MATHS

BOOKS - TARGET MATHS (HINGLISH)

VECTORS

Classical Thinking

1. If $\overrightarrow{a} = \hat{i} - \hat{j}$and $\overrightarrow{b} = -2\hat{i} + m\hat{j}$ are two collinear vectors, then $m =$

A. 4

B. 3

C. 2

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

Answer: C

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2. The vectors $\bar{a}$ and $\bar{b}$ are non-collinear The value of x for which the vectors $\overrightarrow{c} = (x-2)\overrightarrow{a} + \overrightarrow{b}$ and $\overrightarrow{d} = (2x+1)\overrightarrow{a} - \overrightarrow{b}$ are collinear, is

A. 1

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

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

D. 3

Answer: C

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3. If $3i - 2j + 5k$ and $-2i + pj - qk$ are collinear vectors, then

A. $p = \frac{4}{3}, q = \frac{-10}{3}$

B. $p = \frac{10}{3}, q = \frac{4}{3}$

C. $p = \frac{-4}{3}, q = \frac{10}{3}$

D. $p = \frac{4}{3}, q = \frac{10}{3}$

Answer: D

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4. The points $A\overline{(a)}, B\overline{(b)}, C\overline{(c)}$ will be collinear if

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

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

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

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

Answer: B

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5. If $\bar{a} = \hat{i} + \hat{j}, \bar{b} = 2\hat{i} - \hat{j}$ and $\bar{r} = 2\hat{i} - 4\hat{j},$ then express $\overrightarrow{r}$ as linear combination of $\bar{a}$ and $\bar{b}$

A. $\bar{r} = 2\bar{a} + 2\bar{b}$

B. $\bar{r} = -2\bar{a} + 2\bar{b}$

C. $\bar{r} = 2\bar{a} - 2\bar{b}$

D. $\bar{r} = -2\bar{a} - 2\bar{b}$

Answer: B

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6. Let

$\overline{A} = (x + 4y)\bar{a} + (2x + y + 1)\bar{b}$ and $\overline{B} = (y - 2x + 2)\bar{a} + (2x - 3y - 1)$

, where $\bar{a}$ and $\bar{b}$ are non-collinear vectors, if $3\overline{A} = 2\overline{B},$ then

A. $x = 1, y = 2$

B. $x = 2, y = 1$

C. $x = 2, y = -1$

D. $x = -1, y = 2$

Answer: C

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7. A vector coplanar with the non-collinear vectors $\bar{a}$ and $\bar{b}$ is

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

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

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

D. $\bar{a} \times 3\bar{b}$

Answer: B

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8. The vectors $\bar{a}, \bar{b}$ and $\bar{a}+\bar{b}$ are

A. Collinear

B. Coplanar

C. Non-coplanar

D. Non-collinear

Answer: B

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9. $\bar{p}$ and $\bar{q}$ are position vectors of two points P and Q. The position vectors of a point which divides PQ internally in the ratio $2:5$ is

A. $\dfrac{\bar{p}+\bar{q}}{7}$

B. $\dfrac{5\bar{p}+2\bar{q}}{7}$

C. $\dfrac{2p+5q}{7}$

D. $\dfrac{\bar{p}-\bar{q}}{7}$

Answer: B

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10. The co-ordinates of the points which divides line segment joining the point $A(2, 3, -1)$ and $B(3, 1, 4)$ internally in the ratio $2:3$ are

A. $\left(\frac{-12}{5}, \frac{-11}{5}, 1\right)$

B. $\left(\frac{12}{5}, \frac{11}{5}, 1\right)$

C. $\left(\frac{-12}{5}, \frac{-11}{5}, \frac{1}{5}\right)$

D. $\left(\frac{12}{5}, \frac{11}{5}, \frac{1}{5}\right)$

Answer: B

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11. If O is origin and C is the mid - point of A (2, -1) and B (-4, 3) . Then value of OC is

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

B. $\hat{i} - \hat{j}$

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

D. $-\hat{i} - \hat{j}$

Answer: C

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12. If the position vectors of the points A and B are $\hat{i} + 3\hat{j} - \hat{k}$ and $3\hat{i} - \hat{j} - 3\hat{k}$, then what will be the position vectors of the mid point of AB

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

B. $2\hat{i} + \hat{j} - 2\hat{k}$

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

D. $\hat{i} + \hat{j} - 2\hat{k}$

Answer: B

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13. Position vectors of a point which divides line joining points A and B whose position vectors are $2\hat{i} + \hat{j} - \hat{k}$ and $\hat{i} - \hat{j} + 2\hat{k}$ externally in the ratio $5:2$ is

A. $\frac{1}{3}\left(\hat{i} - 7\hat{j} + 12\hat{k}\right)$

B. $-\frac{1}{3}\left(\hat{i} + 7\hat{j} - 12\hat{k}\right)$

C. $\hat{i} - 7\hat{j} + 12\hat{k}$

D. $\hat{i} + 7\hat{j} - 12\hat{k}$

Answer: A

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14. If $P \equiv (2, -1, 4), Q \equiv (3, 2, 1)$ then the co-ordinates of the point which divides PQ externally in the ratio $2 : 1$ are

A. $(4, 5, 2)$

B. $(-4, 5, -2)$

C. $(-4, -5, 2)$

D. $(4, 5, -2)$

Answer: D

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15. If the point $A(5, a, -1), B(2, -7, k)$ and $P\left(\frac{17}{4}, \frac{11}{4}, 0\right)$ are collinear, then the ratio in whihc P divides AB is

A. $1 : 2$

B. $3 : 1$

C. $2 : 1$

D. $1:3$

Answer: D

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16. If $A(2, 3, -4), B(m, 1, -1), C(3, 2, 2)$ and $G(3, 2, n)$ is the centroid of ΔABC, then the values of m and n respectively are

A. $-4, 1$

B. $3, 4$

C. $4, 3$

D. $4, -1$

Answer: D

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17. If $A(a, 2, 2), B(a, b, 1)$ and $C(1, 2, -2)$ are the vertices of triangle ABC and $G(2, 1, c)$ is centroid, then values of a, b and c are

A. $a = \frac{1}{2}, b = 1, c = 1$

B. $a = \frac{5}{2}, b = -1, c = \frac{1}{3}$

C. $a = -1, b = 1, c = \frac{3}{2}$

D. $a = \frac{1}{2}, b = \frac{1}{2}, c - 1$

Answer: B

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18. If $\hat{i}, \hat{j}, \hat{k}$ are the unit vectors and mutually perpendicular, then $\left[\hat{i}\hat{k}\hat{j}\right]$ is equal to

A. 0

B. -1

C. 1

D. 2

Answer: B

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19. The scalar triple product of the vectors $2\hat{i}, 3\hat{j}$ and $-5\hat{k}$ is

A. 0

B. 10

C. -15

D. -30

Answer: D

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20. The value of $\left(\hat{i}+\hat{j}\right).\left[\left(\hat{j}+\hat{k}\right)\times\left(\hat{k}+\hat{i}\right)\right]$ is

A. 0

B. 1

C. -1

D. 2

Answer: D

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21. If $\bar{a} = \hat{i} - \hat{j} + \hat{k}, \bar{b} = \hat{i} + \hat{j} - 4\hat{k}, \bar{c} = -\hat{i} + 2\hat{j} - \hat{k}$, then $[\bar{a}\bar{b}\bar{c}] =$

