MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

ALGEBRA OF VECTORS

Illustration

1. If $ABCD$ is a rhombus whose diagonals cut at the origin O, then proved that $\vec{O}A+\vec{O}B+\vec{O}C+\vec{O}D$ =0

A. $\vec{AB}+\vec{AC}$

B. $\vec{0}$

C. $2\left(\overrightarrow{AB}+\overrightarrow{BC}\right)$

D. $\vec{AC}+\overrightarrow{BD}$

Answer: B

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2. If C is the mid point of AB and P is any point outside AB then (A) $\overrightarrow{PA}+\overrightarrow{PB}+\overrightarrow{PC}=0$ (B) $\overrightarrow{PA}+\overrightarrow{PB}+2\overrightarrow{PC}=\vec{0}$ (C) $\overrightarrow{PA}+\overrightarrow{PB}=\overrightarrow{PC}$ (D) $\overrightarrow{PA}+\overrightarrow{PB}=2\overrightarrow{PC}$

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

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

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

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

Answer: D

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3. If the sum of two unit vectors is a unit vector, then the magnitude of their difference is

A. 1

B. 2

C. $\sqrt{3}$

D. $2\sqrt{3}$

Answer: C

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4. The non-zero vectors a,b and c are related by a=8b and c=-7b angle between a and c is

A. 0

B. $\pi / 4$

C. $\pi / 2$

D. π

Answer: D

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5. If $ABCDEF$ is a regular hexagon with $\overrightarrow{AB} = \overrightarrow{a}$ and $\overrightarrow{BC} = \overrightarrow{b}$, then $\overrightarrow{CE}$ equals

A. $\overrightarrow{b} - \overrightarrow{a}$

B. $-\overrightarrow{b}$

C. $\overrightarrow{b} - 2\overrightarrow{a}$

D. none of these

Answer: C

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

A. $3\overrightarrow{a} - 2\overrightarrow{b}$

B. $3\overrightarrow{b} - 2\overrightarrow{a}$

C. $3\overrightarrow{a} + 2\overrightarrow{a}$

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

Answer: B

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7. Let $\overrightarrow{AD}$ be the angle bisector of the angle A of ΔABC, then $\overrightarrow{AD} = \alpha\overrightarrow{AB} + \beta\overrightarrow{AC}$, where

A. $\alpha = \frac{\left|\overrightarrow{AB}\right|}{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}, \beta = \frac{\left|\overrightarrow{AC}\right|}{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}$

B. $\alpha = \frac{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}{\left|\overrightarrow{AB}\right|}, \beta = \frac{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}{\left|\overrightarrow{AC}\right|}$

C. $\alpha = \frac{\left|\overrightarrow{AC}\right|}{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}, \beta = \frac{\left|\overrightarrow{AB}\right|}{\left|\overrightarrow{AB}\right| + \left|\overrightarrow{AC}\right|}$

D. $\alpha = \frac{\left|\overrightarrow{AB}\right|}{\left|\overrightarrow{AC}\right|}, \beta = \frac{\left|\overrightarrow{AC}\right|}{\left|\overrightarrow{AB}\right|}$

Answer: C

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8. Let $D, EandF$ be the middle points of the sides $BC, CAandAB$, respectively of a triangle ABC. Then prove that $\vec{A}D + \vec{B}E + \vec{C}F = \vec{0}$.

A. $\vec{0}$

B. 0

C. 2

D. none of these

Answer: A

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9. G is a point inside the plane of the triangle $ABC, \vec{G}A + \vec{G}B + \vec{G}C = 0$, then show that G is the centroid of triangle ABC.

