PHYSICS

BOOKS - BITSAT GUIDE PHYSICS (HINGLISH)

SCALARS AND VECTORS

Others

1. In insect moves on a circular path of radius $7m$. Find the maximum magnitude of displacement of the insect

A. $7m$

B. $14\pi m$

C. $7\pi m$

D. $14m$

Answer:

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2. Two forces of magnitudes $3N$ and $4N$ are acted on a body. The ratio of magnitude of minimum and maximum resultant force on the body is

A. $3/4$

B. $4/3$

C. $1/7$

D. none of these

Answer:

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3. A vector a makes $30°$ and b makes $120°$ angle

with the x-axis. The magnitude of these vectors

are 3 unit and 4 unit, respectively. The magnitude of resultant vector is

A. 3 unit

B. 4 unit

C. 5 unit

D. 1 unit

Answer:

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4. If two forces of equal magnitude 4 units acting at a point and the angle between them is $120°$, then find the magnitude of direction of the sum of the two vectors

A. $4, \theta = \tan^{-10(1.73)}$

B. $4, \theta = \tan^{-1}(0.73)$

C. $2, \theta = \tan^{-1}(1.73)$

D. $6, \theta^{-1}(0.73)$

Answer:

5. If $\dfrac{|a + b|}{|a - b|} = 1$, then the angle between a and b

is

A. 0°

B. 45°

C. 90°

D. 60°

Answer:

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6. The angle between A the resultant of $(A + B)$ and $(A - B)$ will be

A. $0°$

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

C. $\tan^{-1}\left(\dfrac{B}{A}\right)$

D. $\tan^{-1}\left(\dfrac{A - B}{A + B}\right)$

Answer:

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**7.** Three forces are acted on a body. Their magnitudes are $3N$, $4N$ and $5N$. Then,

   A. the acceleration of body must be zero

   B. the acceleration of body may be zero

   C. the acceleration of the body must not be

   zero

   D. none of the above

Answer:

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8. In the given figure O is the centre of regular pentagon $ABCDE$. Five forces each of magnitude F_0 are acted as shown in figure. The resultant force is
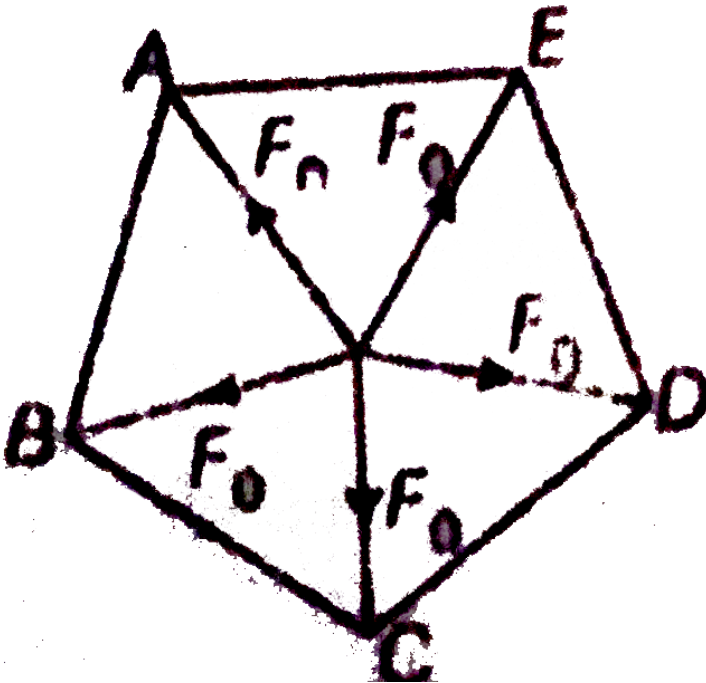
A. $5F_0$

B. $5F_0\cos 72°$

C. $5F_0\sin 72°$

D. zero

Answer:

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9. $ABCD$ is a parallelogram, and a, b, c and d are the position vector of vertices A, B, C and D of a parallelogram choose the correct option.