A. 2

B. 3

C. 6

D. 5

Answer: D

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22. If $\bar{a} = 3\hat{i} - 2\hat{j} + 2\hat{k}, \bar{b} = 6\hat{i} + 4\hat{j} - 2\hat{k}$ and $\bar{c} = 3\hat{i} - 2\hat{j} - 4\hat{k}$, then $\bar{a}(\bar{b} \times \bar{c})$ is

A. 122

B. -144

C. 120

D. -120

Answer: B

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23. Let $\bar{a}, \bar{b}$ and $\bar{c}$ three vectors, Then scalar triple product $[\bar{a}\bar{b}\bar{c}]$ is equal to

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

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

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

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

Answer: D

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24. If $\bar{a}, \bar{b}, \bar{c}$ are three vectors, then $\left[\bar{a}, \bar{b}, \bar{c}\right]$ is not equal to

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

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

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

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

Answer: D

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25. $\left[\hat{i}\,\hat{k}\,\hat{j}\right] + \left[\hat{k}\,\hat{j}\,\hat{i}\right] + \left[\hat{j}\,\hat{k}\,\hat{i}\right]$

A. 1

B. 3

C. -3

D. -1

Answer: D

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26. The scalar triple product of vectors is zero if_____

A. One of the vectors is zero vectors

B. Any two vectors are non-collinear

C. the three vectors are non-coplanar

D. All of the above

Answer: A

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27. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors then $\left[\bar{a}+2\bar{b} \quad \bar{a}+\bar{c} \quad \bar{b}\right] =$

A. 0

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

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

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

Answer: C

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28. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors, then three points with position vectors $\bar{a} - 2\bar{b} + 3\bar{c}, 2\bar{a} + m\bar{b} - 4\bar{c}$ and $-7\bar{b} + 10\bar{c}$ will be collinear if m equals

A. 2

B. 3

C. 0

D. -1

Answer: B

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29. The vectors $\hat{i} + 2\hat{j} + 3\hat{k}, \lambda\hat{i} + 4\hat{j} + 7\hat{k}$ and $-3\hat{i} - 2\hat{j} - 5\hat{k}$ are collinear, if λ equals

A. 3

B. 4

C. 5

D. 6

Answer: A

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30. If $\bar{a}, \bar{b}, \bar{c}$ are any vectors, then which of these sets of vectors are coplanar

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

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. $\bar{a}+2\bar{b}, \bar{b}+2\bar{c}, \bar{c}+2\bar{a}$

Answer: C

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31. If $\bar{a} = \hat{i} - \hat{j} + \hat{k}, \bar{b} = \hat{i} + 2\hat{j} - \hat{k}$ and $\bar{c} = 3\hat{i} + p\hat{j} + 5\hat{k}$ are coplanar then the value of p will be

A. -6

B. -2

C. 2

D. 6

Answer: A

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32. If the vectors $\hat{i} + 3\hat{j} - 2\hat{k}, 2\hat{i} - \hat{j} + 4k$ and $3\hat{i} + 2\hat{j} + x\hat{k}$ are coplanar, then the value of x is

A. -2

B. 2

C. 1

D. 3

Answer: B

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33. If vectors $\hat{i}+\hat{j}+\hat{k}, \hat{j}-\hat{i}, \hat{i}+2\hat{j}+a\hat{k}$ are coplanar, then a is equal to

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

B. 3

C. -3

D. 0

Answer: A

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34. For any vectors $\bar{a}, \bar{b}, \bar{c}$ correct statement is

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

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

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

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

Answer: D

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35. $\left[\bar{a} \quad \bar{b} \quad \bar{a} \times \bar{b}\right]$ is equal to

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

B. $\left|\bar{a} \times \bar{b}\right|^2$

C. 0

D. None of these

Answer: B

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36. If $\bar{a}$ and $\bar{b}$ be parrallel vectors, then $\begin{bmatrix}\bar{a} & \bar{c} & \bar{b}\end{bmatrix} =$

A. 0

B. 1

C. 2

D. 3

Answer: A

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

A. $\bar{a}.\left(\bar{b} \times \bar{c}\right) = 1$

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

C. $\left(\bar{a}\times\bar{b}\right).\,c=0$

D. $(\bar{c}\times\bar{a}).\,b=1$

Answer: C

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38. If $\bar{a}=\frac{11}{2}\hat{i}, \bar{b}=12\hat{j}$ and $\bar{c}=\frac{13}{3}\hat{k}$ represents the three co-terminus edges of a parallelopiped, then its volume is given by

A. 510

B. 145

C. 286

D. 268

Answer: C

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39. Three concurrent edges OA, OB, OC of a parallelopiped are represented by three vectors $2\hat{i}+\hat{j}-\hat{k}, \hat{i}+2\hat{j}+3\hat{k}$ and $-3\hat{i}-\hat{j}+\hat{k}$ the volume of the solid so formed in cubic unit is

A. 5

B. 6

C. 7

D. 8

Answer: A

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40. If $\bar{a}=-3\hat{i}+7\hat{j}+5\hat{k}, \bar{b}=-3\hat{i}+7\hat{j}-3\hat{k}$ and $c=7\hat{i}-5\hat{j}-3\hat{k}$ are the three coterminus edges of a parallelopiped, then its volume is

A. 108

B. 210

C. 272

D. 308

Answer: C

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41. The volume of the tetrahedron whose vertices are $A(1, -1, 10), B(-1, -3, 7), C(5, -1, 1)$ and $D(7, -4, 7)$ is

A. 26

B. 29

C. 32

D. None of these

Answer: B

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42. The volume of the tetrahedron with vertices $5\hat{i} - \hat{j} + \hat{k}, 7\hat{i} - 4\hat{j} + 7\hat{k}, \hat{i} - 6\hat{j} + 10\hat{k}$ and $-\hat{i} - 3\hat{j} + 7\hat{k}$ is

A. 7

B. 3

C. 15

D. 11

Answer: D

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43. The sum of the three vectors determined by the medians of triangle directed from the vertices is

A. 0

B. 1

C. -1

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

Answer: A

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Critical Thinking

1. The points with respective position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}, x\hat{i}-52\hat{j}$ are collinear if x is equal to

A. -40

B. 40

C. 20

D. -20

Answer: A

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2. If the vectors $\hat{i} + 2\hat{k}, \ \hat{j} + \hat{k}$ and $\lambda\hat{i} + \mu\hat{j}$ collinear, then

A. $\lambda = 2, \mu = 1$

B. $\lambda = 2, \mu = -1$

C. $\lambda = -1, \mu = 2$

D. $\lambda = -1, \mu = -2$

Answer: C

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3. If the vectors $-\hat{i} + 3\hat{j} + 2\hat{k}, \ -4\hat{i} + 2\hat{j} - 2\hat{k}$ and $5\hat{i} + \lambda\hat{j} + \mu\hat{k}$ are collinear then

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

B. $\lambda = 2, \mu = -1$

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

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

Answer: A

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4. If three points A,B and C have position vectors (1,x,3),(3,4,7) and (y,-2,-5), respectively and if they are collinear, then find (x,y).

