MATHS

BOOKS - MARVEL MATHS (HINGLISH)

VECTORS

Multiple Choice Question

1. A vector which is collinear/coincident/parallel with any given vector is

A. a unit vector

B. a zero vector

C. i

D. free vector

Answer: B

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2. Two vectors are collinear/coincident/parallel iff each of them is a

A. projection of the other

B. scalar multiple of the other

C. linear combination of the other

D. square of the other

Answer: B

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3. If $\bar{a}$ and $\bar{b}$ are non-collinear vectors, then

A. only $\bar{a} = \bar{0}$

B. only $\bar{b} = \bar{0}$

C. both $\bar{a} \neq \bar{0}$ and $\bar{b} \neq \bar{0}$

D. both $\bar{a} = \bar{b} = \bar{0}$

Answer: C

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4. If $\bar{a}, \bar{b}$ are non-collinear vectors and x,y are scalars such that $x\bar{a} + y\bar{b} = \bar{0}$, then

A. x = 1, y=-1

B. x=- 2,y= 2

C. x =0,y=0

D. x, y are any real numbers such that x + y = 0

Answer: C

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5. If $\bar{a}$, $\bar{b}$ are non-collinear vectors and x,y are scalars such that

$(1\bar{a}-\bar{b})x+(2\bar{b}-\bar{a})y+(\bar{a}+2\bar{b})=\bar{0}$, then

A. $2\bar{a}=\bar{b}$ and $2\bar{b}=\bar{a}$

B. $x=\frac{-4}{3}, y=\frac{-5}{3}$

C. $\bar{a}=\bar{0}, \bar{b}=\bar{0}$

D. x = 0,y = 0

Answer: B

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6. If vectors $\bar{a}\equiv(a_1, a_2, a_3)$ and $\bar{b}\equiv(b_1, b_2, b_3)$ are collinear/coincident/parallel, then, in general,

A. $a_1b_1+a_2b_2+a_3b_3=0$

B. $\frac{a_1}{b_1}+\frac{a_2}{b_2}+\frac{a_3}{b_3}$=0

C. $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{a_3}{b_3}$=0

D. $\frac{a_1}{b_1} = \frac{a_2}{b_2} = \frac{a_3}{b_3}$=0

Answer: D

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7. If $\bar{a}$ = -3i + nj + 4k and $\bar{b}$ = - 2i + 4j + pk are collinear, then

A. $n = \frac{-8}{3}, p = 6$

B. $n = 6, p = \frac{8}{3}$

C. n = 18,p =- 24

D. n =-3, p = 48

Answer: B

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8. If $\overrightarrow{a} = mi + 2j - 3k$ and $\overrightarrow{b} = 3i - 2j + nk$ are collinear, then $(m, n) \equiv$

A. $(-3, 3)$

B. $(3, -3)$

C. $(-3, -3)$

D. $(3, 3)$

Answer: A

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9. If diagonals of a parallelogram ABCD intersect each other in M, then $\overline{OA} + \overline{OB} + \overline{OC} + \overline{OD}$ =

A. $\overline{OM}$

B. $2\overline{OM}$

C. $3\overline{OM}$

D. $4\overline{OM}$

Answer: D

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10. E and F are mid-points of diagonals AC and BD of □ ABCD. If G is the mid-point of seg EF, then

A. $4\ \overline{AG}$

B. $\bar{0}$

C. 0

D. $2\overline{GC}$

Answer: B

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11. If AD , BE and CF are medians of ΔABC, then $\overline{AD}+\overline{BE}+\overline{CF}$ =

A. $\overline{BD}+\overline{EA}+\overline{FB}$

B. 0

C. $\overline{AE}+\overline{DB}+\overline{FA}$

D. $\bar{0}$

Answer: D

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12. If P is a point on the plane of ΔABC such that $\overline{PA}+\overline{PB}+\overline{PC}=0$, then, for Δ ABC, the point P is

A. circumcentre

B. centroid

C. orthocentre

D. incentre

Answer: B

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13. If G is the centroid of Δ ABC, then $\overline{CA} + \overline{CB}$ =

A. 3 $\overline{GC}$

B. 3 $\overline{CG}$

C. 3 $\overline{AB}$

D. 3 $\overline{GA}$

Answer: B

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14. If G_1, G_2 are centroids of triangles A_1, B_1, C_1 and A_2, B_2, C_2 respectively, then $\overline{A_1A_2} + \overline{B_1B_2} + \overline{C_1C_2}$=

A. $\overline{G_1G_2}$

B. $2\overline{G_1G_2}$

C. $3\overline{G_1G_2}$

D. $4\overline{G_1G_2}$

Answer: C

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15. If P is a point in th e plane of D ABCD such that $\overline{AP}+\overline{PB}+\overline{CP}+\overline{PD}=\bar{0}$, then the quadrilateral is in general, a

A. kite

B. parallelogram

C. trapezoid

D. rectangle

Answer: B

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16. If ABCDE is a pentagon, then $\overline{AB}+\overline{AE}+\overline{BC}+\overline{DC}+\overline{ED}=$

A. $\overline{AC}$

B. $2\overline{AC}$

C. $2\overline{AD}$

D. $3\overline{AD}$

Answer: B

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17. If PQRST is a pentagon, then

$\overline{PQ}+\overline{PR}+\overline{PS}-\overline{TQ}-\overline{TR}-\overline{TS}$ =

A. $\overline{PT}$

B. $2\overline{PT}$

C. $3\overline{PT}$

D. $4\overline{PT}$

Answer: C

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18. If ABCDEF is a regular hexagon , then

$\overline{AB}+\overline{AC}+\overline{AE}+\overline{AF}$ =

A. $4\overline{AD}$

B. $3\overline{AD}$

C. $2\overline{AD}$

D. $\overline{AD}$

Answer: C

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19. In a regular hexagon $ABCDEF, \overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} = k\overline{AD}$ then k is equal to

A. $6\overline{BO}$

B. $6\overline{AO}$

C. $6\overline{OA}$

D. $6\overline{OC}$

Answer: B

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20. AB and CD are equal and parallel chords of a circle. KN is a diameter of the circle, and K is equidistant from A and B. Then $\overline{KA} + \overline{KB} + \overline{KC} + \overline{KD}$ =

A. $\overline{KN}$

B. $2\overline{KN}$

C. $3\overline{KN}$

D. $4\overline{KN}$

Answer: B

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21. If ABCD is a square, then

$\overline{AB}+2\overline{BC}+3\overline{CD}+4\overline{DA}$ =

A. 4 $\overline{AC}$

B. 3 $\overline{AC}$

C. 2 $\overline{CA}$

D. $\overline{AC}$

Answer: C

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22. If D,E and F are the mid-points of the sides BC, CA and AB respectively of a triangle ABC and λ is scalar, such that $\overrightarrow{AD}+\frac{2}{3}\overrightarrow{BE}+\frac{1}{3}\overrightarrow{CF}=\lambda\overrightarrow{AC}$, then λ is equal to

A. $\frac{1}{2}\overline{AC}$

B. $2\overline{AC}$

C. $4\overline{AC}$

D. $6\overline{AC}$

Answer: A

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23. If A (a, 2, - 2), B (a, b, 1) and C (1, 2, -2) are vertices of Δ ABC whose centroid is G (2, 1, c), then (a, b, c) $\equiv$

A. (5, - 2, - 2)

B. $\left(\frac{5}{2}, -1, -1\right)$

C. $\left(\frac{5}{2}, 1, -1\right)$

D. (5,-1,-1)

Answer: B

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24. If origin is centroid of triangle with vertices (a, 1 , 3), (- 2, b, -5) and (4, 7, c), then (a, b, c) $\equiv$

A. (2, 2,8)

B. (- 2,8,2)

C. (- 2,-8,- 2)

D. (-2, -8,2)

Answer: D

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25. If two vertices of a triangle are (2, 1, 3), (- 2, 3, - 1) and its centroid is the origin, then its third vertex is

A. (0, 4, 2)

B. (0, - 4, 2)

C. (0, 4, - 2)

D. (0, - 4, - 2)

Answer: D

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26. XOY-plane divides the join of A (2, 3, -4) and B (4, 5, 2)

A. internally in the ratio 2 : 1

B. internally in the ratio 1 : 2

C. externally in the ratio 2 : 1

D. externally in the ratio 1 : 2

Answer: A

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27. YOZ-plane divides the join of A (3, 5, 6) and B (4, 6, - 3)

A. internally in the ratio 3 : 4

B. internally in the ratio 4: 3

C. externally in the ratio 3 : 4

D. externally in the ratio 4 : 3

Answer: C

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28. Curve x = 4 divides the join of A (3, - 2, 5) and B (7, 3,- 2) in the ratio

A. $-1:3$

B. $1:3$

C. $-3:1$

D. $3:1$

Answer: B

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29. If points $A(\bar{a}), B(\bar{b})$ and $C(\bar{c})$ are such that $2\bar{a}+3\bar{b}-\bar{5}c=\bar{0}$, then their relative positions are

A. A - B -C

B. B -A-C

C. A-C-B

D. C - A - B

Answer: C

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30. If $\left[\bar{a}\bar{b}\bar{c}\right] = 3$, then the volume (in cu. u.) of the parallelepiped with $2\bar{a} + \bar{b}, 2\bar{b} + \bar{c}$ and $2\bar{c} + \bar{a}$ as coterminus edges is

A. 15

B. 22

C. 27

D. 25

Answer: C

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31. If $\bar{a}$ is perpendicular to $\bar{b}$ and $\bar{c}$, $|\bar{a}| = 2, |\bar{b}| = 3, |\bar{c}| = 4$ and $m\angle(\bar{b}, \bar{c}) = \frac{2\pi}{3}$, then : $\left[\bar{a}\bar{b}\bar{c}\right]$=

A. $6\sqrt{3}$

B. $12\sqrt{3}$

C. $18\sqrt{3}$

D. $4\sqrt{3}$

Answer: B

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32. Evaluate $[i; j; k]$. Also; interpret it geometrically.

