JEE MAIN : CHAPTER WISE TEST-2

SUBJECT :- PHYSICS **DATE**.....

CLASS :- 11th **NAME**.....

CHAPTER :- BASIC MATHS & VECTOR **SECTION**.....

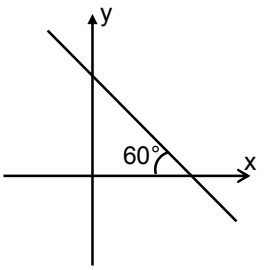
(SECTION A)

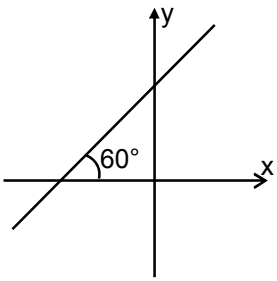
1. If the resultant of $\vec{A}$ and $\vec{B}$ make angle α with $\vec{A}$ and β with $\vec{B}$

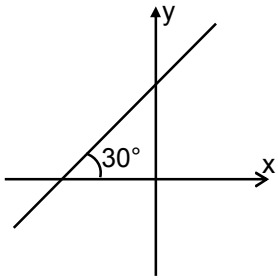
(A) $\alpha < \beta$ (B) $\alpha < \beta$ if A < B

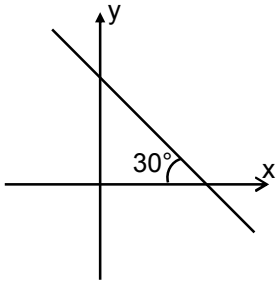
(C) $\alpha < \beta$ if A > B (D) $\alpha < \beta$ if A = B

2. The graph of straight line $y = \sqrt{3}x + 2\sqrt{3}$ is :

(A) 

(B) 

(C) 

(D) 

3. Convert 9° to radian :

(A) $\frac{\pi}{10}$ (B) $\frac{180}{\pi}$

(C) $\frac{\pi}{9}$ (D) $\frac{\pi}{20}$

4. Maximum value of $f(x) = \sqrt{3}\sin x + \cos x$ is :

(A) 2 (B) 1

(C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

5. A particle is moving with speed 12 m/s along the direction of $\vec{A} = 2\hat{i} + 2\hat{j} - \hat{k}$, find the velocity.

(A) $(8\hat{i} + 8\hat{j} - 4\hat{k})$ m/s

(B) $(4\hat{i} + 4\hat{j} - 2\hat{k})$ m/s

(C) $(4\hat{i} + 6\hat{j} - 2\hat{k})$ m/s

(D) $(4\hat{i} + 4\hat{j} - 6\hat{k})$ m/s

6. $\int_0^1 \frac{1}{6x+2}dx$ =

(A) $\frac{\ell n8}{9}$ (B) $\frac{\ell n4}{3}$

(C) $\frac{\ell n2}{2}$ (D) $\frac{\ell n8}{6}$

7. The value of $\sec\left(\frac{15\pi}{3}\right)$ is : -

(A) 1 (B) 2 (C) $\frac{1}{2}$ (D) –1

8. $\int \frac{dx}{(3x+5)}$ is

(A) $\ell n\,(3x+5)^{1/3} + C$ (B) $\frac{-3}{(3x+5)^2} + C$

(C) $\ell n\,(3x+5)^3 + C$ (D) $\ell n\,(3x+5) + C$

Paragraph for Question Nos. 9 to 10

There are two vectors $\vec{A}$ & $\vec{B}$. the x and y components of vector $\vec{A}$ are 4 m and 6 m respectively. The x, y components of vector $\vec{A} + \vec{B}$ are 10 m and 9 m respectively. Find :

9. The magnitude of $\vec{B}$.

(A) 45 (B) 60 (C) 75 (D) 50

10. Angle between $\vec{B}$ and X-axis.

(A) $\tan^{-1}\frac{1}{3}$ (B) $\tan^{-1}\frac{1}{2}$

(C) $\tan^{-1}\frac{1}{4}$ (D) $\tan^{-1}\frac{1}{\sqrt{2}}$

11. Match the statements given in column-I with statements given in column - II

Column - I

(a) if $|\vec{A}| = |\vec{B}|$ and $|\vec{A} + \vec{B}| = |\vec{A}|$ then angle between $\vec{A}$ and $\vec{B}$ is

(b) Magnitude of resultant of two forces $|\vec{F}_1| = 8N$ and $|\vec{F}_2| = 4$ N may be

(c) Angle between $\vec{A} = 2\hat{i}+2\hat{j}$ & $\vec{B} = 3\hat{k}$ is

(d) Magnitude of resultant of vectors $\vec{A} = 2\hat{i}+\hat{j}$ & $\vec{B} = 3\hat{k}$ is

Column - II

(p) 90°
(q) 120°
(r) 12 N
(s) $\sqrt{14}$

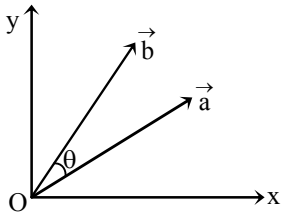
(A) (a) $\rightarrow$ s, (b) $\rightarrow$ r, (c) $\rightarrow$ q, (d) $\rightarrow$ p
(B) (a) $\rightarrow$ q, (b) $\rightarrow$ r, (c) $\rightarrow$ p, (d) $\rightarrow$ s
(C) (a) $\rightarrow$ p, (b) $\rightarrow$ r, (c) $\rightarrow$ s, (d) $\rightarrow$ q
(D) (a) $\rightarrow$ p, (b) $\rightarrow$ q, (c) $\rightarrow$ r, (d) $\rightarrow$ s

12. **Statement-1 :** A vector is a quantity that has both magnitude and direction and obeys the triangle law of addition.
Statement-2 : The magnitude of the resultant vector of two given vectors can never be less than the magnitude of any of the given vector.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

13. A particle moves in the xy plane and at time t is at the point whose coordinates are (t^2, $t^3 - 2t$). Then at what instant of time will its velocity and acceleration vectors be perpendicular to each other?