A. $2, -3$

B. $-2, 3$

C. $2, 3$

D. $-2, -3$

Answer: A

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5. If the position vectors of the point A, B, C be $\hat{i}+\hat{j}, \hat{i}-\hat{j}$ and $a\hat{i}+b\hat{j}+c\hat{k}$ respectively then the point A, B, C are collinear if

A. $a=b=c=1$

B. $a=1, b$ and c are arbitary scalars

C. $a=b=c=0$

D. $c=0, a=1$ and b is arbitary scalar

Answer: D

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6. Three points whose position vectors are $\bar{a}+\bar{b}, \bar{a}-\bar{b}$ and $\bar{a}+k\bar{b}$ are collinear, then the value of k is

A. Zero

B. Only negative real number

C. Only positive real number

D. Every real number

Answer: D

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7. If $\bar{a}, \bar{b}$ and $\bar{c}$ be there non-zero vectors, no two of which are collinear. If the vectors $\bar{a} + 2\bar{b}$ is collinear with $\bar{c}$ and $\bar{b} + 3\bar{c}$ is collinear with a, then (λ being some non-zero scalar)$\bar{a} + 2\bar{b} + 6\bar{c}$ is equal to

A. $\lambda\bar{a}$

B. $\lambda\bar{b}$

C. $\lambda\bar{c}$

D. 0

Answer: D

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8. If the points A, B, C and D have position vectors $\bar{a}, 2\bar{a}+\bar{b}, 4\bar{a}+2\bar{b}$ and $5\bar{a}+4\bar{b}$ respectively, then three collinear points are

A. A, B, D

B. A, B, C

C. B, C, D

D. A, C, D

Answer: A

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9. If $\bar{a} = 2\bar{p} + 3\bar{q} - \bar{r}, \bar{b} = \bar{p} - 2\bar{q} + 2\bar{r}$ and $\bar{c} = -2\bar{p} + \bar{q} - 2\bar{r}$ and $\overline{R} = 3\bar{p}$

where $\bar{p}, \bar{q}, \bar{r}$ are non-coplanar vectors, then $\overline{R}$ in terms of $\bar{a}, \bar{b}, \bar{c}$ is

A. $5\bar{a} + 2\bar{b} + 3\bar{c}$

B. $3\bar{a} + 5\bar{b} + 2\bar{c}$

C. $2\bar{a} + 5\bar{b} + 3\bar{c}$

D. $5\bar{a} + 3\bar{b} + 2\bar{c}$

Answer: C

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10. If $\bar{a} + \bar{b} + \bar{c} = \lambda \bar{d}$ and $\bar{b} + \bar{c} + \bar{d} = \mu \bar{a}$ and $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar, then $\bar{a} + \bar{b} + \bar{c} + \bar{d}$ is equal to

A. $\mu \bar{b}$

B. $\lambda \bar{a}$

C. $\bar{0}$

D. $(\lambda \mid \mu)\bar{a}$

Answer: C

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11. A and B are two points. The position vector of A is 6b-2a. A point P divides the line AB in the ratio 1:2. if a-b is the position vector of P, then the position vector of B is given by

A. $7\bar{a} - 15\bar{b}$

B. $7\bar{a} + 15\bar{b}$

C. $15\bar{a} - 7\bar{b}$

D. $15\bar{a} + 7\bar{b}$

Answer: A

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12. 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. $2:3$

B. $3:2$

C. $3:5$

D. $5:2$

Answer: B

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13. If $\overline{OA} = \hat{i} + 3\hat{j} - 2\hat{k}$ and $\overline{OB} = 3\hat{i} + \hat{j} - 2\hat{k}$, then the vectors $\overline{OC}$ which bisects $\angle AOB$ is equal to

A. $\hat{i} - \hat{j} - \hat{k}$

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

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

D. $2\left(\hat{i}+\hat{j}-\hat{k}\right)$

Answer: D

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14. $\bar{a}, \bar{b}$ are position vectors of points A and B. If P divides AB in the ratio $3:1$ and Q is the mid-point of AP, then position vectors of Q will be

A. $\frac{1}{2}(\bar{a}-\bar{b})$

B. $\frac{1}{2}(\bar{a}+\bar{b})$

C. $\frac{1}{8}(5\bar{a}+3\bar{b})$

D. $\frac{1}{8}(5\bar{a}-3\bar{b})$

Answer: C

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15. If $2\bar{a}+\bar{b}=3\bar{c}$, then A divides BC in the ratio

A. $3:1$ externally

B. $3:1$ internally

C. $1:3$ externally

D. $1:3$ internally

Answer: A

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16. In ΔABC, P is the mid point of BC,Q divides CA internally in the ratio $2:1$ and R divides AB externally in the ratio $1:2$ then

A. R divides PQ externally in the ratio $2:1$

B. P,Q,R are collinear

C. P divides QR externally in the ratio $3:2$

D. Q divides PR internally in the ration $3:2$

Answer: B

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17. If $\vec{a} = \hat{i} - \hat{k}, \vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k}$ and $\overset{c}{=} y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$. Then $\left[\vec{a}, \vec{b}, \vec{c}\right]$ depends on

A. only x

B. only y

C. neither x nor y

D. both x and y

Answer: C

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18. If the points $(1, 1, 2), (2, 1, p), (1, 0, 3)$ and $(2, 2, 0)$ are co-planar then value of p is

A. 1

B. 2

C. -1

D. 0

Answer: A

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19. If the points A, B, C and D with position vectors $\hat{i} + \hat{j} + \hat{k}, 2\hat{i} + 3\hat{j} + \hat{k}, \hat{i} + 2\hat{j} + 5\hat{k}$ and $\lambda\hat{i} + 3\hat{j} + 4\hat{k}$ are coplanar then λ is equal to

A. 5

B. 7

C. 2

D. $\frac{13}{8}$

Answer: D

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20. If $a\hat{i}+\hat{j}+\hat{k}, \hat{i}-b\hat{j}+\hat{k}, \hat{i}+\hat{j}-c\hat{k}$ are coplanar, then $abc+2$ is equal to

A. $a+b-c$

B. $a-b-c$

C. $a+b+c$

D. $a-b+c$

Answer: B

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21. If the given vectors $\left(-bc, b^2+bc, c^2+bc\right)\left(a^2+ac, -ac, c^2+ac\right)$ and $\left(a^2+ab, b^2+ab, -\right.$

are coplanar, where none of a, b and c is zero then

A. $a^2+b^2+c^2=1$

B. $bc+ca+ab=0$

C. $a+b+c=0$

D. $a^2+b^2+c^2=bc+ca+ab$

Answer: B

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22. If $\bar{a}, \bar{b}, \bar{c}$ are non-zero, non collinear vectors, then the vectors $\bar{a}-\bar{b}+\bar{c}, 4\bar{a}-7\bar{b}-\bar{c}$ and $3\bar{a}+6\bar{b}+6\bar{c}$ are

A. collinear

B. Coplanar

C. both collinear and co-planar

D. neither collinear nor coplanar

Answer: D

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23. Given vectors $\bar{a}, \bar{b}, \bar{c}$ such that $\bar{a}.\left(\bar{b}\times\bar{c}\right)=\lambda\neq 0$ the value of $\left(\bar{b}\times\bar{c}\right).\left(\bar{a}+\bar{b}+\bar{c}\right)/\lambda$ is

A. 3

B. 1

C. -3λ

D. $\frac{3}{\lambda}$

Answer: B

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24. For any three vectors $\bar{a}, \bar{b}$ and $\bar{c}$, $(\bar{a}-\bar{b})\left[(\bar{b}+\bar{c})\times(\bar{c}+\bar{a})\right]$ is equal to:

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

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

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

D. 0

Answer: D

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

A. 0

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

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

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

Answer: C

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26. If $\bar{r} = l(\bar{b} \times \bar{c}) + m(\bar{c} \times \bar{a}) + n(\bar{a} \times \bar{b})$ and $[\bar{a}\bar{b}\bar{c}] = 2,$ then $l + m + n$ is equal to

A. $(\bar{a} + \bar{b} + \bar{c})\bar{r}$

B. $\frac{\bar{1}}{2}(\bar{a} + \bar{b} + \bar{c})\bar{r}$

C. $\frac{1}{3}(\bar{a} + \bar{b} + \bar{c})(\bar{a} + \bar{b} + \bar{c})$

D. $\frac{2}{3}(\bar{a} + \bar{b} + \bar{c})\bar{r}$

Answer: B

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27. The volume of parallelopiped with vector $\bar{a}+2\bar{b}-\bar{c}, \bar{a}-\bar{b}$ and $\bar{a}-\bar{b}-\bar{c}$ is equal to $k\left[\bar{a}\bar{b}\bar{c}\right]$ then $k=$

A. -3

B. 3

C. 2

D. -2

Answer: B

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28. If the volume of parallelopiped with coterminus edges $-p\hat{i}+5k, \hat{i}-\hat{j}+q\hat{k}$ and $3\hat{i}-5\hat{j}$ is 8 then

A. $5pq+18=0$

B. $3pq-18=0$

C. $pq+18=0$

D. $pq - 18 = 0$

Answer: A

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29. If the volumes of tetrahearon where vertices $(1, 2, 0), (2, 0, 4), (-1, 2, 0)$ and $(-1, 1, \lambda)$ is $\frac{2}{3}cu$, unit, find the value of λ

A. 0

B. 1

C. 4

D. -2

Answer: B

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30. 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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31. 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. $\sqrt{288}$

B. $\sqrt{18}$

C. $\sqrt{72}$

D. $\sqrt{33}$

Answer: D

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32. If G and G' are the centroids of the triangle ABC and $A'B'C'$, then the value of $\overline{AA'} + \overline{BB'} + \overline{CC'}$ equals

A. $\overline{GG'}$

B. $2\overline{GG'}$

C. $3\overline{GG'}$

D. $\frac{2}{3}\overline{GG'}$

Answer: C

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33. If S is circumcentre, O is orthocentre of ΔABC, then $\overrightarrow{SA} + \overrightarrow{SB} + \overrightarrow{SC}$ =

A. $\overline{SO}$

B. $2\overline{SO}$

C. $\overline{OS}$

D. $2\overline{OS}$

Answer: A

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34. If $A(-3, -2, 0), B(3, -3, 1)$ and $C(5, 0, 2)$ are three successive vertices of parallelogram $ABCD$, then its fourth vertex D is

A. $(1, 1-1)$

B. $(-1, 1, 1)$

C. $(1, -1, 1)$

D. $(2, -3, 5)$

Answer: B

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35. In a trapezium, if the vectors $\overline{BC} = \lambda(AD), \overline{P} = \overline{AC} + \overline{BD}$ is collinear with $\overline{AD}$ and $\overline{P} = \mu \overline{AD}$, then

A. $\mu = \lambda + 1$

B. $\lambda = \mu + 1$

C. $\lambda + \mu = 1$

D. $\mu = 2 + \lambda$

Answer: A

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Competitive Thinking

1. If the point $(1, 0), (0, 1)$ and $(x, 8)$ are collinear, then the value of x is equal to

A. 5

B. -6

C. 6

D. -7

Answer: D

Watch Video Solution

2. The points with position vectors $20\hat{i}+p\hat{j}, 5\hat{i}-\hat{j}$ and $10\hat{i}-13\hat{j}$ are collinear. The value of p is

A. 7

B. -37

C. -7

D. 37

Answer: B

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3. If the points $P(\bar{a}+2\bar{b}+\bar{c})$. $Q(2\bar{a}+3\bar{b})$ and $R(\bar{b}+t\bar{c})$ are collinear, where $\bar{a}, \bar{b}, \bar{c}$ are three non-coplanar vectors, then the value of t is

A. -2

B. $-\frac{1}{2}$

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

D. 2

Answer: D

Watch Video Solution

4. If the position vectors of the points A, B, C are $\bar{a}, \bar{b}$ and $3\bar{a}-2\bar{b}$ respectively, then the position A, B, C are

A. Collinear

B. Non-collinear

C. Forming a right angled triangle

D. None of these

Answer: A

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5. 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. $\bar{c}$

B. $\bar{0}$

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

D. $\bar{a}$

Answer: B

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6. If the vectors $3\hat{i}+2\hat{j}-\hat{k}$ and $6\hat{i}-4x\hat{j}+y\hat{k}$ are parallel, then the value of x and y will be

A. $-1, -2$

B. $1, -2$

C. $-1, 2$

D. $1, 2$

Answer: A

Watch Video Solution

7. If the vectors $3\hat{i}+\hat{j}-5\hat{k}$ and $a\hat{i}+b\hat{j}-15\hat{k}$ are collinear, if

A. $a=3, b=1$

B. $a=9, b=1$

C. $a = 3, b = 3$

D. $a = 9, b = 3$

Answer: D

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8. 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. $x = 0$, but y is not necessarily zero

B. $y = 0$, but x is nont necessary zero

C. $x = 0, y = 0$

D. None of these

Answer: C

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9. If $\bar{a}, \bar{b}, \bar{c}$ are non-collinear vectors such that for some scalar $x, y, z, x\bar{a} + y\bar{b} + z\bar{c} = 0$, then

A. $x = 0, y = 0, z = 0$

B. $x \neq 0, y \neq , z = 0$

C. $x = 0, y \neq 0, z \neq 0$

D. $x \neq 0, y \neq 0z \neq 0$

Answer: A

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10. $\overrightarrow{a}$ and $\overrightarrow{b}$ are two non collinear vectors then $x\overrightarrow{a} + y\overrightarrow{b}$ (where x and y are scalars) represents a vector which is (A) parallel to vecb(B)parallel to $\overrightarrow{a}$ (C) coplanar with $\overrightarrow{a}$ and $\overrightarrow{b}$ (D) none of these

A. Parallel to $\bar{b}$

B. Parallel to $\bar{a}$

C. Coplanar with $\bar{a}$ and $\bar{b}$

D. None of these

Answer: C

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11. If $\bar{a} = \hat{i} + \hat{j} - 2\hat{k}, \bar{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\bar{c} = 3\hat{i} + \hat{k}$ and $\bar{c} = m\bar{a} + n\bar{b}$ then $m + n$

A. 0

B. 1

C. 2

D. -1

Answer: C

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12. The position vectors of the point which divides internally in the ratio $2:3$ the join of the points $2\bar{a}-3\bar{b}$ and $3\bar{a}-2\bar{b}$, is

A. $\frac{12}{5}\bar{a}+\frac{13}{5}\bar{b}$

B. $\frac{12}{5}\bar{a}-\frac{13}{5}\bar{b}$

C. $\frac{3}{5}\bar{a}-\frac{2}{5}\bar{b}$

D. $\frac{2}{5}\bar{a}=\frac{3}{5}\bar{b}$

Answer: B

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13. Let $A(1,-1,2)$ and $B(2,3-1)$ be two points. If a point P divides AB internally in the ratio $2:3$, then the position vector of P is

