. A + B

    B. A - B

    C. $\sqrt{A^2 + B^2}$

    D. $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

Answer: D

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21. A force of 5N acts on a particle along a direction making an angle of $30°$ with vertical . Its vertical component will be :

A. 10N

B. 3N

C. 4N

D. 2.5N

Answer: D

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22. The expression $\left(\dfrac{1}{\sqrt{2}}\hat{i} + \dfrac{1}{\sqrt{2}}\hat{j} \right)$ is a :

A. unit vector

B. null vector

C. vector of magnitude $\sqrt{2}$

D. scalar

Answer: A

23. For the figure, which of the following is correct ?

A. $\vec{A} + \vec{B} = \vec{C}$

B. $\vec{B} + \vec{C} = \vec{A}$

C. $\vec{C} + \vec{A} = \vec{B}$

D. $\vec{A} + \vec{B} + \vec{C} = 0$

Answer: C

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24. It is found that $|A + B| = |A|$. This necessarily implies :

A. B = 0

B. A,B are anti- parallel

C. A, B are perpendicular

D. $A, B \leq 0$

Answer: B

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25. The magnitude of the resultant of the two orthogonal vectors of 3 units and 4 units is :

A. 7

B. 25

C. 5

D. 1

Answer: C

26. The unit vector along the negative z-axis is :

A. $-\hat{k}$

B. $-\hat{j}$

C. $\hat{i}$

D. $+\hat{k}$

Answer: A

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27. If $\overrightarrow{A}$ is a vector of magnitude 4 units due east. What is the magnitude and direction of a vector $-4\overrightarrow{A}$?

A. 4 units due east

B. 8 units due east

C. 16 units due east

D. 16 units due west

Answer: D

28. Figure shows the orientation of two vectors u and v in te

XY plane . If $u = a\hat{i} + b\hat{j}$ and $v = p\hat{i} + q\hat{j}$. Which of the

following is correct ?

A. a and p are positive while b and q are negative

B. a,p and b are positive while q is negative

C. a,q and b are positive while p is negative

D. a,b,p and q are all positive

Answer: B

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29. Assertion : Circular motion is a motion described by a particle traversing a circular path .

Reason : The whirling motion of a stone attached to a string . from the following statements select the correct statement

A. Assertion is false and reason is true.

B. Assertion is true and reason is false.

C. Assertion is ture and reason is the correct explanation

of assertion.

D. Assertion is true and reason is not the correct

explanation of assertion .

Answer: C

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30. If is given that $\overrightarrow{A} = 2\hat{i} + 3\hat{j} + \hat{k}$ and $\overrightarrow{B} = 6\hat{i} + 9\hat{j} + 3\hat{k}$

which of the following statements is correct ?

A. $\overrightarrow{A}$ and $\overrightarrow{B}$ are equal vectors

B. $\overrightarrow{A}$ and $\overrightarrow{B}$ are parallel vectors

C. $\vec{A}$ and $\vec{B}$ are perpendicular vectors

D. None of these

Answer: B

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31. A vector having unit magnitude is called . . . . Vector.

A. like

B. unlike

C. orthogonal

D. unit

Answer: D

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32. Select the correct pair from the following statements.

Vectors can be added :

A. algebrically and vectorially

B. algebrically and geometrically

C. graphically and geometrically

D. graphically and algebrically

Answer: C

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33. According to parallelogram law of vector addition, the

resultant is given by :

A. $\sqrt{P^2 + Q^2 + 2PQ\cos\theta}$

B. $\sqrt{P^2 + Q^2 - 2PQ\cos\theta}$

C. $\sqrt{\dfrac{P^2}{Q^2}}$

D. $\sqrt{P^2\cos^2\theta + Q^2\sin^2\theta}$

Answer: A

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34. According to triangle law of vector addition, the direction of the resultant is given by :

A. $\tan\alpha = \dfrac{P\cos\theta}{P + Q\sin\theta}$

B. $\tan\alpha = \dfrac{Q\sin\theta}{P + Q\cos\theta}$

C. $\tan\alpha = \dfrac{Q\cos\theta}{P + Q\sin\theta}$

D. $\tan \alpha = \dfrac{Q \cos \theta}{Q \sin \theta}$

Answer: B

35. The resultant of two vectors $\vec{A}$ and $\vec{B}$ is perpendicular to the vector $\vec{A}$ and its magnitude is equal to half of the magnitude of vector $\vec{B}$ (figure). The angle between $\vec{A}$ and $\vec{B}$ is

A. $120°$

B. $150°$

C. $135°$

D. None of these

Answer: B

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36. A hall has the dimensions $10m \times 12m \times 14m$. A fly starting at one corner ends up at a diametrically opposite corner, what is the magnitude of its displacement ?

A. 17m

B. 26m

C. 36m

D. 21m

Answer: D

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37. What is the angle between $\hat{i} + \hat{j} + \hat{k}$ and $\hat{j}$?

A. $0°$

B. $45°$

C. $60°$

D. None of these

Answer: D

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38. If $\vec{A} + \vec{B} + \vec{C} = 0$, then $\vec{A} \times \vec{B}$ is :

A. $\vec{B} \times \vec{C}$

B. $\vec{C} \times \vec{B}$

C. $\vec{A} \times \vec{C}$

D. None of these

Answer: A

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39. The angle between two vectors $2\hat{i} + 3\hat{j} + \hat{k}$ and $-3\hat{i} + 6\hat{k}$ is :

A. $0°$

B. $45°$

C. $60°$

D. $90°$

Answer: D

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40. Assertion : Vibratory motion is sometimes called oscillatory motion.

Reason : Spinning of the Earth about its axis .

Choose the correct statement from the following :

A. Assertion is false and reason is true.

B. Assertion is true and reason is false.

C. Assertion is ture and reason does not give the correct explanation of assertion.

D. Assertion is true and reason explains the assertion correctly.

Answer: C

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41. The scalar product of two $\vec{A}$ and $\vec{B}$ is :

A. AB sin θ

B. $AB \cos \theta$

C. $AB \sin \theta \widehat{n}$

D. $AB \cos \theta \hat{n}$

Answer: B

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42. Angle of inclination of the resultant when two vectors act at right to each other is :

A. $\dfrac{Q}{P}$

B. Q-P

C. Q+P

D. $\dfrac{P}{Q}$

Answer: A

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43. Horizontal component of a vector is represented as :

A. $\sin\theta$

B. $R\tan\theta$

C. $R\cos\theta$

D. $R\cos ec\theta$

Answer: C

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44. Resultant of two vectors which are parallel to each other and are in the same direction is obtained by .... Of vectors .

A. addition

B. subtraction

C. multiplication

D. division

Answer: A

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45. A stone is allowed to fall from a top of a tower 100 m high and at the same time another stone is projected vertically upwards from the ground with a velocity of 25 m/s. The two stones will melt after :

A. 40s

B. 0.4s

C. 4s

D. 0.04s

Answer: C

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46. A ball is thrown vertically upwards. Which of the following

plots represent the speed graph of the ball during its flight if

the air resistence is not ignored?

A.

B.

C.

D.

Answer: D

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47. If a particle has moved from one position to another position, then :

A. its distance is zero

B. its displacement is zero

C. neither distance nor displacement is zero

D. average velocity is zero

Answer: B

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48. Which one out of the following statement is false ?

A. A body can have zero velocity and still be accelerated

B. A body can have a constant velocity and still have a

varying speed

C. A body can have a constant speed and still have a

varying velocity

D. The direction of the velocity of a body can change when

its acceleration is constant

Answer: B

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49. Which of the following curves does not represent motion

in one dimension ?

A.

B.

C.

D.

Answer: B

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50. Position-time graph for motion with negative acceleration

is :

A.

B.

C.

D.

Answer: B

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51. A tiger chases a deer 30 m ahead of it and gains 3 m in 5 second after the chase began . The distance gained by the tiger in 10 second is :

A. 18m

B. 20m

C. 6m

D. 12m

Answer: D

52. Which graph pertains to uniform acceleration .

A.

B.

C.

D.

Answer: A

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53. Retardation means that acceleration :

A. decreases with time

B. increases with time

C. increases and decreases

D. decreases and increases

Answer: A

54. Slope of displacement-time graph at any instant gives :

A. speed

B. acceleration

C. retardation

D. velocity

Answer: D

55. . . . . . is given by the slope of velocity -time graph at any instant

A. speed

B. acceleration

C. retardation

D. velocity

Answer: B

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56. Which of the following is represented by the area under a-t curve ?

A. change in acceleration

B. change in velocity

C. change in distance

D. constant acceleration

Answer: B

57. Two projectiles thrown from the same point at angles $60°$ and $30°$ with the horizontal attain the same height . Which of the following statements is a correct statement ?

A. The ratio of their initial velocityies is $\sqrt{3}$

B. The ratio of their initial velocities is $\dfrac{1}{\sqrt{3}}$

C. The ratio of their initial velocities is 1.

D. The ratio of their initial velocities is infinity .

Answer: B

58. The range of a projectile fired at angle of $15°$ is 40m . If it is fired with the same speed at an angle of $45°$ then, which one of the following statement is an incorrect statement ?

A. Final range is twice the initial range.

B. Final range is half of the initial range.

C. Final range is greater then the initial range

D. Final range is 80 m

Answer: B

59. If x = a cos t is the displacement in time t then,

acceleration is :

   A. a cos t

   B. $-a\cos t$

   C. a sin t

   D. $-a\sin t$

Answer: B

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60. Choose the correct statement :

   A. motion is an absolute term but rest is relative

B. motion is a relative term but rest is an absolute

C. both motion and rest are relative

D. both motion and rest are absolute

Answer: C

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61. Statement 1 represents Assertion, statement 2 represent

Reasons .

Statement I : One radian is the angle subtended at the center

of a circle by an arc that is equal to the radius of the circle .

Setement 2: Radian describes the planar angle subtended by

a circular arc at the centre of the circle .

Which one of the following statements is a correct statement

?

A. Statement 1 is true and statement 2 is false

B. Statement 1 is false and statement 2 is true

C. Statement 1 is true and statement 2 does not explain statement 1.

D. Statement 1 is true and statement 2 explains statement 1.

Answer: D

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62. Statement 1 represents Assertion, statement 2 represent Reasons .

Statement I : In a non uniform circular motion, a body has one acceleration along the tangent to the circle and the other

acceleration acts towards the centre of the circular motion .

Setement 2: The magnitude and direction of the velocity of the body change with time in the non-uniform circular motion.

A. Statement 1 is true and statement 2 is ture and explains statement 1 correctly.

B. Statement 1 is true and statement 2 is true but it is not the correct explanation for statement 1

C. Statement 1 is true and statement 2 is false.

D. Statement 1 is false and statement 2 is true.

Answer: A

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63. In the following question statement 1 represent Assertion and statement 2 represents Reason .

Statement 1 : The velocity of a particle at a point on its trajectory is equal to the slope at that point .

Statement 2 : The velocity of the particle acts along the tangent to the trajectory at the point .