A. -1

B. 0

C. 1

D. 3

Answer: C

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33. If $\bar{a} = i + 5k, \bar{b} = 2i + 3k, \bar{c} = 4i - j + 2k$ and $\bar{d} = i - j,$ then $(\bar{c} - \bar{a}) \cdot (\bar{b} \times \bar{d})$ =

A. -7

B. 12

C. 6

D. 5

Answer: B

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34. If vectors i + j + k,i - j+k and 2i + 3j + mk are coplanar, then m =

A. 2

B. 3

C. -3

D. -2

Answer: A

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35. If the origin O and the points A (1, 2, 3), B (2, 3, 4) and P(x,y,z) are coplaner, then

A. x-2y+z+1=0

B. x-2y+z=0

C. z- 2x +y = 0

D. x+y+z=-6

Answer: B

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36. M and N are mid-point of the diagnols AC and BD respectivley of quadrilateral ABCD, then $\overline{AB}+\overline{AD}+\overline{CB}+\overline{CD}$=

A. 4 $\overline{OM}$

B. 4 $\overline{MN}$

C. 2 $\overline{MN}$

D. 4 $\overline{ON}$

Answer: A

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37. $ABCD$ is parallelogram. If L and M are the middle points of BC and CD, then $\overline{AL} + \overline{AM}$ equals

A. $\frac{1}{2}\overline{AC}$

B. $\frac{3}{2}\overline{AC}$

C. $\overline{AC}$

D. 2 $\overline{AC}$

Answer: A

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38. $\bar{a}$ and $\bar{b}$ are non- collinear vectors. If $\bar{c} = (x-2)\bar{a} + \bar{b}$ and $\bar{d} = (2x+1)\bar{a} - \bar{b}$ are collinear , then find the value of x

A. $\frac{4}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. $-\frac{4}{3}$

Answer: C

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39. Find the constant a so that the following vectors are coplaner $2i - j + k, i + 2j - 3k, 3i + aj + 5k$

A. 4

B. -4

C. 2

D. -2

Answer: D

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40. P, Q, R, S have position vectors $\bar{p}, \bar{q}, \bar{r}, \bar{s}$ respctively such that $(\bar{p}-\bar{q})=2(\bar{s}-\bar{r})$ then QS and PR

A. PQ and RS bisect each other

B. PQ and PR bisect each other

C. PQ and RS trisect each other

D. QS and PR trisect each other

Answer: D

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41. Let PQRS be a parallelogram whose diagonals PR and QS intersect at O'. IF O is the origin then : $\overline{OP} + \overline{OQ} + \overline{OR} + \overline{OS} =$

A. 4 $\overline{OO'}$

B. 3 $\overline{OO'}$

C. 2 $\overline{OO'}$

D. $\overline{OO'}$

Answer: D

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42. The volume of a parallelopiped whose edges are represented by $-12\bar{i} + \lambda\bar{k}, 3\bar{j} - \bar{k}$ and $2\bar{i} + \bar{j} - 15\bar{k}$ is 546 then $\lambda =$_ _

A. $-3, 179$

B. 3,- 179

C. $-4, 178$

D. 4, - 178

Answer: B

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43. If points $A(\bar{a}) = 10i + 3j. B(\bar{b}) = 12i - 5j$ and $C(\bar{c}) = ai + 11j$ are collinear, then a =

A. -8

B. 4

C. 8

D. 12

Answer: D

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44. If a and b are position vectors of A and B respectively the position vector of a point C on AB produced such that $\overrightarrow{AC} = 3\overrightarrow{AB}$ is

A. $3\bar{a} - \bar{b}$

B. $3\bar{b} - \bar{a}$

C. $3\bar{a} - 2\bar{b}$

D. $3\bar{b} - 2\bar{a}$

Answer: A

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45. If $\bar{a}.\bar{b} = \bar{b}.\bar{c} = \bar{c}.\bar{a} = 0$ and $\bar{a}, \bar{b}, \bar{c}$ form a right-handed triad, then $\bar{a}.\left(\bar{b} \times \bar{c}\right)$=

A. a non-zero vector

B. 1

C. -1

D. $|\bar{a}||\bar{b}||\bar{c}|$

Answer: D

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46. If $\bar{a}.\,i=4,$ then $\bar{a}.\,[j\times(2j-3k)]$=

A. 12

B. 2

C. 0

D. -12

Answer: D

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47. $i\cdot(j\times k)+j\cdot(k\times i)+k\cdot(i\times j)=$

A. 1

B. 3

C. -3

D. 0

Answer: D

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48. If $\bar{a} = 2i + 3j - k, \bar{b} = -i + 2j - 4k$ and $\bar{c} = i + j + k.$ then $(a \times b) \cdot (a \times c)$

A. 60

B. 68

C. -60

D. -74

Answer: D

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49. If vectors $2i - j + k, i + 2j - 3k$ and $3i + mj + 5k$ are coplanar, then m is a root of the equation

A. x^2 + 3x= 4

B. x^2 + 2x= 6

C. x^2 + 3x= 6

D. x^2 + 2x= 4

Answer: A

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50. P,Q and R are three points with position vector i + j , i - j and ai +bj +ck respectively. if P,Q,R are collinear then

A. a = b = c = 1

B. a = b = c = 0

C. a= 1 and b,c $\in$ R

D. a = 1,b $\in$ R, c = 0

Answer: A

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51. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner vectors, then

$$\frac{\bar{a}.\,\bar{b} \times \bar{c}}{\bar{c} \times \bar{a}.\,\bar{b}} + \frac{\bar{b}.\,\bar{a} \times \bar{c}}{\bar{c}.\,\bar{a} \times \bar{b}} =$$

A. 0

B. 1

C. -1

D. 2

Answer: B

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52. Vectors $i+j+(m+1)k, i+j+mk$ and $i-j+mk$ are coplaner for

A. 0

B. 1

C. $-\sqrt{3}$

D. $\sqrt{3}$

Answer: A

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53. If $\bar{a}, \bar{b}, \bar{c}$ are coplanar unit vectors, then

$\left[2\bar{a}-\bar{b}, 2\bar{b}-\bar{c}, 2\bar{c}-\bar{a}\right]=$

A. m=2

B. $m=\frac{1}{2}$

C. $m = \frac{-1}{2}$

D. no value of m

Answer: D

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54. For three vectors $\vec{u}, \vec{v}, \vec{W}$ which of the folllowing expressions is not equal to any of the remaining three ?

A. $\bar{a}.\left(\bar{b} \times \bar{c}\right)$

B. $\left(\bar{b} \times \bar{c}\right).\bar{a}$

C. $\bar{b}.\left(\bar{a} \times \bar{c}\right)$

D. $\left(\bar{a} \times \bar{b}\right).\bar{c}$

Answer: D

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55. $(3\bar{a} \times 2\bar{b}) \cdot \bar{c} + (3\bar{b} \times 2\bar{c}) \cdot \bar{a} + (4\bar{c} \times 3\bar{b}) \cdot \bar{a} =$

A. 0

B. $24[\bar{a}\bar{b}\bar{c}]$

C. $24[\bar{b}\bar{a}\bar{c}]$

D. 1

Answer: B

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56. If $\bar{a} \cdot (\bar{b} \times \bar{c}) = 3$, then

A. $\bar{c}.\ (\bar{a} \times \bar{b}) = -3$

B. $\bar{a}.\ (\bar{c} \times \bar{b}) = 3$

C. $\bar{b}.\ (\bar{a} \times \bar{c}) = -3$

D. $(\bar{a} \times \bar{c}).\ \bar{b} = 3$

Answer: C

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57. If $[\,2\bar{a}+4\bar{b}\quad \bar{c}\quad \bar{d}\,]=m[\,\bar{a}\quad \bar{c}\quad \bar{d}\,]+n[\,\bar{b}\quad \bar{c}\quad \bar{d}\,],$ then m+n=

A. 6

B. -6

C. 10

D. 8

Answer: A

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58. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors, then $(\bar{a}+\bar{b}+\bar{c}).\,(\bar{a}+\bar{b})\times(\bar{a}+\bar{c})=$

A. 0

B. $\left[\bar{a}\bar{b}\bar{c}\right]$

C. $2\left[\bar{a}\bar{b}\bar{c}\right]$

D. $-\left[\bar{a}\bar{b}\bar{c}\right]$

Answer: B

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59. $\bar{a}.\left(\bar{b}+\bar{c}\right)\times\left(\bar{a}+\bar{b}+\bar{c}\right)=$

A. $3\left[\bar{a}\bar{b}\bar{c}\right]$

B. $2\left[\bar{a}\bar{b}\bar{c}\right]$

C. $\left[\bar{a}\bar{b}\bar{c}\right]$

D. 0

Answer: D

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60. If a and b are non-zero and non-collinear vectors, then show that

$a \times b = [\mathrm{a\,b\,I}]\hat{i} + [\mathrm{a\,b\,j}]\hat{j} + [\mathrm{a\,b\,k}]\hat{k}$

A. $\bar{a} + \bar{b}$

B. $\bar{a} \times \bar{b}$

C. $\bar{a} - \bar{b}$

D. $\bar{b} \times \bar{a}$

Answer: B

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61. If $A(\bar{a}), B(\bar{b})$ and $C(\bar{c})$ are vertices of a triangle whose circumcentre is origin, then its orthocentre is

A. $\dfrac{\bar{a} + \bar{b} + \bar{c}}{3}$

B. $\dfrac{\bar{a} + \bar{b} + \bar{c}}{2}$

C. $\bar{a}+\bar{b}+\bar{c}$

D. $3(\bar{a}+\bar{b}+\bar{c})$

Answer: B

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62. If $|\bar{a}|=|\bar{b}|=1$ and $[\bar{a}\ \ \bar{b}\ \ \bar{a}\times\bar{b}]=\frac{1}{4}$, then $m\angle(\bar{a},\bar{b})$=

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. cannot be determined

Answer: A

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63. If $\bar{a}$ is collinear with $\bar{b}$=3i + 6j + 6k and $\bar{a}.\ \bar{b} = 27$, then $\bar{a}$=

A. i + 2j-2k

B. i + 2j + 2k

C. i - 2j + 2k

D. i - 2j - 2k

Answer: B

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64. $2i \cdot (j \times k) - 3j \cdot (i \times k) - 4k \cdot (i \times j) =$