A. $c + b = d - a$

B. $c - b = d - a$

C. $c - c = d - a$

D. None of these

Answer:

10. A man walks $4km$ due West, $500m$ due south finally $7580m$ in South-West direction. Find the distance and magnitude of displacement travelled by the man.

A. $4646.016m$ and $5250m$

B. $5250m$ and $4646.016m$

C. $4550.016m$ and $2300m$

D. None of these

Answer:

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11. A particle is being acted upon by four forces of $30N$ due east , $20N$ due north , $50N$ due west and $40N$ due south. The resultant force will be

A. $20\sqrt{2}N$, $60°$ South to West

B. $20\sqrt{2}N$, $45°$, South of West

C. $20\sqrt{2}N$, $45°$, South of East

D. $20\sqrt{2}$, $45°$, South of East

Answer:

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12. A block of $150kg$ is placed on an inclined plane withh an angle of $60°$. Calculate of the weight

parallel to the inclined plane.

A. 1300N

B. 1400N

C. 1100N

D. 750N

Answer:

13. A cat is situated at a point $A(0, 3, 4)$ and rat is situated at point $B(5, 0, -8)$. The car is free to move but the rat is always at rest. Find the minimum distance travelled by cat to catch the rat.

A. 5 unit

B. 12 unit

C. 13 unit

D. 17 unit

Answer:

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14. An insect fly start from one corner of a cubical room and reaches at diagonally opposite corner. The magnitude or displacement of the insect is $40\sqrt{3}$ ft. Find the volume of cube.

A. $64\sqrt{3}ft^3$

B. $1600ft^3$

C. $64000\,ft^3$

D. None of these

Answer:

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15. If a particle is moving on an parallel path given by $r = b\cos\omega t\,\hat{i} + a\sin\omega t\,\hat{j}$, then find its radial acceleration along r

A. ωr

B. $\omega^2 r$

C. $-\omega^2 r$

D. none of these

Answer:

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16. Obtain the magnitude and direction cosines of vector $(A - B)$, if

$A = 2\hat{i} + 3\hat{j} + \hat{k}, B = 2\hat{i} + 2\hat{j} + 3\hat{k}$

A. $0, \dfrac{1}{\sqrt{5}}, \dfrac{-2}{\sqrt{5}}$

B. $0, \dfrac{2}{\sqrt{5}}, \dfrac{1}{\sqrt{5}}$

C. $0, 0, \dfrac{1}{\sqrt{5}}$

D. none of these

Answer:

17. The vertices of a quadrilateral are $A(1, 2, -1), B(-4, 2, -2), C(4, 1, -5)$ and $D(2, -1, 3)$. Forces of magnitude $2, 3, 2N$ are acting at point A along the lines AB, AC, AD respectively.Find their resultant.

A. $\dfrac{10\hat{i} - 9\hat{j} + 6\hat{k}}{\sqrt{26}}$

B. $\left(\dfrac{\hat{i} - 9\hat{j} - 6\hat{k}}{\sqrt{26}}\right)$

C. $\dfrac{\hat{i} - 9\hat{j} + 16\hat{k}}{\sqrt{26}}$

D. $\dfrac{\hat{i} - 19\hat{j} + 6\widehat{K}}{\sqrt{26}}$

Answer:

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18. A force $F = a\hat{i} + b\hat{j} + c\hat{k}$ is acted upon a body of mass m. If the body starts from rest and

was at athe origin initially, find its new coordinate

after time t.