A. $\vec{0}$

B. $3\overrightarrow{GA}$

C. $3G\vec{B}$

D. $3\overrightarrow{GC}$

Answer: A

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10. If the vectors $\vec{A}B = 3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is

A. $\sqrt{18}$

B. $\sqrt{72}$

C. $\sqrt{33}$

D. $\sqrt{45}$

Answer: C

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11. Let ABC be a triangle having its centroid its centroid at G. If S is any point in the plane of the triangle, then $\overrightarrow{SA} + \overrightarrow{SB} + \overrightarrow{SC} =$

A. $\overrightarrow{SG}$

B. $2\overrightarrow{SG}$

C. $3\overrightarrow{SG}$

D. $\overrightarrow{0}$

Answer: C

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12. If $O \, and \, O'$ are circumcentre and orthocentre of $ABC, \, then \, \vec{O} A + \vec{O} B + \vec{O} C$ equals $2\vec{O} O'$ b. $\vec{O} O'$ c. $\vec{O}'O$ d. $2\vec{O}'O$

A. $\overrightarrow{O'O}$

B. $\overrightarrow{OO'}$

C. $2\overrightarrow{OO'}$

D. $\vec{0}$

Answer: B

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13. If o is the circumcenter, G is the centroid and O' is orthocenter or triangle ABC then prove that:

A. $\overrightarrow{O'O}$

B. $\overrightarrow{OO'}$

C. $2\overrightarrow{OO'}$

D. $2\overrightarrow{O'O}$

Answer: C

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14. Let ABC be a triangle whose circumcentre is at P. If the position vectors of A, B, C and P are $\vec{a}, \vec{b}, \vec{c}$ and $\frac{\vec{a}+\vec{b}+\vec{c}}{4}$ respectively, then the position vector of the orthocentre of this triangle is

A. $\vec{0}$

B. $-\frac{\vec{a}+\vec{b}+\vec{c}}{2}$

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

D. $\frac{\vec{a}+\vec{b}+\vec{c}}{2}$

Answer: C

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15. Consider $\triangle ABC$ and $\triangle A_1B_1C_1$ in such a way that $\overline{AB} = \overline{A_1B_1}$ and M, N, M_1, N_1 be the midpoints of AB, BC, A_1B_1 and B_1C_1 respectively, then

A. $\overrightarrow{MM_1} = \overrightarrow{NN_1}$

B. $\overrightarrow{CC_1} = \overrightarrow{MM_1}$

C. $\overrightarrow{CC_1} = \overrightarrow{NN_1}$

D. $\overrightarrow{MM_1} = \overrightarrow{BB_1}$

Answer: D

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16. Let $ABCD$ be a parallelogram whose diagonals intersect at P and let O be the origin. Then prove that $\vec{O}A + \vec{O}B + \vec{O}C + \vec{O}D = 4\vec{O}P$.

A. $\overrightarrow{OP}$

B. $2\overrightarrow{OP}$

C. $3\overrightarrow{OP}$

D. $4\overrightarrow{OP}$

Answer: D

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17. If $ABCD$ is quadrilateral and E and F are the mid-points of AC and BD respectively, prove that $\vec{A}B + \vec{A}D$ +$\vec{C}B$ +$\vec{C}D$ =4 $\vec{E}F$.

A. $3\overrightarrow{EF}$

B. $4\overrightarrow{EF}$

C. $4\overrightarrow{FE}$

D. $3\overrightarrow{FE}$

Answer: B

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18. Given that the vectors $\vec{a}$ and $\vec{b}$ are non- collinear, the values of x and y for which the vector equality $2\vec{u} - \vec{v} = \vec{w}$ holds true if $\vec{u} = x\vec{a} + 2y\vec{b}, \vec{v} = -2y\vec{a} + 3x\vec{b}, \vec{w} = 4\vec{a} - 2\vec{b}$ are

A. $x = \frac{4}{7}, y = \frac{6}{7}$

B. $x = \frac{10}{7}, y = \frac{4}{7}$

C. $x = \frac{8}{7}, y = \frac{2}{7}$

D. $x = 2, y = 3$

Answer: B

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19. Let $\vec{a}, \vec{b}, \vec{c}$ be three non-zero vectors such that any two of them are non-collinear. If $\vec{a} + 2\vec{b}$ is collinear with $\vec{c}$ and $\vec{b} + 3\vec{c}$ is collinear with $\vec{a}$ then prove that $\vec{a} + 2\vec{b} + 6\vec{c} = \vec{0}$

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20. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are three non-zero vectors, no two of which are collinear and the vector $\vec{a}+\vec{b}$ is collinear with $\vec{c}$, $\vec{b}+\vec{c}$ is collinear with $\vec{a}$, $then\ \vec{a}+\vec{b}+\vec{c}=\vec{a}$ b. $\vec{b}$ c. $\vec{c}$ d. none of these