(A) 1/3sec (B) 2/3 sec
(C) 3/2 sec (D) never

14. For the vectors $\vec{a}$ and $\vec{b}$ shown in figure, $\vec{a} = \sqrt{3}\,\hat{i} + \hat{j}$ and $|\vec{b}| = 10$ units while $\theta = 23^\circ$, then the value of $R = |\vec{a} + \vec{b}|$ is nearly –



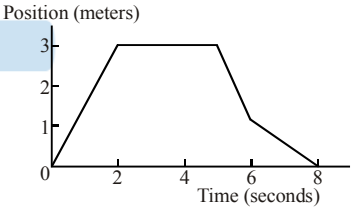
(A) 12 (B) 13 (C) 14 (D) 15

15. The approximate value of x where x = sin 2° cos 2°, is :

(A) $\frac{\pi}{90}$ (B) 2

(C) 1 (D) $\frac{\pi}{45}$

16. An object is moving in a straight line. Its position versus time graph is shown below. The detector is at the origin (0 meters). Between t = 6 and t = 8 seconds, which statement describes the motion shown in the graph.



(A) Motion away from detector with constant velocity
(B) Motion towards detector with constant velocity
(C) Motion towards detector with decreasing velocity
(D) Motion away from detector with increasing velocity

17. Two vectors $\vec{a}$ and $\vec{b}$ lie in one plane. Vector $\vec{c}$ lies in different plane, then $\vec{a} + \vec{b} + \vec{c}$

(A) may be zero
(B) must be zero
(C) must not be zero
(D) All of above are possible

18. A vector $\vec{A}$ is directed along 30° west of north direction and another vector $\vec{B}$ along 15° south of east. Their resultant cannot be in _____ direction.

(A) North (B) East

(C) North-East (D) South

19. A particle is moving under the influence of force $\vec{F} = [\hat{i} - 2\hat{j}]$ N, is now moved from the point (x, y, z) = (2, 1, 3) m to the point (x, y, z) = (3, 2, 4) m. How much work is done by the force $\vec{F}$ during this time period? (W = $\vec{F}.\vec{s}$)

(A) 0 J (B) –1 J

(C) 1 J (D) None of these

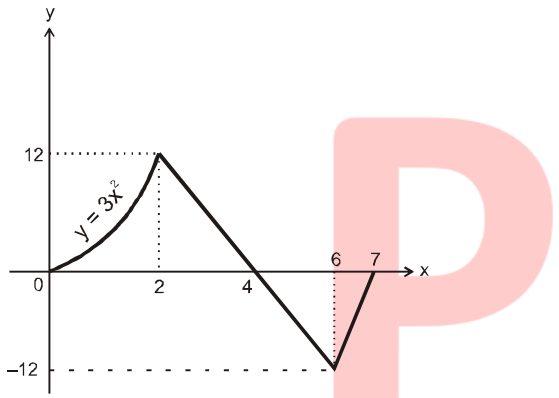
20. A boat is moving in direction of vector $-4\hat{i} + 3\hat{j}$ with a speed of 10 m/s. Velocity vector of boat can be expressed as :

(A) $-8\hat{i} + 6\hat{j}$ (B) $-40\hat{i} + 30\hat{j}$

(C) $-\frac{4}{5}\hat{i} + \frac{3}{5}\hat{j}$ (D) $-6\hat{i} + 8\hat{j}$

(SECTION B)

21. The graph is shown in the figure. The value of area 'a', subtended on x-axis between x = 0 to x = 6 is, find '2a'.



22. If $f(x) = \frac{x-1}{x+1}$ then find $f\left\{f\left(-\frac{1}{10}\right)\right\}$.

23. If f(x) = 24 $\sin^2 x$, then the value of the derivative of the function f(x) at $x = \frac{\pi}{12}$ is :

24. If two positive numbers x & y are such that x + 2y = 60 then maximum value of xy is 25n, find n :

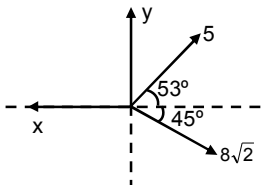
25. The value of :

$$24 \times \left[\int_0^{\pi/4} \cos^2 x\, dx - \int_0^{\pi/4} \sin^2 y\, dy\right] \text{ is}$$

26. Find the area of parallelogram whose diagonals are represented by $\left(3\hat{i} + \hat{j} + \hat{k}\right)$ and $\left(\hat{i} - \hat{j} - \hat{k}\right)$. Find your Answer in form of $\frac{x\sqrt{2}}{5}$ square unit and fill value of x in OMR sheet.

27. Volume of a right circular cone varies as square of the radius of the base when height is constant and the height when base is constant. If radius of the base is 7 cm and height is 15 cm then the volume is 770 cm^3. Find the height of a cone whose volume is 132 cm^3 and base radius is 3 cm.

28. Find the sum of magnitude of the unknown forces X and Y if sum of all forces is zero.



29. If the value of $\int_0^{\pi/2} 3\sin(2x)dx$ is N then, find the value of 5N is.

30. The x-component of a certain vector is 2 units and y-component is + $2\sqrt{3}$ units. If the magnitude of the vector is N then, value of 4N is.