Select the correct statement from the following statements .

    A. Statement 1 is true, statement 2 is true and it explains statement 1 correctly.

    B. Statement 1 is true, statement 2 is true and does not explain statement 1 correctly .

    C. Statement 1 is true, statement 2 is false.

    D. Statement 1 is false , statement 2 is true .

Answer: D

64. A particle moves with uniform velocity which of the following statements about the motion of the particle is true ?

A. Its speed is zero

B. Its acceleration is zero

C. Its acceleration is opposite to the velocity

D. Its speed may by variable

Answer: B

65. A body is allowed to fall from a height of 100m . If the time taken for the first 50m is t_1 and for the remaining 50 m is t_2 , then :

A. $t_1 = t_2$

B. $t_1 > t_2$

C. $t_1 < t_2$

D. Depends upon the mass

Answer: B

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66. A coin is dropped in a lift . It takes time t_1 second to reach the floor when lift is stationary . It takes t_2 second when the

lift is moving up with constant acceleration . Then ,

A. $t_2 < t_1$

B. $t_1 = t_2$

C. $t_1 \geq t_2$

D. $t_1 < t_2$

Answer: A

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67. s-t graph shown in figure is a parabola. From this graph we

find that :

A. the body is moving with uniform velocity

B. the body is moving with uniform speed

C. the body is starting from rest and moving with uniform

   acceleration

D. the body is not moving at all

Answer: C

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68. The acceleration of a moving body can be found from :

A. area under velocity- time graph

B. area under distance-time graph

C. slope of the velocity-time graph

D. slope of distance-time graph

Answer: C

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69. Choose the old man out from the following equations of

motion.

A. v = u + at

B. $y = \dfrac{1}{2}gt^2$

C. $s = ut + \dfrac{1}{2}at^2$

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

Answer: B

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70. the displacement of particle is given by $X = a_0 + \dfrac{a_1 t}{2} - \dfrac{a_2 t^2}{3}$. What is its acceleration?

A. $\dfrac{2a_2}{3}$

B. $-\dfrac{2a_2}{3}$

C. a_2

D. zero

Answer: B

71. The equation for the motion of a particle is $v = at$. The distance travelled by the particle in the first 4 second is :

A. 8a

B. 6a

C. 12a

D. 4a

Answer: A

72. Select the correct statement from the following statement
,

For retarded motion, the . . . . . .

    A. slope of velcoity - time graph is zero.

    B. slope of velocity - time graph is positive .

    C. slope of velocity - time graph is negative.

    D. slope of velocity - time graph is negative or positive .

Answer: C

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73. Match the following :

Column I	Column II
1. Scalar product of two vectors	(i) parabola
2. Cross product of two vectors	(ii) Circle
3. Trajectory of a projectile	(iii) u^2 / g
4. Maximum range of a projectile	(iv) Torque
	(v) $u^2 \sin 2\theta / g$
	(vi) Work

A. 1 - (iv), 2 - (vi), 3 - 9ii), 4 - (v)

B. 1 - (vi), 2 - (iv), 3 - (i), 4 - (iii)

C. 1 - (v), 2 - (iii), 3 - (iv), 4 - (vi)

D. 1 - (i), 2 - (ii), 3 - (iv), 4 - (v)

Answer: B

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74. A train is moving towards east and a car is along north, both with speed. The passenger in the train is observed the car moving in whivh of the following direction ?

    A. East - north direction

    B. West - north direction

    C. South - east direction

    D. None of these

Answer: B

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75. Which one of the following graphs represents uniform motion ?

A.

B.

C.

D.

Answer: D

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76. A man should hold his umbrella with vertical, when rain fals vertically with velocity V_R and man walk horizontally with velocity V_M . It's direction is given by :

A. $\tan^{-1}\left(\dfrac{V_M}{V_R}\right)$

B. $\tan^{-1}\left(\dfrac{V_R}{V_M}\right)$

C. $\tan^{-1}(V_R)$

D. $\tan^{-1}(V_M)$

Answer: A

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77. Relative velocity of A with respect to B when A and B are in the opposite direction is :

A. $V_A + V_B$

B. $V_A - V_B$

C. $\nabla_A + \nabla_B$

D. $\sqrt{V_A^2 + V_B^2 = 2V_AV_B \cos\theta}$

Answer: A

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78. Two stones of different masses are dropped simultaneously from the top of a building. In this situation which one of the following is correct statement ?

A. smaller stone hit the ground earlier

B. larger stone hits the ground earlier

C. both stones reach the ground simulataneously.

D. which of the stones reach the ground earlier depends

one the composition of the stone.

Answer: C

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79. A body a starts from rest with an acceleration a_1 . After 2s,

another body B starts from rest with an acceleration a_2 . If

they travel equal distances in the 5th second after the start of

A then, the ratio $a_1 : a_2$ is equal to :

A. $9 : 7$

B. $9 : 5$

C. $5:7$

D. $5:9$

Answer: D

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80. When a ball is thrown up vertically with velocity v_0 it reaches a maximum height of h. when the ball reaches to triple t he maximum height. The velocity with which the ball was thrown is :

A. $3v_0$

B. $9v_0$

C. $\sqrt{3}v_0$

D. $2v_0$

Answer: C

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81. Two projectiles P and Q are fired from the same point with same velocity at angle $30°$ and $60°$. The horizontal range of :

A. P is equal to Q

B. P is less than Q

C. P is greater than Q

D. none of the above

Answer: A

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82. Choose the correct pair of the following for this situation .

During projectile motion the quantities that remain unchanged are :

    A. force and vertical velocity

    B. acceleration and horizontal velocity

    C. kinetic energy and acceleration

    D. acceleration and momentum

Answer: B

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83. Match the following given in both columns correctly .

Column I

1. Centripetal force
2. Centrifugal force
3. Linear velocity v
4. Momentum

Column II

(i) radius × angular velocity
(ii) $1/2at^2$
(iii) mass × velocity
(iv) mass × acceleration
(v) towards the centre of the circle
(vi) away from the centre of the circle

A. 1 - (v), 2 - (i), 3 - (iv), 4 - (iii)

B. 1 - (iii), 2 - (iv), 3 - (v), 4 - (iv)

C. 1 - (i), 2 - (ii), 3 - (iii), 4 - (iv)

D. 1 - (v), 2 - (vi), 3 - (i), 4 - (iii)

Answer: D

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84. If a projectile is projected with initial velocity 98 m/s in a direction of $30°$ above the horizontal. For this situation which one of the following is a correct statement ?

    A. Time of flight is 100 s

    B. Time of flight is 10 s

    C. Time of flight is 5 s

    D. Time of flight is 0 . 5 s

Answer: B

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85. Neglecting the air resistance , the time of flight of a projectile is determined by :

A. $u_{vertical}$

B. $u_{horizontal}$

C. $u = u^2_{vertical} + u^2_{horizontal}$

D. $u = u\left(u^2_{vertical} + u^2_{horizontal}\right)^{1/2}$

Answer: A

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86. From the following paramenters, select the odd man out .

A. Time of flight

B. Range

C. maximum height attained by a projectile

D. Linear velocity

Answer: D

87. A aeroplane is flying at a constanct horizontal velocity of 600 km/hr at an elevation of 6km towards a point directly above the target on the earth's surface. At a approprate time, the pilot releases a ball so that it strikes the taraget at the earth. The ball will appear to be falling :

   A. on a parabolic path at seen by pilot in the plane

   B. vertically alone a straight path as seen by an observer on the ground near the target

   C. on a parabolic as seen by an observer on the ground near the target

D. on a zig-zag path as seen by pilot in the plane

Answer: C

88. The time of flight is . . . . .the time taken to attain the maximum height .

A. thrice

B. same

C. twice

D. four times

Answer: C

89. When a bady undergoes an oblique projection, maximum range of it is :

A. $\dfrac{u^2}{g}$

B. $\dfrac{u}{g}$

C. $\dfrac{u^2}{g^2}$

D. $\dfrac{u^2}{2g}$

Answer: A

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90. The angle of projection for a projectile to cover maximum range is :

A. $30°$

B. $60°$

C. $0°$

D. $45°$

Answer: D

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91. A particle is projected at such an angle that the horizontal range is three times the greates height attained. For this situation which one of the following statements is correct ?

A. The angle of projection is $25°8'$

B. The angle of projection is $54°1'$

C. The angle of projection is $53°1'$

D. The angle of projection is $32.7°$

Answer: C

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92. For a projectile, projected at an angle, the resultant velocity is :

A. $\sqrt{u^2 + g^2t^2 - 2utg\sin\theta}$

B. $\sqrt{u^2 + g^2t^2}$

C. $\sqrt{u^2 - g^2t^2}$

D. $\sqrt{u^2 + g^2t^2 + 2utg\sin\theta}$

Answer: B

93. At the top of the trajectory of a projectile the acceleration is :

A. maximum

B. minimum

C. zero

D. acceleration due to gravity

Answer: D

94. Which of the following is correct statement ragarding projectile motion ?

    A. horizontal velocity of projectile is constant

    B. vertical velocity of projectile is constant

    C. acceleration is not costant

    D. momentum is constant

Answer: A

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95. In the following question statement 1 represent Assertion and statement 2 represents Reason .

Statement 1 : In a uniform circular motion the momentum of a

particle does not change with time .

Statement 2 : The kinetic energy of the particle remains constnat .

Choose the correct statement of the following statements

A. Statement 1 is true and statement 2 is true and it explains statement 1.

B. Statement 1 is true and statement 2 is true and it does not explain statement 1.

C. Statement 1 is true and statement 2 is false.

D. Statement 1 is false and statement 2 is true.

Answer: D

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96. When a projectile is projected in oblique motion expressions for time of flight and range of the projectile are given .

Which of the following pair is correct ?

A. $t_f = \dfrac{u \sin \theta}{2g} : R = \dfrac{u^2 \sin 2\theta}{2g}$

B. $t_f = \dfrac{2u \sin \theta}{g} : R = \dfrac{u^2 \sin 2\theta}{g}$

C. $t_f = \dfrac{2u \cos \theta}{g} : R = \dfrac{u^2 \cos 2\theta}{g}$

D. $t_f = \dfrac{2u \sin \theta}{g} : R = \dfrac{u^2 \sin 2\theta}{2g}$

Answer: B

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97. The expression for horizontal range when a body is projected at an angle with the horizontal is R =

A. $\dfrac{u \sin \theta}{g}$

B. $\dfrac{u^2 \sin 2\theta}{g}$

C. $\dfrac{u^2 \sin \theta}{g}$

D. $\dfrac{u^2 \sin \theta}{2g}$

Answer: B

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98. Which one of the following statement is correct ?

the equation y $= \dfrac{8}{2u^2}x^2$ represents :

A. the path of a freely falling body

B. the path of a thrown bodies

C. the path of a projectile

D. hyperbola

Answer: C

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99. Select the odd man out from the following :

A. Angular acceleration

B. Linear displacement

C. Angular velocity

D. Angular displacement

Answer: B

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100. During a projectile motion if the maximum height equals the horizontal range,then the angle of projection with the horizontal is :

    A. $\tan^{-1}(1)$

    B. $\tan^{-1}(2)$

    C. $\tan^{-1}(3)$

    D. $\tan^{-1}(4)$

Answer: D

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101. A ball is thrown upwards at a certain angle with the horizontal and it returns to the ground describing a parabolic

path . Which of the following remains constant ?