A. $\vec{c}$

B. $\vec{0}$

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

D. $\vec{a}$

Answer: B

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21. If $\left|\overrightarrow{AO}+\overrightarrow{OB}\right|=\left|\overrightarrow{BO}+\overrightarrow{OC}\right|$, then A, B, C form

A. equilateral triangle

B. collinear

C. non-collinear

D. none of these

Answer: B

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22. If the position vector of these points are $\vec{a} - 2\vec{b} + 3\vec{c}, 2\vec{a} + 3\vec{b} - 4\vec{c}, -7\vec{b} + 10\vec{c},$ then the three points are

A. collinear

B. non-coplanar

C. non-collinear

D. none of these

Answer: A

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23. Three points with position vectors $\vec{a}, \vec{b}, \vec{c}$ will be collinear if there exist scalars x, y, z such that

A. $x\vec{a} + y\vec{b} = z\vec{c}$

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

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

D. $x\vec{a} + y\vec{b} = \vec{c}.$

Answer: C

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24. The position vectors of the vectices A, B, C of a $\triangle ABC$ are $\hat{i} - \hat{j} - 3\hat{k}, 2\hat{i} + \hat{j} - 2\hat{k}$ and $-5\hat{i} + 2\hat{j} - 6\hat{k}$ respectively. The length of the bisector AD of the angle $\angle BAC$ where D is on the line segment BC, is

A. $\frac{15}{2}$

B. $\frac{11}{2}$

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

D. none of these

Answer: D

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25. Consider points A, B, C and D with position vectors $7\hat{i}-4\hat{j}+7\hat{k},\ \hat{i}-6\hat{j}+10\hat{k},\ -\hat{i}-3\hat{j}+4\hat{k}$ and $5\hat{i}-\hat{j}+5\hat{k}$ respectively. Then, ABCD is a

A. parallelogram but not a rhombus

B. square

C. rhombus

D. rectangle

Answer: C

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26. If vectors $\overrightarrow{A}B = -3\hat{i} + 4\hat{k} and \overrightarrow{A}C = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a $\triangle ABC$, then the length of the median through Ais a. $\sqrt{14}$ b. $\sqrt{18}$ c. $\sqrt{29}$ d. $\sqrt{5}$

A. $\sqrt{288}$

B. $\sqrt{18}$

C. $\sqrt{72}$

D. $\sqrt{33}$

Answer: D

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27. The sides of a parallelogram are $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\hat{i} + 2\hat{j} + 3\hat{k}$, then the unit vector parallel to one of the diagonals is

A. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} - 2\hat{k}\right)$

B. $\frac{1}{7}\left(3\hat{i} - 6\widehat{K} - 2\hat{k}\right)$

C. $\frac{1}{7}\left(-3\hat{i} + 6\hat{j} - 2\hat{k}\right)$

D. $\frac{1}{7}\left(3\hat{i} + 6\hat{j} + 2\hat{k}\right)$

Answer: A

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28. If the points $P\left(\vec{a} + 2\vec{b} + \vec{c}\right), Q\left(2\vec{a} + 3\vec{b}\right), R\left(\vec{b} + t\vec{c}\right)$ are collinear, where $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors, the value of t is

A. -2

B. $-1/2$

C. $1/2$

D. 2

Answer: D

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29. A vector coplanar with vectors $\hat{i} + \hat{j}$ and $\hat{j} + \hat{k}$ and parallel to the vector $2\hat{i} - 2\hat{j} - 4\hat{k}$, is

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

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

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

D. $3\hat{i} + 3\hat{j} - 6\hat{k}$

Answer: B

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30. Let co-ordinates of a point 'p' with respectto the system non-coplanar vectors $\vec{a}, \vec{b}$ and $\vec{c}$ is (3, 2, 1). Then, co-ordinates of 'p'with respect to the system of vectors $\vec{a} + \vec{b} + \vec{c}, \vec{a} - \vec{b} + \vec{c}. \vec{a} + \vec{b} - \vec{c}$