A. 1

B. -1

C. 9

D. -9

Answer: A

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65. If C is the mid-point of AB and P is any point outside AB, then

A. $\overline{PA}+\overline{PB}=\overline{PC}$

B. $\overline{PA}+\overline{PB}=2\overline{PC}$

C. $\overline{PA}+\overline{PB}+\overline{PC}=\bar{0}$

D. $\overline{PA}+\overline{PB}+2\overline{PC}=\bar{0}$

Answer: C

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66. In a regular hexagon ABCDEF, $\overrightarrow{AE}$

A. $\overline{AC}+\overline{AF}+\overline{AB}$

B. $\overline{AC} + \overline{AF} - \overline{AB}$

C. $\overline{AC} + \overline{AB} - \overline{AF}$

D. $-\overline{AC} + \overline{AB} - \overline{AF}$

Answer: B

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67. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors and x, y, z are scalars such that $\bar{a} = x\left(\bar{b} \times \bar{c}\right) + y(\bar{c} \times \bar{a}) + z\left(\bar{a} \times \bar{b}\right)$, then x =

A. $\dfrac{\bar{a}.\,\bar{a}}{\left[\bar{a}\bar{b}\bar{c}\right]}$

B. $\dfrac{\bar{a}.\,\bar{b}}{\left[\bar{a}\bar{b}\bar{c}\right]}$

C. $\dfrac{\bar{a}.\,\bar{c}}{\left[\bar{a}\bar{b}\bar{c}\right]}$

D. $\dfrac{\bar{a} \times \bar{a}}{\left[\bar{a}\bar{b}\bar{c}\right]}$

Answer: A

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68. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner vectors and $\bar{p} = \frac{\bar{b} \times \bar{c}}{[\bar{a}\bar{b}\bar{c}]}, \bar{q} = \frac{\bar{c} \times \bar{a}}{[\bar{a}\bar{b}\bar{c}]}, \bar{r} = \frac{\bar{a} \times \bar{b}}{[\bar{a}\bar{b}\bar{c}]}$

then $\bar{a}.\,\bar{p} + \bar{b}.\,\bar{q} + \bar{c}.\,\bar{r} =$

A. 0

B. 1

C. 2

D. 3

Answer: D

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69. If vectors $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner, then

$\frac{[\bar{a} + 2\bar{b}\bar{b} + 2\bar{c}\bar{c} + 2\bar{a}]}{[\bar{a}\bar{b}\bar{c}]}$=

A. 3

B. 9

C. 8

D. 6

Answer: B

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70. Let $\vec{a}=\vec{i}-\vec{k}, \vec{b}=x\vec{i}+\vec{j}+(1-x)\vec{k}$ and $\vec{c}=y\vec{i}+x\vec{j}+(1+x-y)\vec{k}$. Then $\left[\vec{a}\vec{b}\vec{c}\right]$ depends on only x (b) only y Neither xn or y (d) both $xandy$

A. only x

B. only y

C. neither x nor y

D. both x and y

Answer: C

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71. In a triangle OAB, $\angle AOB = 90^0$. If P and Q are points of trisection of AB, prove that $OP^2 + OQ^2 = \frac{5}{9}AB^2$

A. $\frac{2}{9}AB^2$

B. $\frac{5}{9}AB^2$

C. $\frac{7}{9}AB^2$

D. $\frac{1}{9}AB^2$

Answer: B

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72. If ABCDEF is a regular hexagon and $\overline{AB} = \bar{a}$ then $\overline{AD} + \overline{EB} + \overline{FC} =$

A. $4\bar{a}$

B. $\frac{1}{4}\bar{a}$

C. $2\bar{a}$

D. $\frac{1}{2}\bar{a}$

Answer: A

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73. If D is the mid -point of side AB of ΔABC, then $\overline{AB}+\overline{BC}+\overline{AC}$=

A. $2(\overline{AD}-\overline{BD})$

B. $2(\overline{DC}-\overline{BD})$

C. $2(\overline{BD}-\overline{CA})$

D. $2(\overline{BD}-\overline{AC})$

Answer: B

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74. If the vectors $ai + j + k, i - bj + k, i + j - ck$ are co-planar, then abc + 2 =

A. $a + b - c$

B. $a - b - c$

C. a+b+c

D. a-b+c

Answer: B

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75. If the volumes of parallelepiped with coterminus edges $-pj + 5k, i - j + qk$ and $3i - 5j$ is -8, then

A. 3pq+2=0

B. 3pq-2=0

C. pq+2=0

D. pq-2=0

Answer: A

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76. If $\bar{a}.\ i = 4,$ then $\bar{a}.\ [j \times (2j - 3k)]$=

A. 12

B. 2

C. 0

D. -12

Answer: D

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77. If the four points A (2-x, 2, 2), B (2 , 2 - y, 2), C (2, 2, 2 - z) and D (1 , 1, 1) are co-planar, then

A. $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$

B. x+y+z=1

C. $\frac{1}{1-x} + \frac{1}{1-y} + \frac{1}{1-z} = 1$

D. $xy + yz + zx = 1$

Answer: A

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78. If ABCD is a square then,

$2\overline{AB} + 4\overline{BC} + 5\overline{CD} + 7\overline{DA} =$

A. $2\overline{BD}$

B. $3\overline{CA}$

C. $5\overline{DB}$

D. $2\overline{AC}$

Answer: B

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79. If ABCDE is a regular penatagon then :

$\overline{AB} + \overline{BC} + \overline{AD} + \overline{ED} + \overline{AE} =$

A. $\overline{AC} - 2\overline{DC}$

B. $3\overline{AC} - 2\overline{DC}$

C. $\overline{CA} - \overline{DC}$

D. $3\overline{AC} - \overline{DC}$

Answer: B

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80. If the point $\overline{P}(\bar{p}) = \bar{a} + 2\bar{b}$ and the point $A(\bar{a})$ divides seg PQ internally in the ratio 2: 3, then : $Q(\bar{q})$ =

A. $2\bar{a} - \bar{b}$

B. $\bar{b} - 2\bar{a}$

C. $\bar{a} - 3\bar{b}$

D. $\bar{b}$

Answer: C

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81. If $\bar{a}$ is perpendicular to $\bar{b}$ and $\bar{c}$, then : $\left|\bar{a} \times \left(\bar{b} \times \bar{c}\right)\right| =$

A. $|\bar{a}|\left|\bar{b}\right||\bar{c}|$

B. 1

C. 0

D. 2

Answer: C

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82. If the vectors i +j , i - j and li + mj + nk are coplanar, then:

A. l=m =n = 1

B. l=1 and m, n are any scalars

C. n=0 and l, m are any scalars

D. m=0, n = 1 and l are any scalar

Answer: C

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83. Points A(4, 5, 1), B (0, - 1, - 1), C (3 , 9, 4) and D(-4, 4, 4) are

A. collinear

B. coplanar

C. non -coplanar

D. non-collinear and non-coplanar

Answer: B

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84. If PQRSTU is a regular hexagon such that

$\overline{QR} + \overline{QS} + \overline{QP} + \overline{QU} = \alpha \overline{QT}$, then : $\alpha =$

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

85. A unit vector coplanar with $i + j + 2k$ and $i + 2j + k$ and perpendicular to $i + j + k$ is

A. $\pm \frac{1}{2}(j + k)$

B. $\pm \frac{1}{\sqrt{2}}(j + k)$

C. $\pm \frac{1}{\sqrt{2}}(j - k)$

D. $\pm \frac{2}{\sqrt{2}}(j - k)$

Answer: C

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86. If the points (- 1, 2, - 3), (4, a, 1) and (b, 8, 5) are collinear, then : (a, b) $\equiv$

A. (5, 5)

B. (9, 5)

C. (5, 9)

D. (- 5, 9)

Answer: C

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87. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner vectors and

$\bar{p} = \frac{\bar{b} \times \bar{c}}{[\bar{b}\bar{c}\bar{a}]}, \bar{q} = \frac{\bar{c} \times \bar{a}}{[\bar{c}\bar{a}\bar{b}]}, \bar{r} = \frac{\bar{a} \times \bar{b}}{[\bar{a}\bar{b}\bar{c}]}$, then :

$(\bar{b} + \bar{c}).\bar{p} + (\bar{c} + \bar{a}).\bar{q} + (\bar{a} + \bar{b}).\bar{r} =$

A. 0

B. -3

C. 3

D. -9

Answer: A

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88. If the points with position vectors -i + 3j + 2k , -4i + 2j - 2k and 5i + λj + μk lie on a straight line in space, then

A. $\lambda = 5, \mu = -10$

B. $\lambda = -5, \mu = 10$

C. $\lambda = 5, \mu = 10$

D. $\lambda = 10, \mu = 5$

Answer: C

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89. ABCDEF is a regular hexagon where centre O is the origin, if the position vector of A is $\hat{i} - \hat{j} + 2\hat{k}$, then $\overline{BC}$ is equal to

A. i + j + k

B. i-j+k

C. $-i + j - 2k$

D. i + j- 2k

Answer: C

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90. If ABCDEF is a regular hexagon, then $\overline{AC} + \overline{AD} + \overline{EA} + \overline{FA} =$

A. $2\overline{AB}$

B. $3\overline{AB}$

C. $\overline{AB}$

D. $\bar{0}$

Answer: B

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91. If ABCD is a parallelogram, then $\overrightarrow{AC} - \overrightarrow{BD} =$

A. $4\overline{AB}$

B. $3\overline{AB}$

C. $2\overline{AB}$

D. $\overline{AB}$

Answer: C

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92. Let ABCD be a parallelogram such that $\overrightarrow{A}B = \overrightarrow{q}, \overrightarrow{A}D = \overrightarrow{p}$ and $\angle BAD$ be an acute angle. If $\overrightarrow{r}$ is the vector that coincides with the altitude directed from the vertex B to the side AD, then $\overrightarrow{r}$ is

A. $\bar{r} = 3\bar{q} - \dfrac{3(\bar{p}.\bar{q})}{(\bar{p}.\bar{p})}\bar{p}$

B. $\bar{r} = -\bar{q} + \left(\dfrac{\bar{p}.\bar{q}}{\bar{p}.\bar{p}}\right)\bar{p}$

C. $\bar{r} = \bar{q} - \left(\dfrac{\bar{p}.\bar{q}}{\bar{p}.\bar{p}}\right)\bar{p}$

D. $\bar{r} = -3\bar{q} + \dfrac{3(\bar{p}.\bar{q})}{(\bar{p}.\bar{p})}\bar{p}$

Answer: B

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93. Given that $\bar{a}$ and $\bar{b}$ are not mutually perpendicular. If $\bar{c}$ and $\bar{d}$ are two vectors such that $\bar{b} \times \bar{c} = \bar{b} \times \bar{d}$ and $\bar{a}.\ \bar{d}$=0, then : $\bar{d}\ =$

A. $\bar{c} + \left(\frac{\bar{a}.\ \bar{c}}{\bar{a}.\ \bar{b}}\right)\bar{b}$

B. $\bar{b} + \left(\frac{\bar{b}.\ \bar{c}}{\bar{a}.\ \bar{b}}\right)\bar{c}$

C. $\bar{c} - \left(\frac{\bar{a}.\ \bar{c}}{\bar{a}.\ \bar{b}}\right)\bar{b}$

D. $\bar{b} - \left(\frac{\bar{b}.\ \bar{c}}{\bar{a}.\ \bar{b}}\right)\bar{c}$

Answer: C

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94. If the vectors pi + j + k, i + qj + k and i + j + rk, where $p \neq q \neq r \neq 1$ are coplanar, then : pqr- (p + q + r) =.....