A. $\frac{1}{\sqrt{5}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

B. $\frac{1}{\sqrt{3}}\left(\hat{i}+6\hat{j}+\hat{k}\right)$

C. $\frac{1}{\sqrt{3}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

D. $\frac{1}{5}\left(7\hat{i}+3\hat{j}+4\hat{k}\right)$

Answer: D

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14. If z_1 and z_2 are z co-ordinates of the point of trisection of the segment joining the points $A(2, 1, 4), B(-1, 3, 6)$ then $z_1+z_2=$

A. 1

B. 4

C. 5

D. 10

Answer: D

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15. If the position vector of a point A is $\vec{a} + 2\vec{b}$ and $\vec{a}$ divides AB in the ratio $2:3$, then the position vector of B, is

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

B. $\bar{a}$

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

D. $\bar{b}$

Answer: C

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16. Assertion (A): If $(-1, 3, 2)$ and $(5, 3, 2)$ are respectively the orthocentre and circumcentre of a triangle, then $(3, 3, 2)$ is its centroid.
Reason (R): Centroid of a triangle divides the line segment joining the orthocentre and the circumcentre in the ratio $1:2$,

A. A and R are true and R is correct explanation to A.

B. A and R are true but R is not the correct explanation to A.

C. A is true, R is false.

D. A is false. R is true.

Answer: C

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17. If the orthocentre and centroid of a triangle are $(-3, 5, 2)$ and $(3, 3, 4)$ respectively, then its circumcentre is

A. $(6, 2, 5)$

B. $(6, 2, -5)$

C. $(6, -2, 5)$

D. $(6, -2, -5)$

Answer: A

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18. L and M are two points with position vectors $2\vec{a} - \vec{b}$ and $\vec{a} + 2\vec{b}$, respectively. The position vector of the pont N which divides the line segment LM in the ratio 2:1 externally is

A. $3\bar{b}$

B. $4\bar{b}$

C. $5\bar{b}$

D. $3\bar{a} + 4\bar{b}$

Answer: C

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19. The position vector of a point R which divides the line joining two points P and Q whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} - \hat{k}$ respectively, in the ratio $2:1$ externally is

A. $-3\hat{i}-\hat{k}$

B. $3\hat{i}+\hat{k}$

C. $2\hat{i}+\hat{j}-\hat{k}$

D. None of these

Answer: A

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20. If $3\overline{P}+2\overline{R}-5\overline{Q}=\bar{0}$, then

A. P, Q, R are collinear

B. P, Q, R vertices of a Δ

C. Q divides PR externally

D. None of these

Answer: A

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21. If three points A,B,C are collinear, whose position vectors are $\hat{i}-2\hat{j}-8\hat{k}, 5\hat{i}-2\hat{k}$ and $11\hat{i}+3\hat{j}+7\hat{k}$ respectively, then the ratio in which B divides AC is

A. $1:2$

B. $2:3$

C. $2:1$

D. $1:1$

Answer: B

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22. Let $\square PQRS$ be a quadrilateral. If M and N are the mid-points of the sides PQ and RS respectively, then PS+QR=

A. $3\overline{MN}$

B. $4\overline{MN}$

C. $2\overline{MN}$

D. $2\overline{NM}$

Answer: C

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23. In ΔABC, L, M, N are points on BC, CA, AB respectively, dividing them in the ratio $1:2, 2:3, 3:5,$ if the point K divides AB in the ratio $5:3,$ then $\dfrac{\left|\overline{AL}+\overline{BM}+\overline{CN}\right|}{\left|\overline{CK}\right|}=$

A. $\dfrac{1}{15}$

B. $\dfrac{2}{5}$

C. $\dfrac{5}{8}$

D. $\dfrac{3}{5}$

Answer: A

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24. Let G be the centroid of a triangle ABC and O be any other point, then $\overline{OA}+\overline{OB}+\overline{OC}$ is equal to

A. $\bar{0}$

B. $\overline{OG}$

C. $3\overline{OG}$

D. None of these

Answer: C

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25. If A, B, C are the vertices of a triangle whose position vectros are $\vec{a}, \vec{b}, \vec{c}$ and G is the centroid of the ΔABC, then $\overline{GA}+\overline{GB}+\overline{GC}=$

A. $\bar{0}$

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

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

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

Answer: A

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26. If $\bar{a}=2\hat{i}+\hat{j}-\hat{k}, \bar{b}=\hat{i}+2\hat{j}+\hat{k}$ and $\bar{c}=\hat{i}-\hat{j}+2\hat{k}$, then $\bar{a}.\left(\bar{b}\times\bar{c}\right)=$

A. 6

B. 10

C. 12

D. 24

Answer: C

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27. If $\bar{a} = \hat{i} + \hat{j} + \hat{k}, \bar{b} = 2\hat{i} + \lambda\hat{j} + \hat{k}, \bar{c} = \hat{i} - \hat{j} + 4\hat{k}$ and $\bar{a}.\left(\bar{b} \times \bar{c}\right) =$

, then λ is equal to

A. 6

B. 7

C. 9

D. 10

Answer: A

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28. If $\bar{a}$ is perpendicular to $\bar{b}$ and $\bar{c}$, $|\bar{a}| = 2, \left|\bar{b}\right| = 3, |\bar{c}| = 4$ and the angle between $\bar{b}$ and $\bar{c}$ is $\frac{2\pi}{3}$. then $\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

Answer: C

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29. If $\bar{a}, \bar{b}, \bar{c}$ are mutually prependicular vectors having megnitudes $1, 2, 3$ respectively, then $\left[\bar{a} + \bar{b} + \bar{c}\bar{b} - \bar{a} \quad \bar{c}\right] =$

A. 0

B. 6

C. 12

D. 18

Answer: C

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30. The value of $\left[\bar{a}-\bar{b}, \bar{b}-\bar{c}, \bar{c}-\bar{a}\right]$, where $|\bar{a}|=1, |\bar{b}|=5 \text{ and } |\bar{c}|=3$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

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31. The value of $(\bar{a}-\bar{b}).\left[(\bar{b}-\bar{c}) \times (\bar{c}-\bar{a})\right]$ is

A. 0

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

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

D. None of these

Answer: A

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32. If a vector $\overline{\alpha}$ lie in plane $\bar{\beta}$ and $\bar{\gamma}$ then which is correct

A. $\left[\overline{\alpha}, \bar{\beta}, \bar{\gamma}\right] = 0$

B. $\left[\overline{\alpha}, \bar{\beta}, \bar{\gamma}\right] = 1$

C. $\left[\overline{\alpha}, \bar{\beta}, \bar{\gamma}\right] = 3$

D. $\left[\bar{\beta}, \bar{\gamma}, \overline{\alpha}\right] = 1$

Answer: A

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33. If $\bar{a}, \bar{b}, \bar{c}$ are three coplanar vectors, then $\left[\bar{a}+\bar{b} \quad \bar{b}+\bar{c} \quad \bar{c}+\bar{a}\right] =$

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

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

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

D. 0

Answer: D

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34. If $\bar{a}, \bar{b}, \bar{c}$ be any three non-coplanar vectors, then $\left[\bar{a}+\bar{b} \quad \bar{b}+\bar{c} \quad \bar{c}+\bar{a}\right] =$

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

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

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

D. $2\left[\bar{a} \quad \bar{b} \quad \bar{c}\right]^2$

Answer: B

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35. Let $\overline{A} = \hat{i} + \hat{j} + \hat{k}, \overline{B} = \hat{i}, \overline{C} = C_1 \hat{i} + C_2 \hat{j} + C_3 \hat{k}$ if $C_2 = -1$ and $C_3 = 1$, then make three vectors coplanar