A. $(3/2, 1/2, 1)$

B. $(3/2, 1, 1/2)$

C. $(1/2, 3/2, 1)$

D. none of these

Answer: C

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31. Suppose that $\vec{p}$, $\vec{q}$ and $\vec{r}$ are three non- coplaner in R^3 ,Let the components of a vector $\vec{s}$ along $\vec{p}$, $\vec{q}$ and $\vec{r}$ be 4,3, and 5, respectively , if the components this vector $\vec{s}$ along $\left(-\vec{p}+\vec{q}+\vec{r}\right), \left(\vec{p}-\vec{q}+\vec{r}\right)$ and $\left(-\vec{p}-\vec{q}+\vec{r}\right)$ are x, y and z , respectively , then the value of $2x+y+z$ is

A. 7

B. 8

C. 9

D. 6

Answer: C

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32. If

$(x, y, z) \neq (0, 0, 0)$ and $\left(\hat{i} + \hat{j} + 3\hat{k}\right)x + \left(3\hat{i} - 3\hat{j} + \hat{k}\right)y + \left(-4\hat{i} + 5\hat{j}\right.$

$= a\left(x\hat{i} + y\hat{j} + z\hat{k}\right),$ then the values of a are

A. 0, -2

B. 2, 0

C. 0, -1

D. 1, 0

Answer: C

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33. The vectors $a = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of the vectors $b = \hat{i} + \hat{j}$ and $c = \hat{j} + \hat{k}$ and bisects the angle between b and c. Then, which one of the following gives possible values of α and β?

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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34. If $\vec{a}, \vec{b}$ are the vectors forming consecutive sides of a regular of a regular hexagon $ABCDEF$, then the vecrtor representing side CD is $\vec{a} + \vec{b}$ b. $\vec{a} - \vec{b}$ c. $\vec{b} - \vec{a}$ d. $-\left(\vec{a} + \vec{b}\right)$

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

B. $\vec{a} - \vec{b}$

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

D. $-\left(\vec{a} + \vec{b}\right)$

Answer: C

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35. In a regular hexagon $ABCDEF,\ \overrightarrow{AB} = a,\ \overrightarrow{BC} = \vec{b}\ and\ \vec{C}D = \cdot Then\ \vec{A}E =$ $\vec{a} + \vec{b} + \vec{c}$ b. $2\vec{a} + \vec{b} + \vec{c}$ c. $\vec{b} + \vec{c}$ d. $\vec{a} + 2\vec{b} + 2\vec{c}$

A. $\vec{a} + \vec{b} + \vec{c}$

B. $2\vec{a} + \vec{b} + \vec{c}$

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

D. $\vec{a} + 2\vec{b} + 2\vec{c}$

Answer: C

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36. If ABCDEF is regular hexagon, then AD+EB+FC is

A. $2\overrightarrow{AB}$

B. $\overrightarrow{0}$

C. $3\overrightarrow{AB}$

D. $4\overrightarrow{AB}$

Answer: D

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37. If $\overrightarrow{a}$, $\overrightarrow{b}$, $\overrightarrow{c}$ and $\overrightarrow{d}$ are the position vectors of points A, B, C, D such that no three of them are collinear and $\overrightarrow{a} + \overrightarrow{c} = \overrightarrow{b} + \overrightarrow{d}$, $then\ ABCD$ is a a. rhombus b. rectangle c. square d. parallelogram

A. rhombus

B. rectangle

C. square

D. parallelogram

Answer: D

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38. ABCDEF si a regular hexagon with centre at the origin such that $\overrightarrow{AD} + \overrightarrow{EB} + \overrightarrow{FC} = \lambda \overrightarrow{ED}$. Then, λ equals

A. 2

B. 4

C. 6

D. 3

Answer: B

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39. $ABCD$ isa parallelogram with $AC \text{ and } BD$ as diagonals. Then, $\overrightarrow{A}C - \overrightarrow{B}D = 4\overrightarrow{A}B$ b. $3\overrightarrow{A}B$ c. $2\overrightarrow{A}B$ d. $\overrightarrow{A}B$

A. $4A\overrightarrow{B}$

B. $3A\overrightarrow{B}$

C. $2A\overrightarrow{B}$

D. $A\overrightarrow{B}$

Answer: C

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40. If OACB is a parallelogrma with $\overrightarrow{OC} = \overrightarrow{a}$ and $\overrightarrow{AB} = \overrightarrow{b}$ then $\overrightarrow{OA}$ is equal to