A. -2

B. 2

C. 0

D. -1

Answer: A

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95. If $\bar{a}, \bar{b}, \bar{c}$ are three non-zero vectors which are pairwise non-collinear. If $\bar{a}+3\bar{b}$ is collinear with $\bar{c}$ and $\bar{b}+2\bar{c}$ is collinear with $\bar{a}$, then $\bar{a}+3\bar{b}+6\bar{c}$ is

A. $\bar{a}+\bar{c}$

B. $\bar{a}$

C. $\bar{c}$

D. $\bar{0}$

Answer: D

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96. vectors $\vec{a} = i - j + 2k, \vec{b} = 2i + 4j + k$ and $\vec{c} = \lambda i + j + \mu k$ are mutually orthogonal then (λ, μ) is

A. (- 3, 2)

B. (2, - 3)

C. (- 2, 3)

D. (3, - 2)

Answer: A

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97. If $\vec{u}, \vec{v}, \vec{w}$ are non -coplanar vectors and $p, q,$ are real numbers then the equality

$\left[3\vec{u}\,p\vec{v}\,p\vec{w}\right] - \left[p\vec{v}\,\vec{w}\,q\vec{u}\right] - \left[2\vec{w} - q\vec{v}\,q\vec{u}\right] = 0$ holds for

A. 2

B. more than 2 but not infinite

C. infinite

D. 1

Answer: D

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98. The vector $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of vectors $\vec{b} = \hat{i} + \hat{j}$ and $\vec{c} = \hat{j} + \hat{k}$ and bisects the angle between $\vec{b}$ and $\vec{c}$. Then which one of the following gives possible values o α and β? (A) alpha=2, beta=1(B)alpha=1, beta=1(C)alpha=2, beta=1(D)alpha=1, beta=2`

A. $\alpha = 2, \beta = 2$

B. $\alpha = 1, \beta = 2$

C. $\alpha = 2, \beta = 1$

D. $\alpha = 1, \beta = 1$

Answer: D

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99. The non-zero vectors $\bar{a}$, $\bar{b}$ and $\bar{c}$ are related by $\bar{a} = 8\bar{b}$ and $\bar{c} = -7\bar{b}$. Then, the angle between $\bar{a}$ and $\bar{c}$ is of measures

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. π

Answer: D

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100. If $\widehat{u}$ and $\hat{v}$ are unit vectors and θ is the acute angle between them, then $2\widehat{u} \times 3\hat{v}$ is a unit vector for (1) exactly two values of θ (2) more than two values of θ (3) no value of θ (4) exactly one value of θ

A. exactly 2 values of θ

B. more than 2 values of θ

C. no value of θ

D. exactly 1 value of θ

Answer: D

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101. Let $\bar{a} = \hat{i} + \hat{j} + \hat{k}, b = \hat{i} - \hat{j} + 2\hat{k}$ and $\bar{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$. If the vector c lies in the plane of a and b , then x equals (1) 0 (2) 1 (3) -4 (4) -2

A. 0

B. 1

C. -4

D. -2

Answer: D

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102. ABC is triangle, right angled at A. The resultant of the forces acting along $\overrightarrow{AB}. \overrightarrow{AC}$ with magnitudes $\frac{1}{AB}$ and respectively is the force along $\overrightarrow{AD}$, where D is the foot of the perpendicular from A onto BC. The magnitude of the resultant is-

A. $\frac{(AB)(AC)}{AB+BC}$

B. $\frac{1}{AB}+\frac{1}{AC}$

C. $\frac{1}{AD}$

D. $\frac{(AB)^2+(AC)^2}{(AB)^2.(AC)^2}$

Answer: C

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103. The values of a, for which points A, B, C with position vectors $2\hat{i} - \hat{j} + \hat{k}, \hat{i} - 3\hat{j} - 5\hat{k}$ and $a\hat{i} — 3\hat{j} + \hat{k}$ respectively are the vertices of a right angled triangle with $C = \frac{\pi}{2}$ are

A. $-2, \ -1$

B. $-2, 1$

C. 2,-1

D. 2,1

Answer: D

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104. If C is the mid-point of AB and P is any point outside AB, then

A. $\overline{PA}+\overline{PB}+\overline{PC}=0$

B. $\overline{PA}+\overline{PB}+2\overline{PC}=\bar{0}$

C. $\overline{PA}+\overline{PB}=\overline{PC}$

D. $\overline{PA}+\overline{PB}=2\overline{PC}$

Answer: D

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105. I is the incentre of ΔABC.

Forces $\overline{P}, \overline{Q}, \overline{R}$ acting along IA,IB,IC respectively are in equilibrium. Then $|\overline{P}|:|\overline{Q}|:|\overline{R}|$=

A. cos A : cos B : cos C

B. $\frac{\cos A}{2}:\frac{\cos B}{2}:\frac{\cos C}{2}$

C. $\frac{\sin A}{2}:\frac{\sin B}{2}:\frac{\sin C}{2}$

D. $\sin A:\sin B:\sin C$

Answer: B

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106. If $\overrightarrow{a}$ is any vector, then $\left(\overrightarrow{a} \times \overrightarrow{i}\right)^2 + \left(\overrightarrow{a} \times \overrightarrow{j}\right)^2 + \left(\overrightarrow{a} \times \overrightarrow{k}\right)^2$ is equal to

A. $4\bar{a}^2$

B. $2\bar{a}^2$

C. $\bar{a}^2$

D. $3\bar{a}^2$

Answer: B

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107. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors and λ is a real numbers then $\left[\lambda\left(\bar{a}+\bar{b}\right)\lambda^2\bar{b} \quad \lambda\bar{c}\right] = \left[\bar{a}\bar{b}+\bar{c}\bar{b}\right]$ for

A. exactly 2 values of λ

B. exactly 3 values of λ

C. no values of λ

D. exactly one values of λ

Answer: C

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108. Given $\bar{a}, \bar{b}, \bar{c}$ are three non-zero vectors, no two of which are collinear. If the vector $(\bar{a}+\bar{b})$ is collinear with $\bar{c}$ and $(\bar{b}+\bar{c})$ is collinear with $\bar{a}$, then : $\bar{a}+\bar{b}+\bar{c}$=

A. $\lambda\bar{a}$

B. $\lambda\bar{b}$

C. $\lambda\bar{c}$

D. $\bar{0}$

Answer: D

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109. A particle acted by constant forces $4\hat{i}+\hat{j}-3\hat{k} and 3\hat{i}+\hat{9}-\hat{k}$ is displaced from point $\hat{i}+2\hat{j}+3\hat{k}$ to point $5\hat{i}+4\hat{j}+\hat{k}.$ find the total work done by the forces in units.

A. 40

B. 30

C. 25

D. 15

Answer: A

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110. If $\bar{a}, \bar{b}, \bar{c}$ are non coplanar vectros and λ is a real number then the vectors $\mp 2\bar{b} + 3\bar{c}, \lambda\bar{b} + 4\bar{c}$ and $(2\lambda - 1)\bar{c}$ are non coplanar for (A) all values of lamda (B) non value of lamda (C) all except two values of lamda (D) all except one vaue of lamda

A. all values of λ

B. all except one value of λ

C. all except two value of λ

D. no value of λ

Answer: B

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111. Let $\bar{u}, \bar{v}, \overline{w}$ be such that $|\bar{u}| = 1, |\bar{v}| = 2, |\overline{w}| = 3$. If the projection of $\bar{v}$ along $\bar{u}$ is equal to that of $\overline{w}$ along $\bar{u}$, and $\bar{v} \perp \overline{w}$, then : $|\bar{u} - \bar{v} + \overline{w}| =$

A. 2

B. $\sqrt{7}$

C. $\sqrt{14}$

D. 14

Answer: C

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112. If $\bar{a}, \bar{b}\bar{c}$ are three vectors such that $\bar{a} + \bar{b} + \bar{c} = 0,$ where $|\bar{a}| = 1, |\bar{b}| = 2, |\bar{c}| = 3$

then : $\bar{a}.\,\bar{b} + \bar{b}.\,\bar{c} + \bar{c}.\,\bar{a}$=

A. 0

B. -7

C. 7

D. 1

Answer: B

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113. If $\vec{u}, \vec{v}, \vec{w}$ are three non-coplanar vectors, the $\left(\vec{u}+\vec{v}-\vec{w}\right).\left(\vec{u}-\vec{v}\right)\times\left(\vec{v}-\vec{w}\right)$ equals