A. Momentum of the ball

B. Kinetic energy of the ball

C. vertical component of the velocity

D. Horizontal component of the velocity

Answer: D

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102. The expression for maximum height attained when the body is projected at an angle with the horizontal is :

A. $\dfrac{u \sin \theta}{2g}$

B. $\dfrac{u \sin^2 \theta}{2g}$

C. $\dfrac{u^2 \sin^2 \theta}{g}$

D. $\dfrac{u^2 \sin^2 \theta}{2g}$

Answer: D

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103. The angula speed of a fly-wheel making 120 revolutions /minute is :

A. π rad / sec

B. 4π rad / sec

C. 2π rad / sec

D. $4\pi^2$ rad / sec

Answer: B

104. What is the ratio of the angular speeds of the minute hand second hand of a clock ?

    A. $1:12$

    B. $12:1$

    C. $1:60$

    D. $60:1$

Answer: D

105. In the following situation which one of the following is a correct statement ?

When a body moves on circular path , the :

A. magnitude of velocity changes and its direction remain constant

B. magnitude of velocity remains constant and its direction change continuously

C. magnitude of velocity remains constant and direction remains constant

D. magnitude of velocity and direction change continuously

Answer: B

106. Dimension of angular velocity is :

A. MLT^{-1}

B. $M^0L^0T - 1$

C. MLT^{-2}

D. $M^0L^0T^{-2}$

Answer: B

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107. Choose the correct pair of the following pairs .

A. Angular velocity $\omega = vr$

   Angular acceleration $\propto = ra$

B. Angular velocity $\omega = \dfrac{v}{r}$

   Angular acceleration $\alpha = \dfrac{a}{r}$

C. Angular velocity $\omega = \dfrac{r}{v}$

   Angular acceleration $\alpha = \dfrac{r}{a}$

D. Angular velocity $\omega = \dfrac{v^2}{r}$

   Angular acceleration $\alpha = \dfrac{a}{r^2}$

Answer: B

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108. Radial acceleration is :

A. $v\omega^2$

B. $r\omega$

C. $r^2\omega$

D. $r\omega^2$

Answer: D

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109. A body moving with a constant speed v in a circle of radius r. its angular acceleration is :

A. 0

B. vr

C. $\dfrac{v}{r}$

D. $\dfrac{v^2}{r}$

Answer: A

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110. If ω_0, ω are initial and final angular velocities θ is the angular displacement and α is the angular acceleration then, choose the correct statement .

A. $omrga^2 = \omega_0^2 - 2\alpha\theta$

B. $\omega_0^2 = \omega^2 - 22\alpha\theta$

C. $\omega_0^2 + \omega^2 + 2\alpha\theta$

D. $\omega^2 = \omega_0^2 + 2\alpha\theta$

Answer: D

111. A particle moving in a circular path of certain radius, with uniform angular velocity ω has an angular acceleration equal to :

A. 0

B. unity

C. infinity

D. 1

Answer: A

112. In which direction of the motion of the particle does centripetal force act ?

A. parallel

B. radial

C. tangential

D. right angle

Answer: B

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113. A body is moving with a constant speed v in a circle of radius r. its angualr acceleration is :

A. vr

B. $\dfrac{v}{r}$

C. zero

D. $\dfrac{v}{r^2}$

Answer: C

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114. For one complete revolution, the angle swept by the radius vector is :

A. $360°$

B. $180°$

C. $270°$

D. $0°$

Answer: A

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115. Match the following :

Column I   Column II

1. Centripetal force   (i) $\frac{u^2 \sin^2 \theta}{2g}$

2. Relative velocity $\overrightarrow{V}_{AB}$ (ii) $ut + \frac{1}{2}at^2$

3. Distance in linear motion s   (iii) $\frac{mr}{v^2}$

4. h_{Mas} of a   (iv) $\nabla_A - \nabla_B$

                                          (v) $\frac{mv^2}{r}$

    A. 1 - (iv), 2 - (i), 3 - (iii), 4 - (v)

    B. 1 - (i), 2 - (iii), 3 - (ii), 4 - (iv)

    C. 1 - (ii), 2 - (v), 3 - (iv), 4 - (i)

D. 1 - (v), 2 - (iv), 3 - (ii), 4 - (i)

Answer: D

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116. In non-uniform circular motion , particle will have . . . . .

And tangential acceleration

A. centripetal

B. centrifugal

C. both (a) and (b)

D. neither (a) nor (b)

Answer: A

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117. Select the correct statement of the following

A. 1 radian = $5.729°$

B. 1 radian $= 57° 29'$

C. 1 radian $= 57.295°$

D. 1 radian $= 572.9°$

Answer: C

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118. A butterfly and stone (mass of later is greater than earlier) is moving with same velocity . Momentum of the stone is . . . . . Than the momentum of butterfly .

A. equal

B. greater

C. lesser

D. lesser (or) equal to

Answer: B

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119. Kinematics is the branch of mechanics which delas with the motion of objects without taking _____ into account

A. mass

B. force

C. velocity

D. all the above

Answer: B

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120. Which of the following statement is incorrect ?

A. Kinematics deals with the motion of objects .

B. Kinematics deals with the equilibrium of objects .

C. Kinema means motion.

D. The conceptof root and motion can be understood in

kinematics .

Answer: B

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121. A person performing a somersault is an example of . . . . .

Motion.

A. circular

B. vibratory

C. linear

D. rotational

Answer: D

122. A motion of a shell fired from the gun is an example for . .

. . . Dimensional motion.

A. two

B. three

C. one

D. both (a) and (b)

Answer: A

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123. Match the following :

Column I	Column II
1. Work	(i) Supplementary unit in SI system
2. Torque	(ii) Kinematics
3. Plane angle	(iii) Motion
4. Meaning of Kinema	(iv) Vector
	(v) Scalar

A. 1 - (i) , 2 - (iii), 3- (iv), 4 - (v)

B. 1 - (iv), 2 - (iii), 3 - (i), 4 - (ii)

C. 1 - (v), 2 - (iv), 3 - (i), 4- (iii)

D. 1 - (iv), 2 -(iii), 3 - (ii), 4 - (v)

Answer: C

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124. Length of the vector is always . . . . Quantity

A. negative

B. positive

C. unit

D. zero

Answer: B

---

125. Displacement (y) of a body is represented by $y = pt + qt^2 - rt^3$ where p,q and r are constants of motion. The velocity of the body when its acceleration is 0 :

A. $p + \dfrac{q^2}{2r}$

B. $p + \dfrac{q^2}{r}$

C. $p + \dfrac{q^2}{4r}$

D. $p + \dfrac{q^2}{3r}$

Answer: D

126. What is the resultant vectors , when two vectors are at right angles to each other ?

A. $R = \sqrt{P^2 Q^2}$

B. $R = P + Q$

C. R = P - Q

D. $R = \sqrt{\dfrac{P}{Q}}$

Answer: A

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127. Resultant of the two vector is maximum when angle between them is :

A. 90°

B. 180°

C. 0°

D. 270°

Answer: C

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128. Two vectors act along the mutually perpendicular directions are called . . . . . . Vectors .

A. equal

B. opposite

C. orthogonal

D. orthogonal unit

Answer: D

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129. Choose the correct statement from the following statement ?

A. The dot product is associative

B. The dot product is commutative

C. The dot product is not commutative

D. The dot product is applied only to unit vectors .

Answer: B

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130. If $\vec{A}$ and $\vec{B}$ are perpendicular then $\vec{A} . \vec{B} = \ldots.$

A. $\left|\vec{A}\right|\left|\vec{B}\right|$

B. $\left|\vec{A} \times \vec{B}\right|$

C. $\left|\vec{A}\right|\left|\vec{B}\right| \cos 180°$

D. $\left|\vec{A}\right|\left|\vec{B}\right| \cos 90°$

Answer: D

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131. Which of the following rule is applied to know the diretion of the vectors product ?

A. Fleming's left hand rule

B. Fleming's right hand rule

C. Right handed screw rule

D. Left handed screw rule

Answer: C

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132. The parallelogram law of vector addition is equivalent to .
. . . Method.

A. polygon

B. coplanar

C. triangle

D. collinear

Answer: C

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133. If for two vectors $\vec{A}$ and $\vec{B}$, $\vec{A} \times \vec{B} = 0$ then the vectors are :

A. perpendicular to each other

B. parallel to each other

C. act at an angle $60°$

D. act at an angle $30°$

Answer: B

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134. Which of the following statements is /are not true ?

    A. v,a and s are vectprs

    B. Mass, energy, work are vectors

    C. Vector has only magnitude whereas scalar has both

       magnitude and direction

    D. Both (b) and (c)

Answer: C

135. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle

between these vectors is

A. $0°$

B. $45°$

C. $90°$

D. $180°$

Answer: C

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136. If $\overrightarrow{A}$ and $\overrightarrow{B}$ are two vectors , which of the statement is wrong ?

A. $\overrightarrow{A} + \overrightarrow{B} = \overrightarrow{B} + \overrightarrow{A}$

B. $\overrightarrow{A} - \overrightarrow{B} = -\left(\overrightarrow{B} + \overrightarrow{A}\right)$

C. $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$

D. $\vec{A} . \vec{B} = \vec{B} . \vec{A}$

Answer: C

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137. The displacement of a body is given by $x = 2t^3 - 6t^2 + 12t + 6$. The acceleration of body is zero at time ti is equal to :

A. 3s

B. 2s

C. 1s

D. 10s

Answer: C

---

138. If $\vec{A}$ and $\vec{B}$ are two vectors , $\vec{A} \cdot \vec{B} = \vec{A} \times \vec{B}$ then resultant vector is :

A. A + B

B. A - B

C. $\sqrt{A^2 + B^2}$

D. $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

Answer: D

139. A force of 5N acts on a particle along a direction making an angle of $30°$ with vertical . Its vertical component will be :

A. 10N

B. 3N

C. 4N

D. 2.5N

Answer: D

140. The expression $\left(\dfrac{1}{\sqrt{2}} \hat{i} + \dfrac{1}{\sqrt{2}} \hat{j} \right)$ is a :

A. unit vector

B. null vector

C. vector of magnitude $\sqrt{2}$

D. scalar

Answer: A

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141. In the following figure (not to scale), AD bisects $\angle BAC$. If

$\angle BAD = 45°$ is inscribed in a circle, then which of the

following is the longest?