A. $C_1 = 0$

B. $C_1 = 1$

C. $C_1 = 2$

D. No value of C_1 can be found

Answer: D

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36. If the vectors $2\hat{i} - \hat{j} + \hat{k}, \hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ be coplanar, then $\lambda =$

A. -1

B. -2

C. -3

D. -4

Answer: D

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37. If the vectors $\lambda\hat{i}+\hat{j}+2\hat{k}$, $\hat{i}+\lambda\hat{j}-\hat{k}$ and $2\hat{i}-\hat{j}+\lambda\hat{k}$ are coplanar if

A. $\lambda=-2$

B. $\lambda=0$

C. $\lambda=2$

D. $\lambda=1$

Answer: A

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38. If the vectors $4\hat{i} + 11\hat{J} + m\hat{k}, 7\hat{i} + 2\hat{j} + 6\hat{k}$ and $\hat{i} + 5\hat{j} + 4\hat{k}$ are coplanar, then m is equal to

A. 38

B. 0

C. 10

D. -10

Answer: C

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39. If the vectors $2\hat{i} + 2\hat{j} + 6\hat{k}, 2\hat{i} + \lambda\hat{j} + 6\hat{k}, 2\hat{i} - 3\hat{j} + \hat{k}$ are coplanar, then the value of λ is

A. -10

B. 1

C. 0

D. 2

Answer: D

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40. If the four points with position vectors $-2\hat{i}+\hat{j}+\hat{k}, \hat{i}+\hat{j}+\hat{k}, \hat{j}-\hat{k}$ and $\lambda\hat{j}+\hat{k}$ are coplanar, then $\bar{\lambda}=$

A. 1

B. 2

C. -1

D. 0

Answer: A

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41. If the vectors $\bar{a} = \hat{i} + \hat{j} + \hat{k}, \bar{b} = \hat{i} - \hat{j} - 2\hat{k}$ and $\bar{c} = x\hat{i} + (x-2)\hat{j} - \hat{k}$ are coplanar, then $x =$

A. 1

B. 2

C. 0

D. -2

Answer: D

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42. If the point having the position vectors $3\hat{i} - 2\hat{j} - \hat{k}, 2\hat{i} + 3\hat{j} - 4\hat{k}, -\hat{i} + \hat{j} + 2\hat{k}$ and $4\hat{i} + 5\hat{j} + \lambda\hat{j}k$ are coplanar then $\lambda =$

A. -8

B. 8

C. $\dfrac{146}{17}$

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

Answer: D

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43. If $\bar{a}, \bar{b}$ and $\bar{c}$ are non-coplanar vectors and the four points with position vectors $2\bar{a}+3\bar{b}-\bar{c}, \bar{a}-2\bar{b}+3\bar{c}, 3\bar{a}+4\bar{b}-2\bar{c}, k\bar{a}-6\bar{b}+6\bar{c}$ are coplanar, then k

A. 0

B. 1

C. 2

D. 3

Answer: B

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44. If the vectors $a\hat{i}+\hat{j}+\hat{k}, \hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}$ are coplanar $(a \ne b \ne c \ne 1)$, then the value of $abc-(a+b+c)=$

A. 2

B. -2

C. 0

D. -1

Answer: B

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45. The number of distinct real value of λ, for which the vector $-\lambda^2\hat{i}+\hat{j}+\hat{k}, \hat{i}-\lambda^2\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}-\lambda^2\hat{k}$ are coplanar,is

A. Zero

B. One

C. Two

D. Three

Answer: C

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46. The number of distinct real values of λ for which the vectors $\bar{a} = \lambda^3 \hat{i} + \hat{k}, \bar{b} = \hat{i} - \lambda^3 \hat{j}$ and $\bar{c} = \hat{i} + (2\lambda - \sin\lambda)\hat{j} - \lambda\hat{k}$ are coplanar is

A. 0

B. 1

C. 2

D. 3

Answer: B

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47. If $\bar{a}, \bar{b}, \bar{c}$ are non coplanar vectros and λ is a real number then the vectors $\overline{+}2\bar{b}+3\bar{c}, \lambda\bar{b}+4\bar{c}$ 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. No value of λ

B. all except one value of λ

C. all except two values of λ

D. all values of λ

Answer: C

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48. If the origin and the point $p(2, 3, 4), q(, 1, 2, 3) R(x, y, z)$ are coplanar then

A. $x - 2y - z = 0$

B. $x + 2y + z = 0$

C. $x - 2y + z = -0$

D. $2x - 2y + z = 0$

Answer: C

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49. A vector perpendicular to $2\hat{i} + \hat{j} + \hat{k}$ and coplanar with $\hat{i} + 2\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + 2\hat{k}$ is

A. $5\left(\hat{j} - \bar{k}\right)$

B. $\hat{i} + 7\hat{j} - \hat{k}$

C. $5\left(\hat{j} + \hat{k}\right)$

D. $2\hat{i} - 7\hat{j} - \hat{k}$

Answer: A

View Text Solution

50. Given three arbitary vectors $\bar{a}, \bar{b}, \bar{c}$, then vectors $\overline{\alpha} = 5\bar{a} + 6\bar{b} + 7\bar{c}, \beta = 7\bar{a} - 8\bar{b} + 9\bar{c}, \bar{y} = 3\bar{a} + 20\bar{b} + 5\bar{c}$ are

A. collinear

B. Coplanar

C. Non-coplanar

D. None of these

Answer: B

View Text Solution

51. If $\bar{x}.\,\bar{a} = 0, \bar{x}.\,\bar{b} = 0$ and $\bar{x}.\,\bar{c} = 0$ for some non-zero vectors x, then the TRUE statement is

A. $\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix} = 0$

B. $\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix} \neq 0$

C. $\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix} = 1$

D. None of these

Answer: A

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52. which of the following expression are meaningful?

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

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

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

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

Answer: A

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53. Out of the following which one is not true?

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

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

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

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

Answer: D

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54. For three vectors $\vec{u}, \vec{v}, \vec{w}$ which of the following expressions is not eqal to any of the remaining three?

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

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

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

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

Answer: C

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55. $\bar{a}.\left(\bar{a}\times\bar{b}\right)=$

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

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

C. 0

D. $\bar{a}^2+\bar{a}.\bar{b}$

Answer: C

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56. 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. 2

C. -2

D. None of these

Answer: A

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57. If $\bar{a}, \bar{b}$ and $\bar{c}$ are non-coplanar, then the value of $\bar{a}.\left\{\dfrac{\bar{b}\times\bar{c}}{3\bar{b}.\,(\bar{c}\times\bar{a})}\right\}-\bar{b}.\left\{\dfrac{\bar{c}\times\bar{a}}{2\bar{c}\left(\bar{a}\times\bar{b}\right)}\right\}$ is

A. $\dfrac{-1}{2}$

B. $\dfrac{-1}{3}$

C. $\frac{-1}{6}$

D. $\frac{1}{6}$

Answer: C

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58. $\bar{a}.\left[\left(\bar{b}+\bar{c}\right)\times\left(\bar{a}+\bar{b}+\bar{c}\right)\right]$ is equal to