A. 0

B. $\bar{u}.\left(\bar{v}\times\overline{w}\right)$

C. $\bar{u}.\left(\overline{w}\times\bar{v}\right)$

D. $3\bar{u}.\left(\bar{v}\times\overline{w}\right)$

Answer: B

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114. Let $\vec{u}=\hat{i}+\hat{j}, \vec{v}=\hat{i}-\hat{j}a$ and $\hat{i}-\hat{j}$ and $\vec{w}=\hat{i}+2\hat{j}+3\hat{k}$ If $\widehat{n}$ isa unit vector such that $\vec{u}.\widehat{n}=0$ and $\vec{n}.\widehat{n}=0,$ then $\left|\vec{w}.\widehat{n}\right|$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: D

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115. A tetrahedron has vertices $O(0, 0, 0), A(1, 2, 1), B(2, 1, 3), and C(-1, 1, 2)$, then angle between face $OAB and ABC$ will be a. $\cos^{-1}\left(\frac{17}{31}\right)$ b. 30^0 c. 90^0 d. $\cos^{-1}\left(\frac{19}{35}\right)$

A. $\cos^{-1}\left(\frac{19}{35}\right)$

B. $\cos^{-1}\left(\frac{17}{31}\right)$

C. 30°

D. 90°

Answer: A

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116. The resultant of $\overrightarrow{P}$ and $\overrightarrow{Q}$ is $\overrightarrow{R}$. If $\overrightarrow{Q}$ is doubled, $\overrightarrow{R}$ is doubled, when $\overrightarrow{Q}$ is reversed, $\overrightarrow{R}$ is again doubled, find P : Q : R,

A. $3:1:1$

B. $2:3:2$

C. $1:2:3$

D. $2:3:1$

Answer: B

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117. The unit vector coplannar to the two vectors i-j and i+2j, and perpendicular to the first, is

A. $\frac{1}{\sqrt{2}}(i+j)$

B. $\frac{1}{\sqrt{5}}(2i+j)$

C. $\pm\frac{1}{\sqrt{2}}(i+k)$

D. none of these

Answer: A

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118. The vector $\hat{i}+x\hat{j}+3\hat{k}$ is rotated through an angle θ and doubled in magnitude, then it becomes $4\hat{i}+(4x-2)\hat{j}+2\hat{k}$. Then values of x are (A) $-\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) 2

A. $\left\{-\frac{2}{3}, 2\right\}$

B. $\left\{\frac{1}{3}, 2\right\}$

C. $\left\{\frac{2}{3}, 0\right\}$

D. {2,7}

Answer: A

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119. A parallelepiped is formed by planes drawn through the points $(2, 3, 5) and (5, 9, 7)$, parallel to the coordinate planes. The length of a diagonal of the parallelepiped is 7 unit b. $\sqrt{38}$ unit c. $\sqrt{155}$ unit d. none of these

A. 7

B. $\sqrt{38}$

C. $\sqrt{155}$

D. none of these

Answer: A

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120. If the vectors $\bar{a}, \bar{b}$ and $\bar{c}$ from the sides BC, CA and AB, respectively, of ΔABC, then

A. $\bar{a}. \bar{b} = \bar{b}. \bar{c} = \bar{c}. \bar{b} = 0$

B. $\bar{a} \times \bar{b} = \bar{b} \times \bar{c} = \bar{c} \times \bar{a} = 0$

C. $\bar{a}. \bar{b} = \bar{b}. \bar{c} = \bar{c}. \bar{a} = 0$

D. $\bar{a} \times \bar{a} = \bar{a} \times \bar{c} = \bar{c} \times \bar{a} = 0$

Answer: B

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121. If the vectors $\bar{a} = xi + yj + zk, \bar{b} = j$ and $\bar{c}$ are such that $\bar{a}, \bar{c}, \bar{b}$ form a right-handed system, then : $\bar{c} =$

A. zi-xk

B. $\bar{0}$

C. yj

D. $-zi+xk$

Answer: A

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122. A line segment has length 63 and direction ratios are 3, -26. The components of the line vectors are

A. 27, -18, 54

B. 27, 18, - 54

C. $-27, 18, \ -54$

D. 27, - 18, - 54

Answer: C

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123. If $|\bar{a}| = 2, |\bar{b}| = 3$ and $\bar{a}.\ \bar{b} = 0$, then :

$\bar{a} \times \{\bar{a} \times [\bar{a} \times (\bar{a} \times \bar{b})]\} =$

A. $16\bar{b}$

B. $-16\bar{b}$

C. $16\bar{a}$

D. $-16\bar{a}$

Answer: A

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124. If $\bar{a}, \bar{b}, \bar{c}$ are three unit-vectors such that $3\bar{a} + 4\bar{b} + 5\bar{c} = \bar{0}$, then

A. $\bar{a} || \bar{b}$

B. $\bar{a} \perp \bar{b}$

C. $\bar{a}$ is neither parallel nor perpendicular to $\bar{b}$

D. no such conclusion can be drawn

Answer: D

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125. Let $\overline{V} = 2i + j - k$ and $\overline{W} = i + 3k$

If $\overline{U}$ is a unit vector, then the max imum value of the scalar triple product $[\overline{U}\overline{V}\overline{W}]$ is

A. -1

B. $\sqrt{10} + \sqrt{6}$

C. $\sqrt{59}$

D. $\sqrt{60}$

Answer: C

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126. Let $\bar{a}, \bar{b}, \bar{c}$ be three non-coplanar vectors and $\bar{r}$ be any vector in space such that

$\bar{r}.\bar{a} = 1, \bar{r}.\bar{b} = 2$ and $\bar{r}.\bar{c} = 3$

If $[\bar{a}\bar{b}\bar{c}] = 1$, then : $\bar{r} =$

A. $\bar{a} + 2\bar{b} + 3\bar{c}$

B. $(\bar{b} \times \bar{c}) + 2(\bar{c} \times \bar{a}) + 3(\bar{a} \times \bar{b})$

C. $(\bar{b}.\bar{c})\bar{a} + 2(\bar{c}.\bar{a})\bar{b} + 3(\bar{a}.\bar{b})\bar{c}$

D. none of these

Answer: B

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127. Given $\overline{\alpha}, \bar{\beta}, \bar{\gamma}$ are non-coplanar vectors, and $\overline{\alpha}$ is not parallel to $\bar{\delta}$.

If : $\overline{\alpha} + \bar{\beta} + \bar{\gamma} = a\bar{\delta}$ and $\bar{\beta} + \bar{\gamma} + \bar{\delta} = b\overline{\alpha}$,

then : $\overline{\alpha} + \bar{\beta} + \bar{\gamma} + \bar{\delta} =$ ....

A. $a\overline{\alpha}$

B. $b\bar{\delta}$

C. $\bar{0}$

D. $(a+b)\bar{\gamma}$

Answer: C

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128. A parallelogram is constructed on the vectors $3\bar{a}+\bar{b}$ and $\bar{a}-4\bar{b}$, where $|\bar{a}|=6, |\bar{b}|=8$ and $\bar{a}\uparrow\ \downarrow\bar{b}$. The length of its longer diagonal is

A. 40

B. 64

C. 32

D. 48

Answer: D

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129. Let $\bar{a}, \bar{b}, \bar{c}$ be three vectors such that $\bar{a} \neq \bar{0}, \bar{a} \times \bar{b} = 2(\bar{a} \times \bar{c}), |\bar{a}| = |\bar{c}| = 1, |\bar{b}| = 4$ and $|\bar{b} \times \bar{c}| = \sqrt{15}$. If : $\bar{b} - 2\bar{c} = \lambda \bar{a},$ then : $\lambda =$

A. 1

B. -1

C. 2

D. -4

Answer: D

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130. If $A(\bar{a}), B(\bar{b}), C(\bar{c})$ and $D(\bar{d})$ are four points in a plane such that $(\bar{a} - \bar{d}) \cdot (\bar{b} - \bar{c}) = (\bar{b} - \bar{d}) \cdot (\bar{c} - \bar{a}) = 0.$ then w.r.t ΔABC , point D is

A. centroid of ΔABC

B. orthocentre of ΔABC

C. circumcentre of ΔABC

D. incentre of ΔABC

Answer: B

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131. Let a, b, c be distinct non-negative numbers. If the vectors $ai + aj + ck, i + k$ and $ci + cj + bk$ lie in a plane, then c is the

A. $c^2 = ab$

B. $a^2 = bc$

C. $b^2 = ac$

D. none of these

Answer: A

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132. Let : $\bar{a} = i - j, \bar{b} = j - k, \bar{c} = k - i$ If $\bar{d}$ is a unit vector such that $\bar{a}.\bar{d} = 0 = [\bar{b}\bar{c}\bar{d}]$, then : $\bar{d}$ =

A. $\pm\dfrac{i + j - k}{\sqrt{3}}$

B. $\pm\dfrac{i + j - 2k}{\sqrt{6}}$

C. $\pm\dfrac{i + j + k}{\sqrt{3}}$

D. $\pm k$

Answer: B

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133. If : $\bar{x} + \bar{y} + \bar{z} = 0, |\bar{x}| = |\bar{y}| = |\bar{z}| = 2$ and $m\angle(\bar{y}, \bar{z}) = \theta$, then : $\cos^2\theta + \cot^2\theta =$

A. $\dfrac{4}{3}$

B. $\frac{7}{12}$

C. $\frac{1}{3}$

D. 1

Answer: B

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134. If a and b are vectors such that $|a+b|=\sqrt{29}$ and $a \times (2i+3j+4k)=(2i+3j+4k) \times b,$ then a possivalue of $(a+b)\cdot(-7i+2j+3k)$ is

A. 0

B. 3

C. 4

D. 8

Answer: C

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135. Given $\bar{a}, \bar{b}, \bar{c}$ are three non-zero vectors, no two of which are collinear. If the vector $(\bar{a}+\bar{b})$ is collinear with $\bar{c}$ and $(\bar{b}+\bar{c})$ is collinear with $\bar{a}$, then : $\bar{a}+\bar{b}+\bar{c}$=

A. $\bar{a}$

B. $\bar{b}$

C. $\bar{c}$

D. 0

Answer: D

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136. If $\bar{a}$ and $\bar{b}$ are unit vectors, then the max imum value of $|\bar{a}+\bar{b}|+|\bar{a}-\bar{b}|$ is