A. $\vec{A} + \vec{B} = \vec{C}$

B. $\vec{B} + \vec{C} = \vec{A}$

C. $\vec{C} + \vec{A} = \vec{B}$

D. $\vec{A} + \vec{B} + \vec{C} = 0$

Answer: C

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142. It is found that $|A + B| = |A|$, This necessarily implies.

A. B = 0

B. A,B are anti- parallel

C. A, B are perpendicular

D. $A, B \leq 0$

Answer: B

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143. The magnitude of the resultant of the two orthogonal vectors of 3 units and 4 units is :

A. 7

B. 25

C. 5

D. 1

Answer: C

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144. The unit vector along the negative z-axis is :

A. $-\hat{k}$

B. $-\hat{j}$

C. $\hat{i}$

D. $+\hat{k}$

Answer: A

---

145. If $\overrightarrow{A}$ is a vector of magnitude 4 units due east. What is the magnitude and direction of a vector $-4\overrightarrow{A}$?

A. 4 units due east

B. 8 units due east

C. 16 units due east

D. 16 units due west

Answer: D

146. Figure 2 (EP). 13 shows the orientation of two vectors $\vec{u}$ and $\vec{v}$ in the (XY) plane.

If $\vec{u} = a\hat{i} + b\hat{j}$ and $\vec{v} = p\hat{i} + q\hat{j}$ which of the following is correct ?

A. a and p are positive while b and q are negative

B. a,p and b are positive while q is negative

C. a,q and b are positive while p is negative

D. a,b,p and q are all positive

Answer: B

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147. Assertion : Circular motion is a motion described by a particle traversing a circular path .

Reason : The whirling motion of a stone attached to a string .

from the following statements select the correct statement

    A. Assertion is false and reason is true.

    B. Assertion is true and reason is false.

    C. Assertion is ture and reason is the correct explanation of assertion.

D. Assertion is true and reason is not the correct explanation of assertion .

Answer: C

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148. If is given that

$\overrightarrow{A} = 2\hat{i} + 3\hat{j} + \hat{k}$ and $\overrightarrow{B} = 6\hat{i} + 9\hat{j} + 3\hat{k}$ which of the

following statements is correct ?

A. $\overrightarrow{A}$ and $\overrightarrow{B}$ are equal vectors

B. $\overrightarrow{A}$ and $\overrightarrow{B}$ are parallel vectors

C. $\overrightarrow{A}$ and $\overrightarrow{B}$ are perpendicular vectors

D. None of these

Answer: B

149. A vector having unit magnitude is called . . . . Vector.

A. like

B. unlike

C. orthogonal

D. unit

Answer: D

150. Select the correct pair from the following statements. Vectors can be added :

    A. algebrically and vectorially

    B. algebrically and geometrically

    C. graphically and gemetrically

    D. graphically and algebrically

Answer: C

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151. According to parallelogram law of vector addition, the resultant is given by :

A. $\sqrt{P^2 + Q^2 + 2PQ\cos\theta}$

B. $\sqrt{P^2 + Q^2 - 2PQ\cos\theta}$

C. $\sqrt{\dfrac{P^2}{Q^2}}$

D. $\sqrt{P^2\cos^2\theta + Q^2\sin^2\theta}$

Answer: A

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152. According to triangle law of vector addition, the direction

of the resultant is given by :

A. $\tan\alpha = \dfrac{P\cos\theta}{P + Q\sin\theta}$

B. $\tan\alpha = \dfrac{Q\sin\theta}{P + Q\cos\theta}$

C. $\tan\alpha = \dfrac{Q\cos\theta}{P + Q\sin\theta}$

D. $\tan \alpha = \dfrac{Q \cos \theta}{Q \sin \theta}$

Answer: B

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153. The resultant of two vectors A and B is perpendicular to vector A and its magnitude is equal to half of the magnitude of vector B.

Then the angle between A and B is

A. $120°$

B. $150°$

C. $135°$

D. None of these

Answer: B

154. A hall has the dimensions $10m \times 12m \times 14m$. A fly starting at one corner ends up at a diametrically opposite corner, what is the magnitude of its displacement ?

A. 17m

B. 26m

C. 36m

D. 21m

Answer: D

155. What is the angle between $\hat{i} + \hat{j} + \hat{k}$ and $\hat{j}$?

A. $0°$

B. $45°$

C. $60°$

D. None of these

Answer: D

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156. If $\vec{A} + \vec{B} + \vec{C} = 0$, then $\vec{A} \times \vec{B}$ is :

A. $\vec{B} \times \vec{C}$

B. $\vec{C} \times \vec{B}$

C. $\vec{A} \times \vec{C}$

D. None of these

Answer: A

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157. The angle between two vectors $2\hat{i} + 3\hat{j} + \hat{k}$ and $-3\hat{i} + 6\hat{k}$ is :

A. $0°$

B. $45°$

C. $60°$

D. $90°$

Answer: D

158. Assertion : Vibratory motion is sometimes called oscillatory motion.

Reason : Spinning of the Earth about its axis .

Choose the correct statement from the following :

   A. Assertion is false and reason is true.

   B. Assertion is true and reason is false.

   C. Assertion is ture and reason does not give the correct explanation of assertion.

   D. Assertion is true and reason explains the assertion correctly.

Answer: C

159. The scalar product of two $\vec{A}$ and $\vec{B}$ is :

A. AB sin θ

B. $AB \cos \theta$

C. $AB \sin \theta \hat{n}$

D. $AB \cos \theta \hat{n}$

Answer: B

160. Angle of inclination of the resultant when two vectors act at right to each other is :

A. $\dfrac{Q}{P}$

B. Q-P

C. Q+P

D. $\dfrac{P}{Q}$

Answer: A

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161. Horizontal component of a vector is represented as :

A. $\sin\theta$

B. $R\tan\theta$

C. $R\cos\theta$

D. $R\cos\theta$

Answer: C

162. Resultant of two vectors which are parallel to each other and are in the same direction is obtained by . . . . Of vectors .

    A. addition

    B. subtraction

    C. multiplication

    D. division

Answer: A

163. A stone is allowed to fall from a top of a tower 100 m high and at the same time another stone is projected vertically upwards from the ground with a velocity of 25 m/s. The two stones will melt after :

A. 40s

B. 0.4s

C. 4s

D. 0.04s

Answer: C

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164. A ball is thrown vertically upwards. Which of the following plots represent the speed graph of the ball during its flight if

the air resistence is not ignored?

A.

B.

C.

D.

Answer: D

165. If a particle has moved from one position to another position, then :

    A. its distance is zero

    B. its displacement is zero

    C. neither distance nor displacement is zero

    D. average velocity is zero

Answer: B

166. Which of the followig statement is false ?

A. A body can have zer velocity and still be accelerated

B. A body can have a constant velocity and still have a

varying speed

C. A body can have a constant speed and still have a

varying velocity

D. The direction of the velocity of a body can change when

its acceleration is constant

Answer: B

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167. Which of the following curves does not represent motion

in one dimension ?

A.

B.

C.

D.

Answer: B

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168. Position-time graph for motion with negative acceleration

is :

A.

B.

C.

D.

Answer: B

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169. A tiger chases a deer 30 m ahead of it and gains 3 m in 5 second after the chase began . The distance gained by the tiger in 10 second is :

A. 18m

B. 20m

C. 6m

D. 12m

Answer: D

170. Which graph pertains to uniform acceleration .

A.

B.

C.

D.

Answer: A

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171. Retardation means that acceleration :

A. decreases with time

B. increases with time

C. increases and decreases

D. decreases and increases

Answer: A

172. Slope of displacement-time graph at any instant gives :

A. speed

B. acceleration

C. retardation

D. velocity

Answer: D

173. . . . . . is given by the slope of velocity -time graph at any instant

A. speed

B. acceleration

C. retardation

D. velocity

Answer: B

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174. Which of the following is represented by the area under a-t curve ?

A. change in acceleration

B. change in velocity

C. change in distance

D. constant acceleration

Answer: B

---

175. Two projectiles thrown from the same point at angles

$60°$ and $30°$ with the horizontal attain the same height .

Which of the following statements is a correct statement ?

A. The ratio of their initial velocityies is $\sqrt{3}$

B. The ratio of their initial velocities is $\dfrac{1}{\sqrt{3}}$

C. The ratio of their initial velocities is 1.

D. The ratio of their initial velocities is infinity .

Answer: B

176. The range of a projectile fired at angle of $15°$ is 40m . If it is fired with the same speed at an angle of $45°$ then, which one of the following statement is an incorrect statement ?

    A. Final range is twice the initial range.

    B. Final range is half of the initial range.

    C. Final range is greater then the initial range

    D. Final range is 80 m

Answer: B

177. If x = a cos t is the displacement in time t then, acceleration is :

A. a cos t

B. $-a \cos t$

C. a sin t

D. $-a \sin t$

Answer: B

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178. Choose the correct statement

A. motion is an absolute term but rest is relative

B. motion is a relative term but rest is an absolute

C. both motion and rest are relative

D. both motion and rest are absolute

Answer: C

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179. Statement 1 represents Assertion, statement 2 represent

Reasons .

Statement I : One radian is the angle subtended at the center

of a circle by an arc that is equal to the radius of the circle .

Setement 2: Radian describes the planar angle subtended by

a circular arc at the centre of the circle .

Which one of the following statements is a correct statement

?

A. Statement 1 is true and statement 2 is false

B. Statement 1 is false and statement 2 is true

C. Statement 1 is true and statement 2 does not explain statement 1.

D. Statement 1 is true and statement 2 explains statement 1.

Answer: D

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180. Statement 1 represents Assertion, statement 2 represent Reasons .

Statement I : In a non uniform circular motion, a body has one acceleration along the tangent to the circle and the other

acceleration acts towards the centre of the circular motion .

Setement 2: The magnitude and direction of the velocity of the body change with time in the non-uniform circular motion.

A. Statement 1 is true and statement 2 is ture and explains statement 1 correctly.

B. Statement 1 is true and statement 2 is true but it is not the correct explanation for statement 1

C. Statement 1 is true and statement 2 is false.

D. Statement 1 is false and statement 2 is true.

Answer: A

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181. In the following question statement 1 represent Assertion and statement 2 represents Reason .

Statement 1 : The velocity of a particle at a point on its trajectory is equal to the slope at that point .

Statement 2 : The velocity of the particle acts along the tangent to the trajectory at the point .

Select the correct statement from the following statements .

   A. Statement 1 is true, statement 2 is true and it explains

      statement 1 correctly.

   B. Statement 1 is true, statement 2 is true and does not

      explain statement 1 correctly .