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

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

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

D. 0

Answer: D

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

A. $-\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix}$

B. $\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix}$

C. 0

D. $2\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix}$

Answer: B

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60. If $\bar{a}=\frac{1}{\sqrt{10}}\left(3\hat{i}+\hat{k}\right), \bar{b}=\frac{1}{7}\left(2\hat{i}+3\hat{j}-6\hat{k}\right)$, then the value of $(2\bar{a}-\bar{b}).\{(\bar{a}\times\bar{b})\times(\bar{a}+2\bar{b})\}$ is

A. -5

B. -3

C. 5

D. 2

Answer: A

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61. If $\bar{p} = \dfrac{\bar{b} \times \bar{c}}{\bar{a} \quad \bar{b} \quad \bar{c}}, \bar{q} = \dfrac{\bar{c} \times \bar{a}}{\bar{a} \quad \bar{b} \quad \bar{c}}, \bar{r} = \dfrac{\bar{a} \times \bar{b}}{\bar{a} \quad \bar{b} \quad \bar{c}}$, where $\bar{a}, \bar{b}, \bar{c}$ are three non-coplanar vectors, then the value of $\left(\bar{a} + \bar{b} + \bar{c}\right).\,(\bar{p} + \bar{q} + \bar{r})$ is given by

A. 3

B. 2

C. 1

D. 0

Answer: A

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

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

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

Answer: B

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63. If $\bar{a}, \bar{b}, \bar{c}$ are three non-coplanar vectors and $\bar{p}, \bar{q}, \bar{r}$ are defined by the relations $\bar{p}=\dfrac{\bar{b}\times\bar{c}}{\bar{a}\bar{b}\bar{c}}, \bar{q}=\dfrac{\bar{c}\times\bar{a}}{\bar{a}\bar{b}\bar{c}}, \bar{r}=\dfrac{\bar{a}\times\bar{b}}{\bar{a}\bar{b}\bar{c}}$ then $\left(\bar{a}+\bar{b}\right).\bar{p}+\left(\bar{b}+\bar{c}\right).\bar{q}+\left(\bar{c}+\bar{a}\right).\bar{r}=$

A. 0

B. 1

C. 2

D. 3

Answer: D

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64. If a, b and c are non-coplanar vectors and $d = \lambda a + \mu b + \nu c$, then λ is equal to

A. $\frac{[dbc]}{[bac]}$

B. $\frac{[bcd]}{[bca]}$

C. $\frac{[bdc]}{[abc]}$

D. $\frac{[cbd]}{[abc]}$

Answer: B

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65. 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. exactly one value of $(p.\ q)$

B. exactly two value of $(p.\ q)$

C. more than two but not all values of $(p.\ q)$

D. all values of (p, q)

Answer: A

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

A. exactly three values of λ

B. exactly two values of λ

C. exactly one value of λ

D. no value of λ

Answer: D

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67. If the vectors $2\hat{i} - 3\hat{j}, \hat{i} + \hat{j} - \hat{k}$ and $3\hat{i} - \hat{k}$ form three concurrent edges of a parallelopiped, then the volume of parallelopiped is

A. 8

B. 10

C. 4

D. 14

Answer: C

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68. The volumes of the parallelopiped whose edges are represented by $\bar{a} = 2\hat{i} - 3\hat{j} + \hat{k}, \bar{b} = \hat{i} - \hat{j} + 2\hat{k}, \bar{c} = 2\hat{i} + \hat{j} - \hat{k}$ is

A. 14 cu. Units

B. 16 cu. Units

C. 18 cu. Units

D. 20 cu. Units

Answer: A

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69. If the volume of the tetrahedron formed by the coterminus edges $\bar{a}, \bar{b}$ and $\bar{c}$ is 4, then the volume of the parallelopiped formed by the coterminous edges $\bar{a} \times \bar{b}, \bar{b} \times \bar{c}$ and $\bar{c} \times \bar{a}$ is

A. 144

B. 16

C. 48

D. 576

Answer: D

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70. 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

B. 2

C. -3

D. -2

Answer: C

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71. If the three co-terminous edges of a paralleloP1ped are represented by $\bar{a}-\bar{b}, \bar{b}-\bar{c}, \bar{c}-\bar{a}$, then its volume is

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

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

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

D. 0

Answer: D

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72. If $\bar{a}=2\hat{i}-3\hat{j}+5\hat{k}, \bar{b}=3\hat{i}-4\hat{j}+5\hat{k}$ and $\bar{c}=5\hat{i}-3\hat{j}-2\hat{k}$, then the volume of the parallelopiped with co-terminus edges $\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}$ is

A. 1

B. 5

C. 8

D. 16

Answer: D

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73. The volume of a tetrahedron (in cubic units) whose vertices are $4\hat{i}+5\hat{j}+\hat{k}, -\hat{j}+\hat{k}, 3\hat{i}+9\hat{j}+4\hat{k}$ and $-2\hat{i}+4\hat{j}+4\hat{k}$ is

A. $\frac{14}{3}$

B. 5

C. 6

D. 30

Answer: B

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

A. $\sqrt{13}$ units

B. $2\sqrt{5}$ units

C. 5 units

D. 10 units

Answer: C

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75. $A(4, 3, 5), B(0, -2, 2)$ and $C(3, 2, 1)$ are three points. The coordinates of the point in which the bisector of $\angle BAC$ meets the side $\overline{BC}$ is

A. $\left(\frac{15}{8}, \frac{4}{8}, \frac{11}{8}\right)$

B. $\left(\frac{12}{7}, \frac{2}{7}, \frac{10}{7}\right)$

C. $\left(\frac{9}{5}, \frac{2}{5}, \frac{7}{5}\right)$

D. $\left(\frac{3}{2}, 0, \frac{3}{2}\right)$

Answer: A

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76. If $4\vec{i} + 7\vec{j} + 8\vec{k}$,$2\vec{i} + 3\vec{j} + 4\vec{k}$ and $2\vec{i} + 5\vec{j} + 7\vec{j}$ are the position vectors of the vertices of A,B and C of a triangle ABC, then the position vector of the point where the bisector of $\angle A$ meets BC

A. $\frac{1}{3}\left(6\hat{i} + 13\hat{j} + 18\hat{k}\right)$

B. $\frac{3}{2}\left(6\hat{i} + 12\hat{j} - 8\hat{k}\right)$

C. $\frac{1}{3}\left(-6\hat{i} - 8\hat{j} - 9\hat{k}\right)$

D. $\frac{2}{3}\left(-6\hat{i} - 12\hat{j} + 8\hat{k}\right)$

Answer: A

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77. consider the points A, B, C and D with position vector $7\vec{i} - 4\vec{j} + 7\vec{k}, \vec{i} - 6\vec{j} + 10\vec{k}, -\vec{i} - 3\vec{j} + 4\vec{k}$ and $5\vec{i} - \vec{j} + \vec{k}$ respectively then $ABCD$ is

A. parallelogram but not a rhombus

B. square

C. rhombus

D. rectangle

Answer: C

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78. In a right angled triangle ABC, the hypotenuse AB =p, then $\overrightarrow{AB}.\overrightarrow{AC}+\overrightarrow{BC}.\overrightarrow{BA}+\overrightarrow{CA}.\overrightarrow{CB}$ is equal to:

A. $3p^2$

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

C. p^2

D. $\frac{p^2}{2}$

Answer: C

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79. Let $\bar{a}=2\hat{i}+\hat{j}+\hat{k}, \bar{b}=\hat{i}+2\hat{j}-\hat{k}$ and a unit vectors $\bar{c}$ be coplanar. If $\bar{c}$ is prependicular to$\bar{a}$, then $\bar{c}=$