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

B. $\vec{a} - \vec{b}$

C. $\frac{1}{2}\left(\vec{b} - \vec{a}\right)$

D. $\frac{1}{2}\left(\vec{a} - \vec{b}\right)$

Answer: B

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41. If G is the intersection of diagonals of a parallelogram $ABCD$ and O is any point then $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} + \overrightarrow{OD} =$

a.$2\vec{O}G$

b. $4\vec{O}G$

c. $5\vec{O}G$

d. $3\vec{O}G$

A. $2\overrightarrow{OG}$

B. $4\overrightarrow{OG}$

C. $5\overrightarrow{OG}$

D. $3\overrightarrow{OG}$

Answer: B

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42. Let G be the centroid of triangle ABC. If $\overrightarrow{A}B = \overrightarrow{a}, \overrightarrow{A}C = \overrightarrow{b}$, then the bisector $\overrightarrow{A}G$, in terms of $\overrightarrow{a}$ and $\overrightarrow{b}$ is $\frac{2}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$ b. $\frac{1}{6}\left(\overrightarrow{a} + \overrightarrow{b}\right)$ c. $\frac{1}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$ d. $\frac{1}{2}\left(\overrightarrow{a} + \overrightarrow{b}\right)1$

A. $\frac{2}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

B. $\frac{1}{6}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

C. $\frac{1}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

D. $\frac{1}{2}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

Answer: C

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43. The position vectors of the points A, B, C are $2\hat{i}+\hat{j}-\hat{k}, 3\hat{i}-2\hat{j}+\hat{k}$ and $\hat{i}+4\hat{j}-3\hat{k}$ respectively . These points

A. form an isosceles triangle

B. form a right triangle

C. are collinear

D. form a scalene triangle

Answer: C

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44. If 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, then p =

A. 7

B. -37

C. -7

D. 37

Answer: B

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45. 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. $2\vec{a} - \vec{b}$

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

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

D. $\vec{b}$

Answer: C

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46. $\overrightarrow{a}, \overrightarrow{b}$ and $\overrightarrow{c}$ are three non-zero vectors, no two of which are collinear and the vectors $\overrightarrow{a}+\overrightarrow{b}$ is collinear with $\overrightarrow{c}$, $\overrightarrow{b}+\overrightarrow{c}$ is collinear with $\overrightarrow{a}$, then $\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}=$

A. $\overrightarrow{a}$

B. $\overrightarrow{b}$

C. $\overrightarrow{c}$

D. none of these

Answer: D

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47. If points $A\left(60\hat{i}+3\hat{j}\right),\ B\left(40\hat{i}-8\hat{j}\right) and\ C\left(a\hat{i}-52\hat{j}\right)$ are collinear, then a is equal to 40 b. -40 c. 20 d. -20

A. 40

B. -40

C. 20

D. -20

Answer: B

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48. Let $\overrightarrow{OA} = \hat{i} + 3\hat{j} - 2\hat{k}$ and $\overrightarrow{OB} = 3\hat{i} + \hat{j} - 2\hat{k}$. Then vector $\overrightarrow{OC}$ biecting the angle AOB and C being a point on the line AB is

A. $4\left(\hat{i} + \hat{j} - \hat{k}\right)$

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

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

D. none of these

Answer: B

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49. If the vector $-\hat{i}+\hat{j}-\hat{k}$ bisects the angle between the vector $\vec{c}$ and the vector $3\hat{i}+4\hat{j}$, then the vector along $\vec{c}$ is

A. $\frac{1}{15}\left(11\hat{i}+10\hat{j}+2\hat{k}\right)$

B. $-\frac{1}{15}\left(11\hat{i}-10\hat{j}+2\hat{k}\right)$

C. $-\frac{1}{15}\left(11\hat{i}+10\hat{j}-2\hat{k}\right)$

D. $-\frac{1}{15}\left(11\hat{i}+10\hat{j}+2\hat{k}\right)$

Answer: D

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50. If $\vec{r}=3\hat{i}+2\hat{j}-5\hat{k}$, $\vec{a}=2\hat{i}-\hat{j}+\hat{k}$, $\vec{b}=\hat{i}+3\hat{j}-2\hat{k}$ and $\vec{c}=-2\hat{i}+\hat{j}-3\hat{k}$ such that $\hat{r}=x\vec{a}+y\vec{b}+z\vec{c}$ then