   C. Statement 1 is true, statement 2 is false.

   D. Statement 1 is false , statement 2 is true .

Answer: D

182. A particle moves with uniform velocity which of the following statements about the motion of the particle is true ?

A. Its speed is zero

B. Its acceleration is zero

C. Its acceleration is opposite to the velocity

D. Its speed may by variable

Answer: B

183. A body is allowed to fall from a height of 100m . If the time taken for the first 50m is t_1 and for the remaining 50 m is t_2 , then :

    A. $t_1 = t_2$

    B. $t_1 > t_2$

    C. $t_1 < t_2$

    D. Depends upon the mass

Answer: B

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184. A coin is dropped in a lift . It takes time t_1 second to reach the floor when lift is stationary . It takes t_2 second when

the lift is moving up with constant acceleration . Then ,

A. $t_2 < t_1$

B. $t_1 = t_2$

C. $t_1 \geq t_2$

D. $t_1 < t_2$

Answer: A

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185. s-t graph shown in figure is a parabola. From this graph we find that :

A. the body is moving with uniform velocity

B. the body is moving with uniform speed

C. the body is starting from rest and moving with uniform

acceleration

D. the body is not moving at all

Answer: C

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186. The acceleration of a moving body can be found from

A. area under velocity- time graph

B. area under distance-time graph

C. slope of the velocity-time graph

D. slope of distance-time graph

Answer: C

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187. Choose the old man out from the following equations of motion.

A. v = u + at

B. $y = \dfrac{1}{2}gt^2$

C. $s = ut + \dfrac{1}{2}at^2$

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

Answer: B

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188. the displacement of particle is given by

$X = a_0 + \dfrac{a_1 t}{2} - \dfrac{a_2 t^2}{3}$. What is its acceleration?

A. $\dfrac{2a_2}{3}$

B. $-\dfrac{2a_2}{3}$

C. a_2

D. zero

Answer: B

---

189. The equation for the motion of a particle is $v = at$. The distance travelled by the particle in the first 4 second is :

A. 8a

B. 6a

C. 12a

D. 4a

Answer: A

190. Select the correct statement from the following statement ,

For retarded motion, the ......

    A. slope of velcoity - time graph is zero.

    B. slope of velocity - time graph is positive .

    C. slope of velocity - time graph is negative.

    D. slope of velocity - time graph is negative or positive .

Answer: C

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191. Match the following :

Column I	Column II
1. Scalar product of two vectors	(i) parabola
2. Cross product of two vectors	(ii) Circle
3. Trajectory of a projectile	(iii) u^2/g
4. Maximum range of a projectile	(iv) Torque
	(v) $u^2 \sin 2\theta/g$
	(vi) Work

A. 1 - (iv), 2 - (vi), 3 - 9ii), 4 - (v)

B. 1 - (vi), 2 - (iv), 3 - (i), 4 - (iii)

C. 1 - (v), 2 - (iii), 3 - (iv), 4 - (vi)

D. 1 - (i), 2 - (ii), 3 - (iv), 4 - (v)

Answer: B

▶ Watch Video Solution

192. A train is moving towards east and a car is along north, both with speed. The passenger in the train is observed the car moving in whivh of the following direction ?

    A. East - north direction

    B. West - north direction

    C. South - east direction

    D. None of these

Answer: B

▶ **Watch Video Solution**

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193. Which one of the following graphs represents uniform motion ?

A.

B.

C.

D.

Answer: D

▶ **Watch Video Solution**

194. A man should hold his umbrella with vertical, when rain fals vertically with velocity V_R and man walk horizontally with velocity V_M . It's direction is given by :

A. $\tan^{-1}\left(\dfrac{V_M}{V_R}\right)$

B. $\tan^{-1}\left(\dfrac{V_R}{V_M}\right)$

C. $\tan^{-1}(V_R)$

D. $\tan^{-1}(V_M)$

Answer: A

▶ **Watch Video Solution**

195. Relative velocity of A with respect to B when A and B are in the opposite direction is :

A. $\nabla_A - \nabla_B$

B. $\nabla_B - \nabla_A$

C. $\nabla_A + \nabla_B$

D. $\sqrt{V_A^2 + V_B^2 = 2V_A V_B \cos\theta}$

Answer: B

▶ **Watch Video Solution**

196. Two stones of different masses are dropped simultaneously from the top of a building. In this situation which one of the following is correct statement ?

A. smaller stone hit the ground earlier

B. larger stone hits the ground earlier

C. both stones reach the ground simulataneously.

D. which of the stones reach the ground earlier depends

one the composition of the stone.

Answer: C

▶ **Watch Video Solution**

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197. A body a starts from rest with an acceleration a_1 . After

2s, another body B starts from rest with an acceleration a_2 . If

they travel equal distances in the 5th second after the start of

A then, the ratio $a_1 : a_2$ is equal to :

A. $9:7$

B. $9:5$

C. $5:7$

D. $5:9$

Answer: D

---

198. When a ball is thrown up vertically with velocity v_0 it reaches a maximum height of h. when the ball reaches to triple t he maximum height. The velocity with which the ball was thrown is :

A. $3v_0$

B. $9v_0$

C. $\sqrt{3}v_0$

D. $2v_0$

Answer: C

> ▶ **Watch Video Solution**

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199. Two projectiles P and Q are fired from the same point with same velocity at angle $30°$ and $60°$. The horizontal range of :

    A. P is equal to Q

    B. P is less than Q

    C. P is greater than Q

    D. none of the above

Answer: A

200. Choose the correct pair of the following for this situation

.

During projectile motion the quantities that remain unchanged are :

A. force and vertical velocity

B. acceleration and horizontal velocity

C. kinetic energy and acceleration

D. acceleration and momentum

Answer: B

201. Match the following given in both columns correctly .

Column I

1. Centripetal force
2. Centrifugal force
3. Linear velocity v
4. Momentum

Column II

(i) radius×angular velocity
(ii) $1/2at^2$
(iii) mass×velocity
(iv) mass×acceleration
(v) towards the centre of the circle
(vi) away from the centre of the circle

A. 1 - (v), 2 - (i), 3 - (iv), 4 - (iii)

B. 1 - (iii), 2 - (iv), 3 - (v), 4 - (iv)

C. 1 - (i), 2 - (ii), 3 - (iii), 4 - (iv)

D. 1 - (v), 2 - (vi), 3 - (i), 4 - (iii)

Answer: D

▶ Watch Video Solution

202. If a projectile is projected with initial velocity 98 m/s in a direction of $30°$ above the horizontal. For this situation which one of the following is a correct statement ?

    A. Time of flight is 100 s

    B. Time of flight is 10 s

    C. Time of flight is 5 s

    D. Time of flight is 0 . 5 s

Answer: B

▶ **Watch Video Solution**

203. Neglecting the air resistance , the time of flight of a projectile is determined by :

A. u_{vertical}

B. $u_{\text{horizontal}}$

C. $u = u^2_{\text{vertical}} + u^2_{\text{horizontal}}$

D. $u = u\left(u^2_{\text{vertical}} + u^2_{\text{horizontal}}\right)^{1/2}$

Answer: A

▶ **Watch Video Solution**

204. From the following paramenters, select the odd man out

.

A. Time of flight

B. Range

C. maximum height attained by a projectile

D. Linear velocity

Answer: D

205. A aeroplane is flying at a constanct horizontal velocity of 600 km/hr at an elevation of 6km towards a point directly above the target on the earth's surface. At a approprate time, the pilot releases a ball so that it strikes the taraget at the earth. The ball will appear to be falling :

A. on a parabolic path at seen by pilot in the plane

B. vertically alone a straight path as seen by an observer on the ground near the target

C. on a parabolic as seen by an observer on the ground near the target

D. on a zig-zag path as seen by pilot in the plane

Answer: C

▶ **Watch Video Solution**

206. The time of flight is . . . . .the time taken to attain the maximum height .

A. thrice

B. same

C. twice

D. four times

Answer: C

207. When a bady undergoes an oblique projection, maximum range of it is :

A. $\dfrac{u^2}{g}$

B. $\dfrac{u}{g}$

C. $\dfrac{u^2}{g^2}$

D. $\dfrac{u^2}{2g}$

Answer: A

208. The angle of projection for a projectile to cover maximum range is :

A. $30°$

B. $60°$

C. $0°$

D. $45°$

Answer: D

▶ **Watch Video Solution**

209. A particle is projected at such an angle that the horizontal range is three times the greates height attained. For this situation which one of the following statements is correct ?

A. The angle of projection is $25°8'$

B. The angle of projection is $54°1'$

C. The angle of projection is $53°1'$

D. The angle of projection is $32.7°$

Answer: C

▶ **Watch Video Solution**

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210. For a projectile, projected at an angle, the resultant velocity is :

A. $\sqrt{u^2 + g^2t^2 - 2utg\sin\theta}$

B. $\sqrt{u^2 + g^2t^2}$

C. $\sqrt{u^2 - g^2t^2}$

D. $\sqrt{u^2 + g^2t^2 + 2utg\sin\theta}$

Answer: B

211. At the top of the trajectory of a projectile the acceleration is :

A. maximum

B. minimum

C. zero

D. acceleration due to gravity

Answer: D

212. Which of the following is correct statement ragarding projectile motion ?

    A. horizontal velocity of projectile is constant

    B. vertical velocity of projectile is constant

    C. acceleration is not costant

    D. momentum is constant

Answer: A

▶ **Watch Video Solution**

213. In the following question statement 1 represent Assertion and statement 2 represents Reason .

Statement 1 : In a uniform circular motion the momentum of a particle does not change with time .

Statement 2 : The kinetic energy of the particle remains constnat .

Choose the correct statement of the following statements

A. Statement 1 is true and statement 2 is true and it explains statement 1.

B. Statement 1 is true and statement 2 is true and it does not explain statement 1.

C. Statement 1 is true and statement 2 is false.

D. Statement 1 is false and statement 2 is true.

Answer: D

▶ **Watch Video Solution**

214. When a projectile is projected in oblique motion expressions for time of flight and range of the projectile are given .

Which of the following pair is correct ?

A. $t_f = \dfrac{u \sin \theta}{2g} : R = \dfrac{u^2 \sin 2\theta}{2g}$

B. $t_f = \dfrac{2u \sin \theta}{g} : R = \dfrac{u^2 \sin 2\theta}{g}$

C. $t_f = \dfrac{2u \cos \theta}{g} : R = \dfrac{u^2 \cos 2\theta}{g}$

D. $t_f = \dfrac{2u \sin \theta}{g} : R = \dfrac{u^2 \sin 2\theta}{2g}$

Answer: B

▶ Watch Video Solution

215. The expression for horizontal range when a body is projected at an angle with the horizontal is R =

A. $\dfrac{u \sin \theta}{g}$

B. $\dfrac{u^2 \sin \theta}{g}$

C. $\dfrac{u^2 \sin \theta}{g}$

D. $\dfrac{u^2 \sin \theta}{2g}$

Answer: B

▶ **Watch Video Solution**

216. Which one of the following statement is correct ?

the equation y $= \dfrac{8}{2u^2} x^2$ represents :

A. the path of a freely falling body

B. the path of a thrown bodies

C. the path of a projectile

D. hyperbola

Answer: C

▶ **Watch Video Solution**

217. Select the odd man out from the following :

A. Angular acceleration

B. Linear displacement

C. Angular velocity

D. Angular displacement

Answer: B

---

218. During a projectile motion if the maximum height equals the horizontal range,then the angle of projection with the horizontal is :

A. $\tan^{-1}(1)$

B. $\tan^{-1}(2)$

C. $\tan^{-1}(3)$

D. $\tan^{-1}(4)$

Answer: D

219. A ball is thrown upwards at a certain angle with the horizontal and it returns to the ground describing a parabolic path . Which of the following remains constant ?