A. 2

B. 4

C. $2\sqrt{2}$

D. $\sqrt{2}$

Answer: C

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137. If : $\left|\bar{a}-\bar{b}\right| = |\bar{a}| = \left|\bar{b}\right| = 1$, then : $m\angle\left(\bar{a}, \bar{b}\right)$=

A. $\frac{\pi}{3}$

B. $3\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 0

Answer: A

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138. Let $\bar{a}\bar{b}\bar{c}$ be three unit vectors such that $\left|\bar{a}+\bar{b}+\bar{c}\right|=1$ and $\bar{a}\perp\bar{b}$ makes angles a and b with $\bar{a}$ and $\bar{b}$ respectively then $\cos a+\cos b$ is equal to

A. 1

B. -1

C. $\frac{3}{2}$

D. 0

Answer: B

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139. Angle between vectors $\bar{a}$ and $\bar{b}$, where $\bar{a}, \bar{b}, \bar{c}$ are unit vectors satisfying $\bar{a}+\bar{b}+\sqrt{3}.\ \bar{c}=\bar{0}$, is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: C

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140. If $\overrightarrow{u}$ and $\overrightarrow{v}$ are unit vectors and θ is the acute angle between them, then $2u\overrightarrow{u} \times 3\overrightarrow{v}$ is a unit vector for

A. no value of θ

B. exactly one value of θ

C. exactly two values of θ

D. more than two values of θ

Answer: B

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141. If $\bar{a}$ is any vector, then :

$(\bar{a}.\, i)(\bar{a} \times i) + (\bar{a}.\, j)(\bar{a} \times j) + (\bar{a}.\, k)(\bar{a} \times k) =$

A. $3\bar{a}$

B. $\bar{a}$

C. $\bar{0}$

D. $2\bar{a}$

Answer: C

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142. Let $\bar{a}, \bar{b}, \bar{c}$ be unit vectors such that $\bar{a} \cdot \bar{b} = 0 = \bar{a} \cdot \bar{c}$

If $m\angle\left(\bar{b}, \bar{c}\right) = \frac{\pi}{6}$, then : $\bar{a} =$

A. $\pm 2\left(\bar{b} \times \bar{c}\right)$

B. $2\left(\bar{b} \times \bar{c}\right)$

C. $\pm\frac{1}{2}(\bar{b}\times\bar{c})$

D. $-\frac{1}{2}(\bar{b}\times\bar{c})$

Answer: A

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143. Let $\bar{u}$ and $\bar{v}$ be two non-collinear vectors. If the lengths a, b, c of the sides of ΔABC are such that

$(a-b)\bar{u}+(b-c)\bar{v}+(c-a)(\bar{u}\times\bar{v})=\bar{0}$ then ΔABC is

A. right angled

B. equilateral

C. isosceles

D. obtuse angled

Answer: B

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144. If G be the centroid of the ΔABC, then prove that $AB^2 + BC^2 + CA^2 = 3(GA^2 + GB^2 + GC^2)$

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{4}{9}$

Answer: B

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145. If the vectors $\vec{a}, \vec{b}, \vec{c}$ are non -coplanar and l, m, n are distinct scalars such that

$\left[l\vec{a} + m\vec{b} + n\vec{c} \quad l\vec{b} + m\vec{c} + n\vec{a} \quad l\vec{c} + m\vec{a} + n\vec{b}\right] = 0$ then

A. lm + mn + nl = 0

B. l+m + n= 0

C. $l^2 + m^2 + n^2 = 0$

D. $l^3 + m^3 + n^3 = 0$

Answer: B

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146. If $\bar{u}, \bar{v}, \overline{w}$ are three non-coplanar vectors, then :

$(\bar{u} + \bar{v} - \overline{w}).\ (\bar{u} - \bar{v}) \times (\bar{v} - \overline{w}) =$

A. $\bar{u}.\ (\bar{v} \times \overline{w})$

B. $\bar{u}.\ (\overline{w} \times \bar{v})$

C. $3\bar{u}.\ (\bar{v} \times \overline{w})$

D. 0

Answer: A

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147. Let $\bar{a}, \bar{b}, \bar{c}$ be three non-zero non-coplanar vectors and $\bar{p} = \bar{a} + \bar{b} - 2\bar{c}, \bar{q} = 3\bar{a} - 2\bar{b} + \bar{c}$ and $\bar{r} = \bar{a} - 4\bar{b} + 2\bar{c}$

A. $3:1$

B. $7:1$

C. $11:1$

D. $15:1$

Answer: D

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148. Let $\vec{a}, \vec{b}, \vec{c}$ be three non-zero non coplanar vectors and $\vec{p}, \vec{q}$ and $\vec{r}$ be three vectors given by $\vec{p} = \vec{a} + \vec{b} - 2\vec{c}, \vec{q} = 3\vec{a} - 2\vec{b} + \vec{c}$ and $\vec{r} = \vec{a} - 4vcb + 2\vec{c}$

If the volume of the parallelopiped determined by $\vec{a}, \vec{b}$ and $\vec{c}$ is V_1 and that of the parallelopiped determined by $\vec{a}, \vec{q}$ and $\vec{r}$ is V_2, then

$V_2 : V_1 =$

A. 2

B. $\frac{1}{3}$

C. $\frac{1}{2}$

D. 1

Answer: C

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149. Statement -1 : If a transversal cuts the sides OL, OM and diagonal ON of a parallelogram at A, B, C respectively, then

$$\frac{OL}{OA} + \frac{OM}{OB} = \frac{ON}{OC}$$

Statement -2 : Three points with position vectors $\vec{a}, \vec{b}, \vec{c}$ are collinear iff there exist scalars x, y, z not all zero such that

$x\vec{a} + y\vec{b} + z\vec{c} = \vec{0}$, where $x + y + z = 0$.

A. $\dfrac{ON}{2(AC)}$

B. $\dfrac{CN}{OC}$

C. $\dfrac{ON}{BC}$

D. $\dfrac{ON}{OC}$

Answer: D

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150. If $\bar{u}$ and $\bar{v}$ are any two vectors, then :

$$\frac{(1-\bar{u}.\,\bar{v})^2+(\bar{u}+\bar{v}+\bar{u}\times\bar{v})^2}{1+v^2}=$$

A. 0

B. $1+u^2$

C. $\bar{u}.\,\bar{v}$

D. $(\bar{u}+\bar{v})^2$

Answer: B

View Text Solution

151. Suppose $\bar{a}, \bar{b}$ are mutually perpendicular unit vectors and the unit vector $\bar{c}$ is inclined at an angle θ to each of $\bar{a}$ and $\bar{b}$

If : $\bar{c} = x\bar{a} + y\bar{b} + z(\bar{a} \times \bar{b})$, then

A. $x = \cos\theta, y = \sin\theta, z = \cos 2\theta$

B. $x = y = \cos\theta, z^2 = \cos 2\theta$

C. $x = \sin\theta, y = \cos\theta, z = -\cos 2\theta$

D. $x = y = \cos\theta, z^2 = -\cos 2\theta$

Answer: D

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152. The position vectors of the point A, B, C and D are $3\hat{i} - 2\hat{j} - \hat{k}, 2\hat{i} + 3\hat{j} - 4\hat{k}, -\hat{i} + \hat{j} + 2\hat{k}$ and $4\hat{i} + 5\hat{j} + \lambda\hat{k}$, respectively. If the points A, B, C and D lie on a plane, find the value of λ.

A. $\frac{143}{17}$

B. $-\frac{144}{17}$

C. $\frac{145}{17}$

D. $-\frac{146}{17}$

Answer: D

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153. Find the values of λ such that $x, y, z \ne (0, 0, 0) and \left(\hat{i} + \hat{j} + 3\hat{k}\right)x + \left(3\hat{i} - 3\hat{j} + \hat{k}\right)y + \left(-4\hat{i} + 5\hat{j}\right)z =$ are unit vector along coordinate axes.

A. 0, - 1

B. $-1, 1$

C. 2, - 2

D. none of these

Answer: A

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154. Let $\overline{A}, \overline{B}$ and $\overline{C}$ be vectors of length 3, 4 and 5 respectively.

Let $\overline{A} \perp (\overline{B} + \overline{C}). \bar{b} \perp (\overline{C} + \overline{A})$

and $\overline{C} \perp (\overline{A} + \overline{B})$.

Then $\dfrac{\overline{A}.\overline{B} \times \overline{C}}{\overline{C} \times \overline{A}.\overline{B}} + \dfrac{\overline{B}.\overline{A} \times \overline{C}}{\overline{C}.\overline{A} \times \overline{B}} = \ldots$

A. $2\sqrt{2}$

B. $3\sqrt{3}$

C. $4\sqrt{2}$

D. $5\sqrt{2}$

Answer: D

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155. Find a unit vector perpendicular to the plane determined by the points $(1, \ -1, 2), (2, 0, \ -1) and (0, 2, 1)$.

A. $\dfrac{-2i + j + k}{\sqrt{6}}$

B. $\dfrac{2i - j + k}{\sqrt{6}}$

C. $\dfrac{2i + j - k}{\sqrt{6}}$

D. $\dfrac{2i + j + k}{\sqrt{6}}$

Answer: D

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156. If $\overline{A}, \overline{B}$ and $\overline{C}$ are three non-coplanar vectors, then : $\dfrac{\overline{A}.\overline{B} \times \overline{C}}{\overline{C} \times \overline{A}.\overline{B}} + \dfrac{\overline{B}.\overline{A} \times \overline{C}}{\overline{C}.\overline{A} \times \overline{B}} = \dots$

A. -2

B. 2

C. 0

D. none of these

Answer: C

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157. The area of the triangle whose vertices are

$A(1, \ -1, 2), B(2, 1-1)C(3, \ -1, 2)$ is ....

A. $2\sqrt{3}$

B. $\sqrt{13}$

C. $3\sqrt{2}$

D. none of these

Answer: B

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158. If $\overline{A} \equiv (1, 1, 1)$ and $\overline{C} \equiv (0, 1, -1)$ are given vectors, and $\overline{B}$ is a vector such that $\overline{A} \times \overline{B} = \overline{C}$ and $\overline{A} \cdot \overline{B} = 3$, then : $3\overline{B} =$ ...