A. $\dfrac{at^2}{2m}, \dfrac{bt^2}{2m}, \dfrac{ct^2}{2m}$

B. $\dfrac{at^2}{2m}, \dfrac{2bt^2}{m}, \dfrac{ct^2}{2m}$

C. $\dfrac{at^2}{m}, \dfrac{bt^2}{m}, \dfrac{ct^2}{2m}$

D. none of these

Answer:

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19. The angle between vector $a = 2\hat{i} + \hat{j} - 2\hat{k}$ and $b = 3\hat{i} - 4\hat{j}$ is equal to

A. $\cos^{-1}\left(\dfrac{3}{15}\right)$

B. $\cos^{-1}\left(\dfrac{1}{15}\right)$

C. zero

D. $\cos^{-1}\dfrac{2}{15}$

Answer:

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20. If $c = a \times b$, then

   A. the direction of c changes, when the angle between $a \times b$ increases up to $\theta(\theta < 180°)$

   B. the diection of c changes when the angle between a and b decreases up to $\theta(\theta > 0°)$

   C. the direction of c does not changes, when the angle between a and b increases

   D. none of the above

Answer:

21. The unit vector perpendicular to vectors $a = 3\hat{i} + \hat{j}$ and $= 2\hat{i} - \hat{j} - 5\hat{k}$ is

A. $\pm \dfrac{\left(\hat{i} - 3\hat{j} + \hat{k}\right)}{\sqrt{11}}$

B. $\pm \dfrac{3\hat{i} + \hat{j}}{\sqrt{11}}$

C. $\pm \dfrac{\left(2\hat{i} - \hat{j} - 5\hat{k}\right)}{\sqrt{30}}$

D. none of these

Answer:

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22. If three vectors along coordinate axes represent the adjacent sides of a cubie of length b , then the unit vector along its diagonal passing through the origin will be

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

B. $\dfrac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3b}}$

C. $\hat{i} + \hat{j} + \hat{k}$

D. $\dfrac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

Answer:

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23. Choose the correct option $A \times B = C$

(i) C is perpendicular to A

(ii) C is perpendicular to B

(iii) C is perpendicular to $(A + B)$

(iv) C is perpendicular to $(A \times B)$

A. Only (i) and (ii) are correct

B. Only (ii) and (iv) are correct

C. (i),(ii) and (iii) are correct

D. All of the above

Answer:

24. Find the vector area of a triangle whose vertices are $a, b,$ and c

A. $\dfrac{1}{2}(b \times c + c \times a + a \times b)$

B. $\dfrac{1}{3}(b \times c + c \times a + a \times b)$

C. $\dfrac{1}{3}(b \times c + a \times c + b \times a)$

D. None of these

Answer:

25. If three vectors $xa - 2b + 3c, \ -2a + yb - 4c$ and $-zb + 3c$ are coplanar, where a, b and c are unit (or any) vectors then

A. $xy + 3zx - 3z = 4$

B. $2xy - 3zx - 3z - 4 = 0$

C. $4xy - 3zx - 3z = 4$

D. $xy - 2zx - 3z - 4 = 0$

Answer:

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26. A force $F = \left(2\hat{i} + 3\hat{j} - \hat{k}\right)N$ is acting on a body at a position $r = \left(6\hat{i} - 3\hat{j} - 2\hat{k}\right)$. Calculate the torque about the origin

A. $\left(3\hat{i} + 2\hat{j} + 12\hat{k}\right)Nm$

B. $\left(9\hat{i} + 2\hat{j} + 7\hat{k}\right)Nm$

C. $\left(\hat{i} + 2\hat{j} + 12\hat{k}\right)Nm$

D. $\left(3\hat{i} + 12\hat{j} + \hat{k}\right)Nm$

Answer:

27. Find the values of x and y for which vectors $A = \left(6\hat{i} + x\hat{j} - 2\hat{k}\right)$ and $B\left(5\hat{i} - 6\hat{j} - y\hat{k}\right)$ are be parallel

A. $x \equiv 0, y = \dfrac{2}{3}$

B. $x = -\dfrac{36}{5}, y = \dfrac{5}{3}$

C. $x = -\dfrac{15}{3}, y = \dfrac{23}{5}$

D. $x = \dfrac{36}{5}, y = \dfrac{15}{4}$

Answer:

28. Find the area oif the parallelogram determined

$A = 2\hat{i} + \hat{j} - 3\hat{k}$ and $B = 12\hat{j} - 2\hat{k}$

A. 42

B. 56

C. 38

D. 74

Answer:

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29. Choose the correct option

A.

$$a \times (b \times c) + b \times (c \times a) + c \times (a \times b) = 0$$

B.

$$a \times (c \times b) + b \times (c \times a) + c \times (a \times b) = 0$$

C.

$$a \times (c \times b) + b \times (c \times a) - c \times (a \times) = 0$$

D. none of the above

Answer:

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30. The three conterminous edges of parallelopiped are

$$a = 2\hat{i} - 6\hat{j} + 3\hat{k}, b = 5\hat{j}, c = -2\hat{i} + \hat{k}$$

Calculate the volumeof parallelopiped

A. 36 cubic units

B. 45 cubic units

C. 40 cubic units

D. 54 cubic units

Answer:

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31. If the three vectors are coplanar, then find x.

$$A = \hat{i} - 2\hat{j} + 3\hat{k}, \, B = x\hat{j} + 3\hat{k}, \, C = 7\hat{i} + 3\hat{j} - 11\hat{k}$$

A. $36/21$

B. $-51/32$

C. $51/32$

D. $-36/21$

Answer:

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32. A particle is moving along a circular path with a constant speed $30m/s$. What is change in velociyt of a particle, when it describe and angle of $90°$ at the centre of the circle

A. zero

B. $30\sqrt{2}m/s$

C. $60\sqrt{2}m/s$

D. $30\sqrt{2}m/s$

Answer:

33. One day in still air, a motor-cyclist riding norht at $30m/s$, suddenly the wind starts blowing Westward with a velocity $50m/s$, then calculate the apparent velocity with which the motor-cylist will move

A. $58.3m/s$

B. $65.4m/s$

C. $73.2m/s$

D. $53.8m/s$

Answer:

34. Calculate the distance travelled by the car, if a car travels $4km$ towards north at an angle of $45°$ to the east and then travels a distance of $2km$ towards north at an angle of $135°$ to the est.

A. $6km$

B. $8km$

C. $5km$

D. $2km$

Answer:

35. One one rainy day a car starts moving with a constant acceleration of $1.2m/s^2$. If a toy monkey is suspended from the ceilling of the car by a string, then find the angle with the vertical with the string be now inclined.

A. $\tan^{-1} 0.25$

B. $\tan^{-1}(0.63)$

C. $\tan^{-1}(0.12)$

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

Answer:

36. If A and B denote the sides of a parallelogram and its area is $\frac{1}{2}AB$ (A and B are magnitude of A and B respectively), the angle between A and B is

A. $30°$

B. $45°$

C. $60°$

D. $90°$

Answer:

37. A vector $\overrightarrow{F}_1$ is along the positive X-axis. If its vectors product with another vector $\overrightarrow{F}_2$ is zero then $\overrightarrow{F}_2$ could be

A. $4\hat{j}$

B. $\left(\hat{k} + \hat{j}\right)$

C. $\left(\hat{j} + \hat{k}\right)$

D. $-4\hat{i}$

Answer:

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38. The component of vector

$A = a_x\hat{i} + a_y\hat{j} + a_z\hat{k}$ and the directioin of $\hat{i} - \hat{j}$

is

    A. $a_x - a_y + a_z$

    B. $a_x - a_y$

    C. $\left(a_x - a_y\right)/\sqrt{2}$

D. $\left(a_x + a_y + a_z\right)$

Answer:

39. If $A.B = A \times B$, then angle between A and B is

A. $45°$

B. $30°$

C. $60°$

D. $90°$

Answer:

40. If $a = \hat{i} + 2\hat{j} - 3\hat{k}$ and $b = 3\hat{i} + 2\hat{k}$ then the angle between the vectors $a + b$ and $a - b$ is

A. $60°$

B. $90°$

C. $45°$

D. $55°$

Answer:

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