    A. Momentum of the ball

    B. Kinetic energy of the ball

    C. vertical component of the velocity

    D. Horizontal component of the velocity

Answer: D

▶ **Watch Video Solution**

220. The expression for maximum height attained when the body is projected at an angle with the horizontal is :

A. $\dfrac{u \sin \theta}{2g}$

B. $\dfrac{u \sin^2 \theta}{2g}$

C. $\dfrac{u^2 \sin^2 \theta}{g}$

D. $\dfrac{u^2 \sin^2 \theta}{2g}$

Answer: D

▶ **Watch Video Solution**

221. The angula speed of a fly-wheel making 120 revolutions /minute is :

A. π rad / sec

B. 4π rad / sec

C. 2π rad / sec

D. $4\pi^2$ rad / sec

Answer: B

▶ Watch Video Solution

222. What is the ratio of the angular speeds of the minute hand second hand of a clock ?

A. $1:12$

B. $12:1$

C. $1:60$

D. $60:1$

Answer: D

▶ Watch Video Solution

223. In the following situation which one of the following is a correct statement ?

When a body moves on circular path , the :

A. magnitude of velocity changes and its direction remain constant

B. magnitude of velocity remains constant and its direction change continuously

C. magnitude of velocity remains constant and direction remains constant

D. magnitude of velocity and direction change continuously

Answer: B

224. Dimension of angular velocity is :

A. MLT^{-1}

B. $M^0L^0T - 1$

C. MLT^{-2}

D. $M^0L^0T^{-2}$

Answer: B

225. Choose the correct pair of the following pairs .

A. Angular velocity $\omega = vr$

   Angular acceleration $\propto \, = ra$

B. Angular velocity $\omega = \dfrac{v}{r}$

   Angular acceleration $\alpha = \dfrac{a}{r}$

C. Angular velocity $\omega = \dfrac{r}{v}$

   Angular acceleration $\alpha = \dfrac{r}{a}$

D. Angular velocity $\omega = \dfrac{v^2}{r}$

   Angular acceleration $\alpha = \dfrac{a}{r^2}$

Answer: B

▶ **Watch Video Solution**

226. Radial acceleration is :

A. $v\omega^2$

B. $r\omega$

C. $r^2\omega$

D. $r\omega^2$

Answer: D

▶ **Watch Video Solution**

227. A body moving with a constant speed v in a circle of radius r. its angular acceleration is :

A. 0

B. vr

C. $\dfrac{v}{r}$

D. $\dfrac{v^2}{r}$

Answer: A

▶ **Watch Video Solution**

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228. If ω_0, ω are initial and final angular velocities θ is the angular displacement and α is the angular acceleration then, choose the correct statement .

A. $omrga^2 = \omega_0^2 - 2\alpha\theta$

B. $\omega_0^2 = \omega^2 - 22\alpha\theta$

C. $\omega_0^2 + \omega^2 + 2\alpha\theta$

D. $\omega^2 = \omega_0^2 + 2\alpha\theta$

Answer: D

229. A particle moving in a circular path of certain radius, with uniform angular velocity ω has an angular acceleration equal to :

A. 0

B. unity

C. infinity

D. insufficient data to calculate

Answer: A

230. In which direction of the motion of the particle does centripetal force act ?

A. parallel

B. radial

C. tangential

D. right angle

Answer: B

▶ Watch Video Solution

231. A body is moving with a constant speed v in a circle of radius r. its angualr acceleration is :

A. vr

B. $\dfrac{v}{r}$

C. zero

D. $\dfrac{v}{r^2}$

Answer: C

▶ **Watch Video Solution**

232. For one complete revolution, the angle swept by the radius vector is :

A. $360°$

B. $180°$

C. $270°$

D. $0°$

Answer: A

▶ **Watch Video Solution**

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233. Match the following :

Column I   Column II

1. Centripetal force   (i) $\frac{u^2 \sin^2 \theta}{2g}$

2. Relative velocity $\overrightarrow{V}_{AB}$ (ii) $ut + \frac{1}{2}at^2$

3. Distance in linear motion s   (iii) $\frac{mr}{v^2}$

4. h_{Mas} of a   (iv) $\nabla_A - \nabla_B$

                                      (v) $\frac{mv^2}{r}$

A. 1 - (iv), 2 - (i), 3 - (iii), 4 - (v)

B. 1 - (i), 2 - (iii), 3 - (ii), 4 - (iv)

C. 1 - (ii), 2 - (v), 3 - (iv), 4 - (i)

D. 1 - (v), 2 - (iv), 3 - (iii), 4 - (i)

Answer: D

▶ **Watch Video Solution**

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234. In non-uniform circular motion , particle will have . . . . .

And tangential acceleration

A. centripetal

B. centrifugal

C. both (a) and (b)

D. neither (a) nor (b)

Answer: A

▶ **Watch Video Solution**

235. Select the correct statement of the following

A. 1 radian = $5.729°$

B. 1 radian $= 57° 29'$

C. 1 randian $= 57.295°$

D. 1 randian $= 572.9°$

Answer: C

▶ **Watch Video Solution**

236. A butterfly and stone (mass of later is greater than earlier) is moving with same velocity . Momentum of the stone is . . . . . Than the momentum of butterfly .

A. equal

B. greater

C. lesser

D. lesser (or) equal to

Answer: B

▶ **Watch Video Solution**

Other Important Questions Answers Ii Very Short Answer Questions

1. What is Kinematics?

▶ **Watch Video Solution**

2. How does an object supposed to be at rest and in motion are considered to be relative ?

> ▶ **Watch Video Solution**

3. What is meant by Frame of reference?

> ▶ **Watch Video Solution**

4. What is meant by right-handed Cartesian coordinate system ?

> ▶ **Watch Video Solution**

5. What is meant by point mass and give suitable example ?

6. Define linear motion. Give example.

7. Define uniform circular motion . Give some examples.

8. Define rotational motion. Give example.

9. Define vibratory motion. Give example

▶ **Watch Video Solution**

10. What do you mean by motion in one, two and three dimensions ?

▶ **Watch Video Solution**

11. What do you mean by motion in one, two and three dimensions ?

▶ **Watch Video Solution**

12. What do you mean by motion in one, two and three dimensions ?

▶ **Watch Video Solution**

13. State in the following cases, whether the motion is one ,two (or) three dimensional .

A kite flying on a windy day .

▶ **Watch Video Solution**

14. State in the following cases, whether the motion is one ,two (or) three dimensional .

A speeding bike on a highway

▶ **Watch Video Solution**

15. State in the following cases, whether the motion is one ,two (or) three dimensional .

A carom coin rebounding from the side of the board .

▶ **Watch Video Solution**

16. State in the following cases, whether the motion is one ,two (or) three dimensional .

A planet revolving around its star .

▶ **Watch Video Solution**

17. Define and illustrate the following terms.

Equal vectors.

18. What is meant by Collinear vector ? Explain them .

19. Define and illustrate the following terms.

Parallel vectors,

20. Define and illustrate the following terms.

Anti-parallel vectors,

21. Define unit vector .

Watch Video Solution

22. Define Orthogonal unit vectors.

Watch Video Solution

23. Does a scalar quantity depend upon the frame of reference chosen .

Watch Video Solution

24. When the sum to two vectors is maximum?

25. using components methods, add the following vectors

$$\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$$

$$\vec{B} = B_x\hat{i} + B_y\hat{j} + B_z\hat{k} \, .$$

▶ **Watch Video Solution**

26. Unsing components method, sbtract the following vectors

.

$$\overline{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$$

$$\overline{B} = B_x\hat{i} + B_y\hat{j} + B_z\hat{k}$$

▶ **Watch Video Solution**

27. What do you mean by multiplication of a vector by a real number ?

28. Define position vector.

29. Calculate the displacement vector it

$$\vec{r}_1 = x_1\hat{i} + y_1\hat{j} + z_1\hat{k}, \ \vec{r}_2 = x_2\hat{i} + y_2\hat{j} + z_2\hat{k}$$

30. What is Calculus ? What are the types of Calculus ?

▶ **Watch Video Solution**

31. Write the relation between summation and integration.

▶ **View Text Solution**

32. Define velocity and speed.

▶ **Watch Video Solution**

33. What is the nature of velocity - time graph for uniform motion ?

34. Define momentum ? Give its unit .

▶ **Watch Video Solution**

35. Explain the physical significance of momentum with example .

▶ **Watch Video Solution**

36. When does a cyclist appear to be stationaly with respect to another moving cyclist ?

▶ **Watch Video Solution**

37. Define relative velocity.

  ▶ **Watch Video Solution**

38. Can a particle in one dimensional motion have zero speed

and a non-zero velocity

  ▶ **Watch Video Solution**

39. Define Average acceleration .

  ▶ **Watch Video Solution**

40. Is it possible for a body to be accelerated without

speeding up or slowing down ?

41. What is free fall of a body ?

42. Define projectile motion .

43. What is meant by trajectory .

44. What are the two types of projectile motion ?

▶ **Watch Video Solution**

45. Can we use the equations of kinematics to find the height

attained by a body projected upward with any velocity .

▶ **Watch Video Solution**

46. Define time of flight.

▶ **Watch Video Solution**

47. Define horizontal range.

48. Calculate the maximum horizontal range attained by the particle in the case of oblique projection.

49. Define a radian.

50. What is degree ? Express 1 radian in degree.

51. Define angular acceleration.

> ▶ **Watch Video Solution**

52. What is uniform motion ?

> ▶ **Watch Video Solution**

53. What is non uniform circular motion?

> ▶ **Watch Video Solution**

54. Derive the expression for centripetal acceleration.

> ▶ **Watch Video Solution**

55. What furnishes the centripetal acceleration for the earth to go round the sun ?

▶ **Watch Video Solution**

56. What is the angular velocity of the hour hand of a clock ?

▶ **Watch Video Solution**

57. What is Kinematics?

▶ **Watch Video Solution**

58. show that 'Rest' and 'Motion' are relative term.

59. What is meant by Frame of reference?

60. Draw the diangram for Right handed co-ordinate system and explain the same .

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  ▶ Watch Video Solution

63. With suitable example, explain circular motion.

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> ▶ **Watch Video Solution**

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> ▶ **Watch Video Solution**

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 ▶ Watch Video Solution

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104. Calculate the maximum horizontal range attained by the particle in the case of oblique projection.