A. 2 (i + j) + 5k

B. 5 (i + j) + 2k

C. 2i + 5(j+k)

D. 5i+2(j+k)

Answer: D

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159. If $A(\bar{a}), B(\bar{b}), C(\bar{c})$ and $D(\bar{d})$ are four points in a plane such that $(\bar{a} - \bar{d}) \cdot (\bar{b} - \bar{c}) = (\bar{b} - \bar{d}) \cdot (\bar{c} - \bar{a}) = 0.$ then w.r.t ΔABC, point D is

A. centroid

B. circumcentre

C. orthoccntre

D. incentre

Answer: C

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160. Let $\overline{A}, \overline{B}$ and $\overline{C}$ be unit vectors such that

$\overline{A}.\overline{B} = \overline{A}.\overline{C}$=0

Angle between B and C is 60º.

If $\overline{A} = k(\overline{B} \times \overline{C}),$ then : k=

A. ± 1

B. ± 2

C. ± 3

D. none of these

Answer: B

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161. The points with position vectors $60i+3j, 40i-8j, ai-52j$ are collinear if a. $a=-40$ b. $a=40$ c. $a=20$ d. none of these

A. a = -40

B. a = 40

C. a = 20

D. none of these

Answer: A

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162. Let a, b, c be distinct non-negative numbers. If the vectors $ai+aj+ck, i+k$ and $ci+cj+bk$ lie in a plane, then c is the

A. the A.M. of a, b

B. the GM. of a, b

C. the H.M. of a, b

D. equal to zero

Answer: B

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163. Let $\bar{a} = i - k, \bar{b} = xi + j + (1 - x)k,$ and $\bar{c} = yi + xj + (1 + x - y)k$. Then $\bar{a}$, $\bar{b}$ and $\bar{c}$ are non-coplanar for

A. some values of x

B. some values of y

C. no values of x and y

D. for all values of x and y

Answer: D

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164. Let α, β, γ be distinct real numbers. The points with position vectors $\alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}, \beta\hat{i} + \gamma\hat{j} + \alpha\hat{k}, \gamma\hat{i} + \alpha\hat{j} + \beta\hat{k}$

A. are collinear

B. form an equilateral triangle

C. form a scalene triangle

D. form a right angled triangle

Answer: B

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165. $\bar{a}.\ (\bar{b} + \bar{c}) \times (\bar{a} + \bar{b} + \bar{c}) =$

A. 0

B. $[\overline{A}\,\bar{b}\overline{C}] + [\bar{b}\overline{C}\,\overline{A}]$

C. $[\overline{A}\,\bar{b}\overline{C}]$

D. none of these

Answer: A

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166. Let $\bar{u}, \bar{v}$ and $\overline{w}$ be vectors such that $\bar{u}+\bar{v}+\overline{w}=\bar{0}$. If $|\bar{u}|=3, |\bar{v}|=4$ and $|\overline{w}|=5$, then : $\bar{u}\cdot\bar{v}+\bar{v}\cdot\overline{w}+\overline{w}\cdot\bar{u}=$

A. 47

B. -25

C. 0

D. 25

Answer: B

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167. If $\bar{a}, \bar{b}$ and $\bar{c}$ are three non-coplanar vectors, then : $(\bar{a}+\bar{b}+\bar{c}) \cdot [(\bar{a}+\bar{b}) \times (\bar{a}+\bar{c})]$ =

A. 0

B. $[\bar{a}\bar{b}\bar{c}]$

C. $2[\bar{a}\bar{b}\bar{c}]$

D. $-[\bar{a}\bar{b}\bar{c}]$

Answer: D

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168. If the vectors $\bar{a}, \bar{b}$ and $\bar{c}$ from the sides BC, CA and AB, respectively, of ΔABC, then

A. $\bar{a}.\bar{b}+\bar{b}.\bar{c}+\bar{c}.\bar{a}=0$

B. $\bar{a}\times\bar{b}=\bar{b}\times\bar{c}=\bar{c}\times\bar{a}$

C. $\bar{a}.\bar{b}=\bar{b}.\bar{c}=\bar{c}.\bar{a}$

D. $(\bar{a} \times \bar{b}) + (\bar{b} \times \bar{c}) + (\bar{c} \times \bar{a}) = \bar{0}$

Answer: B

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169. Let vectors $\bar{a}, \bar{b}, \bar{c}$ and $\bar{d}$ be such that

$(\bar{a} \times \bar{b}) \times (\bar{c} \times \bar{d}) = \bar{0}$

Let P_1 and P_2 be the planes determined by the pairs of vectors $\bar{a}, \bar{b}$ and $\bar{c}, \bar{d}$ respectively.

Then the angle between P_1 and P_2 is

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: A

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170. If $\bar{a}$ and $\bar{b}$ are unit vectors such that $\bar{a}+2\bar{b}$ and $5\bar{a}-4\bar{b}$ are perpendicular to each other, then the angle between $\bar{a}$ and $\bar{b}$ is

A. 45°

B. 60°

C. $\cos^{-1}\left(\frac{1}{3}\right)$

D. $\cos^{-1}\left(\frac{2}{7}\right)$

Answer: B

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171. Number of vectors ofunit length perpendicular to vectors $\bar{a}\equiv(1,1,0)$ and $\bar{b}\equiv(0,1,1)$ is

A. one

B. two

C. three

D. infinite

Answer: B

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172. Let $\bar{a}$ and $\bar{b}$ be two unit vectors, and α be the angle between them.

Then $\bar{a}+\bar{b}$ is a unit vector, if $\alpha=$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{2\pi}{3}$

D. $\frac{\pi}{2}$

Answer: C

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173. Angle between vectors $\bar{a}$ and $\bar{b}$, where $\bar{a}, \bar{b}, \bar{c}$ are unit vectors satisfying $\bar{a} + \bar{b} + \sqrt{3}.\ \bar{c} = \bar{0}$, is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: C

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174. Values of a for which the points A, B, C with position vectors 2i - j+k, i - 3j - 5k and ai - 3j +k, respectively, are the vertices of a right angled triangle with $C = \frac{\pi}{2}$ are

A. 2, 1

B. $-2, \ -1$

C. $-2, 1$

D. $2, \ -1$

Answer: A

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175. If $\bar{a} = 3i - 5j$ and $\bar{b} = 6i + 3j$ are two vectors, and $\bar{c}$ is a vector such that $\bar{c} = \bar{a} \times \bar{b}$,

then : $|\bar{a}| : |\bar{b}| : |\bar{c}| =$

A. $\sqrt{34} : \sqrt{45} : \sqrt{39}$

B. $\sqrt{34} : \sqrt{45} : 39$

C. $34 : 39 : 45$

D. $39 : 35 : 34$

Answer: B

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176. vectors $\overrightarrow{a} = i - j + 2k, \overrightarrow{b} = 2i + 4j + k$ and $\overrightarrow{c} = \lambda i + j + \mu k$ are mutually orthogonal then (λ, μ) is

A. (- 2, 3)

B. (3, - 2)

C. (- 3, 2)

D. (2 , - 3)

Answer: C

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177. Non-zero vectors $\bar{a}, \bar{b}$ and $\bar{c}$ are related by $\bar{a} = 8\bar{b}$ and $\bar{c} = -7\bar{b}$. Then the angle between $\bar{a}$ and $\bar{c}$ is

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. 0

Answer: C

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178. If $|\bar{a}| = 4, |\bar{b}| = 2$ and the angle between $\bar{a}$ and $\bar{b}$ is $\frac{\pi}{6}$, then $|\bar{a} \times \bar{b}|^2$ is equal to

A. 48

B. 16

C. 8

D. none of these

Answer: B

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179. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and the vectors

$\vec{A} = (1, a, a^2), \vec{B} = (1, b, b^2), \vec{C}(1, c, c^2)$

are non-coplanar then the product abc = ...

A. -3

B. -2

C. -1

D. 0

Answer: C

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180. If the vectors ai + j + k , i + bj + k and i + j + ck, where a, b, c $\neq 1$, are coplanar,

then : $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c} = \dots$

A. -1

B. 0

C. 1

D. 3

Answer: C

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181. if $\widehat{a}, \hat{b}$ and $\hat{c}$ are unit vectors. Then $\left|\left|\widehat{a}-\hat{b}\right|^2+\left|\hat{b}-\hat{c}\right|^2+\left|\overrightarrow{c}-\overrightarrow{a}\right|^2\right|$ does not exceed

A. 4

B. 9

C. 8

D. 6

Answer: B

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182. Let $\overline{V} = 2i + j - k$ and $\overline{W} = i + 3k$

If $\overline{U}$ is a unit vector, then the max imum value of the scalar triple product

$[\overline{U}\overline{V}\overline{W}]$ is

A. -1

B. $\sqrt{10} + \sqrt{6}$

C. $\sqrt{59}$

D. $\sqrt{60}$

Answer: C

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183. If $\overline{a} = i + j + k, \overline{a}.\overline{b} = 1$ and $\overline{a} \times \overline{b} = j - k$, then : $\overline{b}$=

A. i - j + k

B. 2j - k

C. i

D. 2i

Answer: C

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184. Volume of parallelopiped determined by vectors $\bar{a}$ and $\bar{b}$ and $\bar{c}$ is 2. Then the volume of the parallelepiped determined by vectors $2(\bar{a} \times \bar{b}), 3(\bar{b} \times \bar{c})$ and $(\bar{c} \times \bar{a})$ is

A. 100

B. 30

C. 24

D. 60

Answer: C

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185. Volume of parallelepiped determined by vectors $\bar{a}$, $\bar{b}$ and $\bar{c}$ is 5.