A. $\frac{1}{\sqrt{2}}\left(-\hat{j}+\hat{k}\right)$

B. $\frac{1}{\sqrt{3}}\left(-\hat{i}-\hat{j}-\hat{k}\right)$

C. $\frac{1}{\sqrt{5}}\left(\hat{i}-2\hat{j}\right)$

D. $\frac{1}{\sqrt{3}}\left(\hat{i} - \hat{j} - \hat{k}\right)$

Answer: A

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Evaluation Test

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

A. a unit vectors

B. a null vectors

C. equally inclined to $\bar{a}, \bar{b}, \bar{c}$

D. None of these

Answer: B

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2. If $\bar{a}, \bar{b}, \bar{c}$ are three non-coplanar vectors such that $\bar{r}_1 = \bar{a} - \bar{b} + \bar{c}, \bar{r}_2 = \bar{b} + \bar{c} - \bar{a}, \bar{r}_3 = \bar{c} + \bar{a} + \bar{b}, \bar{r} = 2\bar{a} - 3\bar{b} + 4\bar{c},$ if $\bar{r} = \lambda_1\bar{r}_1 + \lambda_2\bar{r}_2 + \lambda_3\bar{r}_3$, then

A. $\lambda_1 = 7$

B. $\lambda_1 + \lambda_3 = 3$

C. $\lambda_1 + \lambda_2 + \lambda_3 = 5$

D. $\lambda_3 + \lambda_2 = 2$

Answer: B

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3. Let a,b,c be distinct non- negative numbers . If the vectors $a\hat{i} + a\hat{j} + c\hat{k}, \hat{i} + \hat{k}$ and $c\hat{i} + c\hat{j} + b\hat{k}$ lie in a plane then c is

A. The arithmetic mean of a and b

B. The geometric mean of a and b

C. The harmonic mean of a and b

D. Equal to zero

Answer: B

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4. The edges of a parallelopiped are of unit length and are parallel to non-coplanar unit vectors $\vec{a}, \vec{b}, \vec{c}$ $sucht$^hat a.hatb=hatb .hatc=hatc.hata=1/2`. Then, the volume of parallelopiped is

A. $\frac{1}{\sqrt{2}}$ cubic units

B. $\frac{1}{2\sqrt{2}}$ cubic units

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

D. $\frac{1}{\sqrt{3}}$ cubic units

Answer: A

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5. If the vectors $a\hat{i}+\hat{j}+\hat{k}, \hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}(a\ne b\ne c\ne 1)$ are coplanar, then the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=$

A. -1

B. $-\frac{1}{2}$

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

D. 1

Answer: D

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6. The value of a so that volume of parallelopiped formed by vectors $\hat{i}+a\hat{j}+\hat{k}, \hat{j}+a\hat{k}, a\hat{i}+.\hat{k}$ becomes minimum is

A. $\sqrt{3}$

B. 2

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

D. 3

Answer: C

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7. If $\bar{a}.\ \bar{b} = \bar{b}.\ \bar{c} = \bar{c}.\ \bar{a} = 0$ then the value of $\begin{bmatrix}\bar{a} & \bar{b} & \bar{c}\end{bmatrix}$ is equal to

A. 1

B. -1

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

D. 0

Answer: C

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8. Let $\bar{a} = -\hat{i} - \hat{k}, \bar{b} = -\hat{i} + \hat{j}$ and $\bar{c} = \hat{i} + 2\hat{j} + 3\hat{k}$ be three given vectors. If $\bar{r}$ is a vector such that $\bar{r} \times \bar{b} = \bar{c} \times \bar{b}$ and $\bar{r}.\bar{a} = 0$, then the value of $\bar{r}.\bar{b}$ is

A. 4

B. 8

C. 6

D. 9

Answer: D

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

A. 0

B. 3

C. 4

D. 8

Answer: C

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

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

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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11. P is any point on the circumference of the circumcircle of ΔABC. H is the orthocentre, M is the midpoint of PH and D is the midpoint of BC. Then

A. DM is parallel to AC

B. DM is perpendicular to AP

C. `DM is perpendicular to AB

D. None of these

Answer: B

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12. The three vectors $10\hat{i}+13\hat{j}+16\hat{k}$, $30\hat{i}+33\hat{j}+36\hat{k}$ and $47\hat{i}+50\hat{j}+53\hat{k}$ are

A. Collinear

B. Coplanar

C. Non-coplanar

D. Mutually perpendicular

Answer: B

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13. If the volume of parallelopiped whose concurrent edges are $3\hat{i}-\hat{j}+4\hat{k}$, $2\hat{i}+\lambda\hat{j}-\hat{k}$ and $-5\hat{i}+2\hat{j}+\lambda\hat{k}$ is 110 cu. units, then the value of λ is

A. 3

B. 5

C. 0

D. $\frac{31}{3}$

Answer: A

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14. If the vectors $5\hat{i} - x\hat{j} + 3\hat{k}$ and $-3\hat{i} + 2\hat{j} - y\hat{k}$ are parallel, the value of x and y respectively are

A. $\frac{10}{3}, \frac{9}{5}$

B. $-\frac{10}{3}, -\frac{9}{5}$

C. $\frac{9}{5}, \frac{10}{3}$

D. $-\frac{9}{5}, -\frac{10}{3}$

Answer: A

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15. If the position vector of p is $3\bar{p} + \bar{q}$ and $\bar{p}$ divides PQ internally in the ratio $3:4$, the position vector of Q is

A. $\frac{1}{3}(5\bar{p} + 4\bar{q})$

B. $\frac{1}{3}(4\bar{p} + 5\bar{q})$

C. $\frac{-1}{3}(5\bar{p} + 4\bar{q})$

D. $\frac{-1}{3}(4\bar{p} + 5\bar{q})$

Answer: C

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16.

$A(\bar{a}) = 3\hat{i} + 2\hat{j}, B(\bar{b}) = 5\hat{i} + 3\hat{j} + 2\hat{k}, C(\bar{c}) = -9\hat{i} + 6\hat{j} - 3\hat{k}$

are vectors of triangle ABC, if AD is the angle bisector of angle BAC, then the co-ordinates of the point D are

A. $\left(-\frac{19}{8}, \frac{57}{16}, \frac{17}{16}\right)$

B. $\left(\frac{19}{8}, \frac{57}{16}, \frac{17}{16}\right)$

C. $\left(\frac{19}{8}, \frac{57}{16}, \frac{17}{16}\right)$

D. $\left(\frac{19}{8}, \frac{57}{16}, \frac{17}{16}\right)$

Answer: D

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17. In ΔABC the mid points of the sides AB, BC and CA are $(l, 0, 0), (0, m, 0)$ and $(0, 0, n)$ respectively. Then, $\frac{AB^2 + BC^2 + CA^2}{l^2 + m^2 + n^2}$ is equal to

A. 2

B. 4

C. 8

D. 16

Answer: C

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18. Find the coordinates of the foot of the perpendicular drawn from point $A(1, 0, 3)$ to the join of points $B(4, 7, 1) and C(3, 5, 3)$.

A. $\left(\frac{5}{3}, \frac{7}{3}, \frac{17}{3}\right)$

B. $(5, 7, 17)$

C. $\left(\frac{5}{7}, -\frac{7}{3}, \frac{17}{3}\right)$

D. $\left(-\frac{5}{7}, \frac{7}{3}, \frac{17}{3}\right)$

Answer: A

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