  ▶ View Text Solution

105. Define unit radian.

  ▶ View Text Solution

106. Define degree.

  ▶ View Text Solution

107. Define angular acceleration.

108. Define uniform motion.

  ▶ View Text Solution

109. What is non uniform circular motion?

  ▶ Watch Video Solution

110. What is centripetal acceleration or radial acceleration or normal acceleration ?

  ▶ Watch Video Solution

111. What furnishes the centripetal acceleration for the earth to go round the sun ?

▶ **Watch Video Solution**

112. What is the angular velocity of the hour hand of a clock ?

▶ **Watch Video Solution**

Other Important Questions Answers Iii Short Answer Questions

1. Write note on function with example.

▶ **Watch Video Solution**

2. Distinguish between average velocity and average speed .

▶ **Watch Video Solution**

3. A man moving in rain holds his umbrella inclined to the vertical even though the rain drops are falling vertically downwards. Why?

▶ **Watch Video Solution**

4. Distinguish between uniformly accelerated and non-uniformly accelerated motion.

▶ **Watch Video Solution**

5. What are the assumptions made in the projectile motion ?

▶ **Watch Video Solution**

6. Deduce the relation between angualr acceleration and linear acceleration.

▶ **Watch Video Solution**

7. Distinguish between kinetic equation for linear and angular motion .

▶ **Watch Video Solution**

8. Can the direction of velocity of an object change, when acceleration is constant ?

> ▶ **Watch Video Solution**

9. Is it possible that the brakes of a car are so parfect that car stops instantaneously . If not give reason.

> ▶ **Watch Video Solution**

10. A ball is thrown in a parabolic path. Is there any point at which the acceleration is perpendicular to the velocity .

> ▶ **Watch Video Solution**

11. Why does the direction of motion of a projectile become horizontal at the hightest point of its trajectory ?

▶ **Watch Video Solution**

12. During the motion of a projectile , the speed of the projectile is minimum at the top of its path. Is this statement true ? Give reason .

▶ **Watch Video Solution**

13. A ball is thrown straight up . What is its velocity and acceleration at the top ?

▶ **Watch Video Solution**

14. Write note on function with example.

> ▶ **Watch Video Solution**

15. Distinguish between average velocity and average speed .

> ▶ **Watch Video Solution**

16. What is a coplanar vector ? Give an example.

> ▶ **Watch Video Solution**

17. Distinguish between uniformly accelerated and non-uniformly accelerated motion.

> ▶ **Watch Video Solution**

18. What do you mean by rectilinear motion ? Give examples.

 ▶ **Watch Video Solution**

19. What do you mean by relative motion ? Give an example.

 ▶ **Watch Video Solution**

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 ▶ **Watch Video Solution**

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> ▶ **Watch Video Solution**

24. Why does the direction of motion of a projectile become horizontal at the hightest point of its trajectory ?

25. What do you mean by translatory motion ? Give an example.

26. The coordinates of a particle moving in a plane are given by x(t) = acos(pt) and y(t) = bsin(pt) where a,b(< a) and p are positive constants of appropriate dimensions.Then

A. the path of the particle is an ellipse

B. The velocity and acceleration of the particle are normal

to each other at $t = \dfrac{\pi}{2p}$

C. The acceleration of the particle is always directed

towards a focus

D. The distance travelled by the particle in a time interval t

= 0 to $t = \dfrac{\pi}{2p}$

Answer: (A,B,C)

▶ **Watch Video Solution**

Other Important Questions Answers Iv Long Answer Questions

1. Define and illustrate the following terms.

Equal vectors.

2. Define and illustrate the following terms.

Parallel vectors,

3. Define and illustrate the following terms.

Anti-parallel vectors,

4. Define unit vector .

5. Two bodies A and B are moving with velocities $\vec{V}_A$ and $\vec{V}_B$ making an 'θ' with each other. Determine the relative velocity of A with respect to B. What will be the relative velocity .

When two bodies are moving in the same direction.

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6. Two bodies A and B are moving with velocities $\vec{V}_A$ and $\vec{V}_B$ making an 'θ' with each other. Determine the relative velocity of A with respect to B. What will be the relative velocity .

When two bodies are moving in the apposite direction.

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7. Two bodies A and B are moving with velocities $\vec{V}_A$ and $\vec{V}_B$ making an $'\theta'$ with each other. Determine the relative velocity of A with respect to B. What will be the relative velocity .

When two bodies are moving at right angle to each other .

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8. What is meant by subtraction of vectors?

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9. Explain the resolution of vectors in three dimensional co-ordinates .

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10. Explain how a vector can be resolved into its rectangular components components in two dimension .

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11. Write note on integration.

▶ **Watch Video Solution**

12. A projectile is fired horizontally with a velocity u. obtain the expression for resultant velocity of the projectile at any instant .

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13. A projectile is fired horizontally with a velocity u . Show that its trajectory is a parabola. Also obtain the expression for Time of flight .

▶ **Watch Video Solution**

14. A projectile is fired horizontally with a velocity u . Show that its trajectory is a parabola. Also obtain the expression for

.

Horizontal range .

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15. A projectile is fired horizontally with a velocityu . Obtain the expression for speed of theparticle when it hits the

ground .

16. A projectile is fired horizontally with a velocity u making an

angle θ . Derive the expression for time of the flight .

17. The relation between linear velocity and angular velocity of

a body moving in a circle is

18. Define and illustrate the following terms.

Equal vectors.

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19. Define and illustrate the following terms.

Parallel vectors,

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20. Define and illustrate the following terms.

Anti-parallel vectors,

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21. Define unit vector .

22. What do you mean by uniform velocity and variable velocity ?

23. Illustrate the velocity-time graph under different conditions.

24. Illustrate the acceleration-time graph under different conditions.

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25. What do you mean by null vector ? Give it's examples.

▶ **Watch Video Solution**

26. Explain the resolution of vectors in three dimensional co-ordinates .

▶ **Watch Video Solution**

27. The stream of a river is flowing with a speed of 2 km/hr. A swimmer can swim at speed of 4 km/hr. What should be the direction of the swimmer with respect to the flow of the river to cross the river straight ?

A. 90°

B. 150°

C. 120°

D. 60°

Answer: C

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28. A particle is moving with a velocity, $\vec{v} = K\left(y\hat{i} + x\hat{j}\right)$, where K is a constant. The general equation for the path is:

    A. $y = x^2$ + constant

    B. $y = x$ + constant

    C. $y^2 = x^2$ + constant

    D. xy = constant

Answer: C

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29. A projectile is fired horizontally with a velocity u. obtain the expression for resultant velocity of the projectile at any instant .

30. A projectile is fired horizontally with a velocity u making an angle θ . Derive the expression for time of the flight .

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31. A projectile is fired horizontally with a velocity u making an angle θ . Derive the expression for time of the flight .

Watch Video Solution

32. A projectile is fired horizontally with a velocity u . Obtain the expression for speed of the particle when it hits the ground .

33. A projectile is fired horizontally with a velocity u making an angle θ . Derive the expression for time of the flight .

34. The relation between linear velocity and angular velocity of a body moving in a circle is

Other Important Questions Answers V Numerical Problems

1. A crow is sitting on a branch of tree whose co-ordinates are (1,2,3) . A hunter is standing on the ground . Represent the position of the crow with respect to the hunter .

2. A boy is running on a circular track of radius 50m. Calculate the displacement of the boy after completing 5 rounds of the track .

3. An animal is moving on circular path of radius 80m . Culculate the distance coered by the animal in one revolution .

4. A bus 150 m long is moving with a speedof 90 km/h . In what time shall it cross 850 m long bridge ?

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6. Find the distance travelled by the particle during the time t = 0 to t = 3 second from the figure .

7. If the speed of a particle is $v = 10t^2 m/s$ then find out distance covered from t = 2s to t = 5s .

8. The driver of a car travelling at 72 kmph observes the light 300 m ahead of him turning red. The traffic light is timed to

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The speed with which the motorist crosses the traffic light .

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10. A car starting from rest covers a distance of 100 m in 5 second . Assuming his acceleration is uniform .

Calculate its velocity at the end of 5 sec .

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12. A body falling freely descends 0.3m in 0.1 s and 0.398 m in the next 0.1 s in some other planet . Calculate the value of g in that planet ?

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(a) magnitude of an average velocity ,

(b) average speed of the man,over the interval of time .

0 to 50 min and

15. A man walks on a straight road from his home to a market 2.5 km away with speed of 5 $\dfrac{km}{hr}$. Finding the market closed, he instantly turns and walks back home with a speed of 7.5 $\dfrac{km}{hr}$. The average speed of the man over the interval of time 0 to 40 min is equal to

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▶ Watch Video Solution

19. The velocity of a particle is given by the equation, $v = 2t^2 + 5 cms^{-1}$. Find the average acceleration during the time interval between $t_1 = 2s$ and $t_2 = 4s$.

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20. The velocity of a particle is given by the equation, $v = 2t^2 + 5 cms^{-1}$. Find the instantaneous acceleration at $t_2 = 4s$

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time graph for the ball and find the maximum height attained

by the ball.

[Assume, $g = -10ms^{-2}$]

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▶ Watch Video Solution

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▶ Watch Video Solution

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32. Given $\vec{B} = 2\hat{i} + 2\hat{j}$. Find out magnitude and direction of $\vec{B}$

33. Show that the resultant of two vectors $\vec{A}$ and $\vec{B}$ always lies between A + B and

A - B

34. If the resultant of two equal forces is $\sqrt{3}$ times a single .

force, find the angle between the forces .

35. Find out unit vector of vector $\vec{A} = 3\hat{i} - 2\hat{j} + 4\hat{k}$

36. If $\vec{A} = 4\hat{i} - 3\hat{j}$ and $\vec{B} = 6\hat{i} + 8\hat{j}$ then obtain the scalar magnitude and directions from x-axis of $\vec{A}, \vec{B}, \vec{A} + \vec{B}$ and $\vec{A} - \vec{B}$.

37. Two vectors $\vec{A} = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{B} = \hat{i} + 3\hat{j} + 6\hat{k}$ find .

their dot products,

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angle between them .

39. Under what condition the sum and difference of two vectors will be equal in magnitude ?

40. There are two displacement vectors , one of magnitude 3m and other of 4m . How should the two vecotrs be added so that the resultant vector be

7 m ,

41. There are two displacement vectors , one of magnitude 3m

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moving horizontally with a speed of 500 kmh^{-1}. By how much distance will the bomb miss the target ?

46. Represent the following vectors graphically :

$$\vec{A} = 3\hat{i} + 4\hat{j}, \vec{B} = 2\hat{i} - 3\hat{j} : \vec{C} = -5\hat{i} - 4\hat{j} : \vec{D} = -4\hat{i} + 3\hat{j}$$

47. If $\vec{A} = 3\hat{i} + 4\hat{j}$ and $\vec{B} = 7\hat{i} + 24\hat{j}$, then find a vector having the same magnitudes as $\vec{B}$ and parallel to $\vec{A}$.

48. Prove that the vectors $\overrightarrow{A} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\overrightarrow{B} = 2\hat{i} - \hat{j}$ are perpendicular to each other .