Then the volume of the parallelepiped determined by the vectors $3(\bar{a}+\bar{b}).\ (\bar{b}+\bar{c})$ and $2(\bar{c}+\bar{a})$ is

A. 100

B. 30

C. 24

D. 60

Answer: D

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186. Area of a triangle with adjacent sides determined by vectors $\vec{a}$ and $\vec{b}$ is 20. Then the area of the triangle with adjacent sides determined by vectors $\left(2\vec{a}+3\vec{b}\right)$ and $\left(\vec{a}-\vec{b}\right)$ is

A. 100

B. 30

C. 24

D. 60

Answer: A

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187. Area of a parallelogram with adjacent sides determined by vectors $\vec{a}$ and $\vec{b}$ is 30. Then the area of the parallelogram with adjacentsides determined by vectors $\left(\vec{a}+\vec{b}\right)$ and $\vec{a}$ is

A. 100

B. 30

C. 24

D. 60

Answer: B

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Previous Years Mht Cet Exam Questions

1. $[\bar{a}-\bar{b} \quad \bar{b}-\bar{a} \quad \bar{c}-\bar{a}]=$

A. $2[\bar{a} \quad \bar{b} \quad \bar{c}]$

B. $[\bar{a} \quad \bar{b} \quad \bar{c}]$

C. 0

D. 1

Answer: C

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2. $\overline{OA}=\bar{a}, \overline{OB}=\bar{b}, \overline{OC}=\bar{c}$

then volume of the parallelopiped is :

A. $\bar{a}.\left(\bar{b}\times\bar{c}\right)$

B. $\left(\bar{a}.\bar{b}\right)\times\bar{c}$

C. $\bar{a}\times\bar{b}\times\bar{c}$

D. $\bar{a}\left(\bar{b}.\bar{c}\right)$

Answer: A

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3. If $\bar{a}, \bar{b}, \bar{c}$are the position vectors of the points A, B, C respectively and $2\bar{a}+3\bar{b}-5\bar{c}=\bar{0}$, then find the ratio in which the point C divides line segment AB.

A. 3 : 2 internally

B. 2 : 3 internally

C. 3.: 2 externally

D. 2 : 3 externally

Answer: A

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4. The volume of a parallelopiped whose co-terminus edges are $2\overline{i} - 3\overline{j}, \overline{i} + \overline{j} - \overline{k}$ and $3\overline{i} - \overline{k}$ is :

A. 4 cubic units

B. 6 cubic units

C. 8 cubic units

D. 5 cubic units

Answer: A

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5. If $\left[\vec{a}\,\vec{b}\,\vec{c}\right] \neq 0$ and $\vec{P} = \dfrac{\vec{b} \times \vec{c}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}, \vec{q} = \dfrac{\vec{c} \times \vec{a}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}, \vec{r} = \dfrac{\vec{a} \times \vec{b}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}$, then $\vec{a} . \vec{p} + \vec{b} . \vec{q} + \vec{c} . \vec{r}$ is equal to ....

A. 0

B. 1

C. 2

D. 3

Answer: D

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6. The volume of a parallelopiped whose coterminous edges are $2\vec{a}, 2\vec{b}, 2\vec{c}$, is

A. $2\left[\vec{a}\,\vec{b}\,\vec{c}\right]$

B. $4\left[\vec{a}\ \vec{b}\ \vec{c}\right]$

C. $8\left[\vec{a}\ \vec{b}\ \vec{c}\right]$

D. $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$

Answer: C

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7. The position vectors of vertices of a ΔABC are $4\hat{i}-2\hat{j}$, $\hat{i}+4\hat{j}-3\hat{k}$ and $-\hat{i}+5\hat{j}+\hat{k}$ respectively, then $\angle ABC$ is equal to

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

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8. G is the centroid of ΔABC. If $AG = BC$, then measure of $\angle BGC$is

A. $\overline{GP}$

B. $2\overline{GP}$

C. $3\overline{GP}$

D. $2\overline{GA}$

Answer: C

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9. If $\bar{a} + \bar{b} + \bar{c} = \bar{0}$ then $\bar{a}.\left(\bar{b} \times \bar{c}\right) + \bar{b}.\left(\bar{c} \times \bar{a}\right) + \bar{c}.\left(\bar{a} \times \bar{b}\right)$ is

A. 1

B. 0

C. 2

D. 3

Answer: B

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10. If $\bar{a}, \bar{b}, \bar{c}$ are three non-zero, non-coplanar vectors and $\alpha\bar{a} + \beta\bar{b} + \gamma\bar{c} = 0$ where α, β, γ are scalers then

A. $\alpha = 0, \beta = 0, \gamma = 1$

B. $\alpha = 0, \beta = 0, \gamma = 0$

C. $\alpha = 1, \beta = 0, \gamma = 0$

D. $\alpha = 1, \beta = 1, \gamma = 1$

Answer: B

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Test Your Grasp

1. If ABCDEF is a regular hexagon , then

$\overline{AB}+\overline{AC}+\overline{AE}+\overline{AF}$ =

A. $4\overline{AD}$

B. $3\overline{AD}$

C. $2\overline{AD}$

D. $\overline{AD}$

Answer:

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2. If the origin is the centroid of a triangle ABC having vertices $A(a, 1, 3),\ B(-2, b, -5) and\ C(4, 7, c)$, find the values of $a, b,\ \cdot$

A. (2,2,8)

B. (-2,8,2)

C. (-2,-8,-2)

D. (-2,-8,2)

Answer:

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3. If α, β, γ are direction angles of a line , then $\cos 2\alpha, \cos 2\beta + \cos 2\gamma =$

A. -1

B. 0

C. 1

D. 2

Answer:

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4. If $|\bar{u}| = \sqrt{3}$ and $\bar{u}$ is equally inclined to co - ordinate axes, then vector $\bar{u}$ =

A. i-j-k

B. i-j+k

C. i+j-k

D. i+j+k

Answer:

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5. If vectors 2i-j+k,i+2j-3k and 3i+aj+5k are coplaner, then a=

A. 4

B. -4

C. 2

D. -2

Answer:

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6. If $\bar{a}.\,i = 4,$ then $\bar{a}.\,[j \times (2j - 3k)]$=

A. 12

B. 2

C. 0

D. -12

Answer:

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7. The vector $\overline{AB} = 3\hat{i} + 4\hat{k}$ and $\overline{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC. The length of the median through A is

A. $3\sqrt{2}$

B. $\frac{6}{\sqrt{2}}$

C. $\frac{3}{\sqrt{2}}$

D. $\sqrt{33}$

Answer:

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8. If $\vec{a}\vec{b}$ are non zero and non collinear vectors, then $\left[\vec{a}\ \vec{b}\ \vec{i}\right]\hat{i}+\left[\vec{a}\ \vec{b}\ \vec{j}\right]\hat{j}+\left[\vec{a}\ \vec{b}\ \vec{k}\right]\hat{k}$ is equal to

A. $\bar{a}+\bar{b}$

B. $\bar{a}\times\bar{b}$

C. $\bar{a}-\bar{b}$

D. $\bar{b}\times\bar{a}$

Answer: B

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9. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner vectors and $\bar{p} = \frac{\bar{b} \times \bar{c}}{[\bar{a}\bar{b}\bar{c}]}, \bar{q} = \frac{\bar{c} \times \bar{a}}{[\bar{a}\bar{b}\bar{c}]}, \bar{r} = \frac{\bar{a} \times \bar{b}}{[\bar{a}\bar{b}\bar{c}]}$

then $\bar{a}.\,\bar{p} + \bar{b}.\,\bar{q} + \bar{c}.\,\bar{r} =$

A. 0

B. 1

C. 2

D. 3

Answer:

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10. If direction ratios of two lines are $2, -6, -3$ and $4, 3, -1$ then direction ratios of a line perpendicular to them are

A. 2,3,3

B. 3,-2,6

C. 1,2,3

D. 2,-2,10

Answer:

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11. If the volumes of parallelepiped with coterminus edges $-pj+5k, i-j+qk$ and $3i-5j$ is -8, then

A. 3pq+2=0

B. 3pq-2=0

C. pq+2=0

D. pq-2=0

Answer: A

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12. A line makes 45° with OX, and equal angles with OY and OZ. Then the sum of these three angles is

A. 180°

B. 165°

C. 150°

D. 135°

Answer:

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13. If the points with position vectors -i + 3j + 2k , -4i + 2j - 2k and 5i + λj + μk lie on a straight line in space, then

A. $\lambda = 5, \mu = -10$

B. $\lambda = -5, \mu = 10$

C. $\lambda = 5, \mu = 10$

D. $\lambda = 10, \mu = 5$

Answer:

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14. If $\bar{a}.\bar{b} = \bar{b}.\bar{c} = \bar{c}.\bar{a} = 0$ and $\bar{a}, \bar{b}, \bar{c}$ form a right-handed triad, then $\bar{a}.\left(\bar{b} \times \bar{c}\right)$=

A. a non-zero vector

B. 1

C. -1

D. $|\bar{a}|\left|\bar{b}\right||\bar{c}|$

Answer: D

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15. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner vectors, then $\frac{\bar{a}.\left(\bar{b}\times\bar{c}\right)}{\bar{b}.\left(\bar{c}\times\bar{a}\right)}+\frac{\bar{b}.\left(\bar{a}\times\bar{c}\right)}{\bar{c}.\left(\bar{a}\times\bar{b}\right)}=$

A. 0

B. 1

C. -1

D. 2

Answer:

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16. $i\cdot(j\times k)+j\cdot(k\times i)+k\cdot(i\times j)=$

A. 1

B. 3

C. -3

D. 0

Answer: B

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17. If $\bar{a} = 2i + 3j - k, \bar{b} = -i + 2j - 4k$ and $\bar{c} = i + j + k$, then $(\bar{a} \times \bar{b}).(\bar{a} \times \bar{c}) =$

A. 60

B. 68

C. -60

D. -74

Answer: D

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18. If vectors $2\hat{i} - \hat{j} + \hat{k}$,$\hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + m\hat{j} + 5\hat{k}$ are coplaner, then m is a root of the equation

A. $x^2 + 3x = 4$

B. $x^2 + 2x = 6$

C. $x^2 + 3x = 6$

D. $x^2 - 3x = 4$

Answer: A

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19. $2i \cdot (j \times k) - 3j \cdot (i \times k) - 4k \cdot (i \times j) =$

A. 1

B. -1

C. 9

D. -9

Answer:

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20. If vectors $\bar{a}, \bar{b}, \bar{c}$ are non-coplaner, then $([\bar{a}+2\bar{b}\ \bar{b}+2\bar{c}\ \bar{c}+2\bar{a}])/([\bar{a}\ \bar{b}\ \bar{c}])$=

A. 3

B. 9

C. 8

D. 6

Answer:

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