49. Find a vector whose length is 7 and that is perpendicular to each of the vectors

$\overrightarrow{A} = 2\hat{i} - 3\hat{j} + 6\hat{k}$ and $\overrightarrow{B} = \hat{i} + \hat{j} - \hat{k}$

50. Find the resultant force of the following forces which act upon a particle . (a) 30 N due east , (b) 20 N due north , (c) 50

N due west , (d) 40 N due south .

$\vec{F}_2 = 20\hat{j}$

$\vec{F}_3 = -50\hat{i}$

$\vec{F}_1 = 30\hat{i}$

W———→———E

$\vec{F}$

$\vec{F}_4 = -40\hat{j}$

S

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51. A bus travels 6 km towards north at an angle of $45°$ to the

east and then travels 4 km towards north at an angle of $135°$

to the east . How for is its final position , due east and due

north ? How far is the point from the starting point ? What

angle does the straight line joining its initial and final position makes with the east ?

52. When the angle of elevation of a gun are $60°$ and $30°$ respectively . The heights it shoots are h_2 and h_2 respectively . Find the ration h_2/h_2 .

53. A projectile has a range of 50 m and reaches a maximum height of 10m . Calculate the angle at which the projectile is fired .

54. Prove that for a given velocity of projection, the horizontal range is same for two angles of projection α and $(90° - \alpha)$.

55. A projectile is thrown with a speed of $98 ms^{-1}$ in a direction $30°$ above the horizontal . Find the time of flight , range and height to which it rises .

56. The pilot of an aeroplane flying horizontally at a height of 2000m with a constant speed of 540 kmph wishes to hit a target on the ground . At what distance from the target should release the bomb to hit the target ?

57. A body is projected upwards with a velocity of $30 ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the time of flight

58. A body is projected upwards with a velocity of $30 ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the range of the body and

59. A body is projected upwards with a velocity of $30ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the maximu height attained by the dody .

60. On a certain day, rain was falling vertically with a speed of $35ms^{-1}$. A wind started blowing after sometime with a speed of $12ms^{-1}$ in east to west direction . In which direction should boy waiting at a bus stop hold his umbrella ?

61. Which is greater the angular velocity of hour hand of a watch or angular velocity of earth around its own axis ?

Calculate their ratio ?

62. A body of mass 10 mg revolves in a circle of diameter 0.40m . making 100 revolutions per minute . Calculate its linear velocity and centripetal acceleration.

63. A particle moves in a circle of radius 4. 0 cm clockwise at constant speed of $2 cms^{-1}$, If $\widehat{x}$ and $\hat{y}$ are unit acceleration vectors along x-axis and y-axis respectively (in cms^{-2}) , find the acceleration of the particle at the instant half way between P and Q .

64. Calculate the angular velocity in rad/sec. of a fly wheel making 300 rpm .

65. Calculate linear velocity of a body which moves in a circular path of radius 10m with an angular velocity 2π radians/sec .

66. A fly wheel of an engine starting from rest attainsan an angular velocity of $100 rads^{-1}$ in 10 s . Calculate

angular acceleration

> ▶ **Watch Video Solution**

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67. A fly wheel of an engine starting from rest attainsan an angular velocity of $100 rads^{-1}$ in 10 s . Calculate angular displacement in 10 s

> ▶ **Watch Video Solution**

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68. A ball whose Kinetic Energy is E is projected at an angle of $45°$ to the horizontal. The kinetic energy of the ball at the highest point of its flight will be

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69. A body moves along a circle of radius $\dfrac{20}{\pi}$ m with constant

tangential acceleration . If the velocity of the body is 80 m/s

at the end of the second revolution after motion has begun .

Then calculate the tangential acceleration .

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70. Is pressure a vector ? Give reason .

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71. Can we add a velocity vector to a displacement vector ?

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72. What is the maximum number of components into which a vector can be resolved ?

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73. Can a body have zero velocity and still be accelerating ?

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74. Can an object have an eastward velocity while experiencing a westward acceleration ?

Watch Video Solution

75. Is the direction of acceleration same as the direction of velocity ?

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76. Can the relative velocities of two bodies be greater than the absolute velocity of either body?

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77. When an observer is standing on earth, the trees and houses appear stationary to him . However , when he is sitting in a moving train, all these objects appear to move in backward direction. Why ?

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78. Can the position-time graph have a negative slope?

  ▶ **Watch Video Solution**

79. What is the nature of the displacement-time graph of a body moving with constant velocity ?

  ▶ **Watch Video Solution**

80. Is it possible that your cycle has a northward velocity but southward acceleration ? If yes, how ?

  ▶ **Watch Video Solution**

81. Is the time variation of position, shown in the adjacent figure observed in nature ?

> ▶ **Watch Video Solution**

82. Why does a tennis ball bounce higher on hills than in plains ?

> ▶ **Watch Video Solution**

83. The magnitude and direction of the acceleration of a body are constant. Will the path of the body necessarily be a straight line ?

> ▶ **Watch Video Solution**

84. A crow is sitting on a branch of tree whose co-ordinates are (1,2,3) . A hunter is standing on the ground . Represent the position of the crow with respect to the hunter .

▶ **Watch Video Solution**

85. A boy is running on a circular track of radius 50m. Calculate the displacement of the boy after completing 5 rounds of the track .

▶ **Watch Video Solution**

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remain red for 20 s before it turns green . If the motorist

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The required uniform acceleration of the car

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▶ **View Text Solution**

93. A car starting from rest covers a distance of 100 m in 5

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Calculate its velocity at the end of 5 sec .

▶ **Watch Video Solution**

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How much distance would he cover in the last second ?

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(a) magnitude of an average velocity ,

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A. 5 $\frac{km}{hr}$

B. $\frac{25}{4}$ $\frac{km}{hr}$

C. $\frac{30}{4}$ $\frac{km}{hr}$

D. $\frac{45}{8}$ $\frac{km}{hr}$

Answer: D

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98. What is meant by magnitude of Average velocity ?

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99. A car is moving along a straight line (OP). It moves from O→P in 18 seconds amd retuns from P→Q in 6 seconds, where OP = 360 m and OQ = 240 m. What is the average velocity and average speed of the car going (a) from O→P and back to Q ?

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From O to P and back to Q ?

```
0  40  80 120 160 200 240 280 320 360 400 m
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──→ X
0   2   4   6   8  10  12  14  16  18  20s
O                      Q          P
```

101. The velocity of a particle is given by the equation, $v = 2t^2 + 5 cms^{-1}$. Find the change in velocity of the particle during the time interval between $t_1 = 2s$ and $t_2 = 4s$.

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102. The velocity of a particle is given by the equation, $v = 2t^2 + 5 cms^{-1}$. Find the average acceleration during the time interval between $t_1 = 2s$ and $t_2 = 4s$.

▶ Watch Video Solution

103. The velocity of a particle is given by the equation, $v = 2t^2 + 5 cms^{-1}$. Find the instantaneous acceleration at $t_2 = 4s$

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$\vec{a} + \vec{b}$

112.   Given $\vec{a} = 3\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + 3\hat{k}$

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▶ Watch Video Solution

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$\vec{F}_3 = -50\hat{i}$

$\vec{F}_1 = 30\hat{i}$

W———————————E

$\vec{F}$

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S

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134. A bus travels 6 km towards north at an angle of $45°$ to the east and then travels 4 km towards north at an angle of $135°$ to the east . How for is its final position , due east and due north ? How far is the point from the starting point ?

What angle does the straight line joining its initial and final position makes with the east ?

135. When the angle of elevation of a gun are $60°$ and $30°$ respectively . The heights it shoots are h_2 and h_2 respectively . Find the ration h_2/h_2 .

136. A projectile has a range of 50 m and reaches a maximum height of 10m . Calculate the angle at which the projectile is fired .

137. Prove that for a given velocity of projection, the horizontal range is same for two angles of projection α and $(90° - \alpha)$.

138. A projectile is thrown with a speed of $98ms^{-1}$ in a direction $30°$ above the horizontal . Find the time of flight , range and height to which it rises .

139. The pilot of an aeroplane flying horizontally at a height of 2000m with a constant speed of 540 kmph wishes to hit a

target on the ground . At what distance from the target should release the bomb to hit the target ?

140. A body is projected upwards with a velocity of $30ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the time of flight

141. A body is projected upwards with a velocity of $30ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the range of the body and

142. A body is projected upwards with a velocity of $30ms^{-1}$ at an angle of $30°$ with the horizontal . Determine .

the maximu height attained by the dody .

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143. On a certain day, rain was falling vertically with a speed of $35ms^{-1}$. A wind started blowing after sometime with a speed of $12ms^{-1}$ in east to west direction . In which direction should boy waiting at a bus stop hold his umbrella ?

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144. Which is greater the angular velocity of hour hand of a watch or angular velocity of earth around its own axis ?

Calculate their ratio ?

145. A body of mass 10 mg revolves in a circle of diameter 0.40m . making 100 revolutions per minute . Calculate its linear velocity and centripetal acceleration.

146. A particle moves in a circle of radius 4. 0 cm clockwise at constant speed of $2cms^{-1}$, If $\widehat{x}$ and $\hat{y}$ are unit acceleration vectors along x-axis and y-axis respectively (in cms^{-2}) , find the acceleration of the particle at the instant half way between P and Q .

147. Calculate the angular velocity in rad/sec. of a fly wheel making 300 rpm .

148. Calculate linear velocity of a body which moves in a circular path of radius 10m with an angular velocity 2π radians/sec .

149. A fly wheel of an engine starting from rest attainsan an angular velocity of $100 rads^{-1}$ in 10 s . Calculate

angular acceleration

150. A fly wheel of an engine starting from rest attainsan an angular velocity of $100 rads^{-1}$ in 10 s . Calculate angular displacement in 10 s

151. A cricket ball is hit at $45°$ to the horizontal with a kinetic energy E . Calculate the kinetic energy at the highest point.

152. A particle moves 2m east then 4m north then 5m west. The distance is

    A. 10m

    B. 11m

    C. -11m

    D. 5m

Answer: B

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153. Is pressure a vector ? Give reason .

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154. Can we add a velocity vector to a displacement vector ?

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155. What is the maximum number of components into which

a vector can be resolved ?

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156. Can a body have zero velocity and still be accelerating ?

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157. Can an object have an eastward velocity while experiencing a westward acceleration ?

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158. Is the direction of acceleration same as the direction of velocity ?

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159. Can the relative velocities of two bodies be greater than the absolute velocity of either body?

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160. When an observer is standing on earth, the trees and houses appear stationary to him . However , when he is sitting in a moving train, all these objects appear to move in backward direction. Why ?

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161. Can the position-time graph have a negative slope?

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162. What is the nature of the displacement-time graph of a body moving with constant velocity ?

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163. Is it possible that your cycle has a northward velocity but southward acceleration ? If yes, how ?

164. Is the time variation of position, shown in the adjacent figure observed in nature ?

165. Why does a tennis ball bounce higher on hills than in plains ?

166. The magnitude and direction of the acceleration of a body are constant. Will the path of the body necessarily be a straight line ?

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