A. x, y, z are in AP

B. x, y, z are in GP

C. x, y, z are in HP

D. $y, \frac{x}{2}, z$ are in AP

Answer: D

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51. Let $\overrightarrow{A}B = 3\hat{i} + \hat{j} - \hat{k}$ and $\overrightarrow{A}C = \hat{i} - \hat{j} + 3\hat{k}$ and a point P on the line segment BC is equidistant from AB and AC, then $\overrightarrow{AP}$ is

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

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

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

D. none of these

Answer: C

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52. The vector $\vec{c}$, directed along the internal bisector of the angle between the vectors $\vec{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ and $\vec{b} = -2\hat{i} - \hat{j} + 2\hat{k}$ with $\left|\vec{c}\right| = 5\sqrt{6}$, is

A. $\frac{5}{3}\left(\hat{i} - 7\hat{j} + 2\hat{k}\right)$

B. $\frac{5}{3}\left(5\hat{i} + 5\hat{j} + 2\hat{k}\right)$

C. $\frac{5}{3}\left(\hat{i} + 7\hat{j} + 2\hat{k}\right)$

D. $\frac{5}{3}\left(-5\hat{i} + 5\hat{j} + 2\hat{k}\right)$

Answer: A

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53. If $ABCD$ is quadrilateral and E and F are the mid-points of AC and BD respectively, prove that $\vec{A}B + \vec{A}D + \vec{C}B + \vec{C}D = 4\vec{E}F$.

A. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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54. Let ABC be a triangle having its centroid its centroid at G. If S is any point in the plane of the triangle, then $\overrightarrow{SA}+\overrightarrow{SB}+\overrightarrow{SC}=$

A. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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55. If o is the circumcenter, G is the centroid and O' is orthocenter or triangle ABC then prove that:

A. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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56. If O be the circumcentre and O' be the orthocentre of the ΔABC, then $O'A + O'B + O'C$ is equal to

A. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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57. Statement -1 : If $\vec{a}$ and $\vec{b}$ are non- collinear vectors, then points having position vectors $x_1\vec{a} + y_1\vec{b}$, $x_2\vec{a} + y_2\vec{b}$ and $x_3\vec{a} + y_3\vec{b}$ are collinear if

$$\begin{vmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_3 \\ 1 & 1 & 1 \end{vmatrix} = 0$$

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. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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58. A transversal cuts the sides OL,OM and diagonal ON of a parallelogram at A,B and C respectively.

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

A. Statement - 1 is True, Statement - 2 is True , Statement - 2 is a correct explanation for Statement - 1.

B. Statement -1 is True, Statement - 2 is True, Statement -2 is not a correct explanation for Statement - 1.

C. Statement - 1 is True, Statement - 2 is False.

D. Statement - 1 is False, Statement - 2 is True.

Answer: A

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Exercise

1. A point O is the centre of a circle circumscribed about a triangle ABC. Then $\vec{O}A\sin 2A + \vec{O}B\sin 2B + \vec{O}C\sin 2C$ is equal to a.

$\left(\vec{O}A + \vec{O}B + \vec{O}C\right)\sin 2A$ b. $3\vec{O}G, where G$ is the centroid of triangle ABC c. $\vec{0}$ d. none of these

A. $\left(O\vec{a} + O\vec{B} + O\vec{C}\right)\sin 2A$

B. $3\overrightarrow{OG},$ where G is the centroid of triangle ABC

C. $\vec{0}$

D. none of these

Answer: C

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2. The vectors $2\hat{i} + 3\hat{j}, 5\hat{i} + 6\hat{j}$ and $8\hat{i} + \lambda\hat{j}$ have their initial points at (1, 1). Find the value of λ so that the vectors terminate on the straight line.

A. 0

B. 3

C. 6

D. 9

Answer: D

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

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

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

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

D. $\frac{1}{3}\left(5\hat{j}+12\hat{k}\right)$

Answer: C

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4. If $\vec{a}$ is a non-zero vector of modulus a and m is a non-zero scalar, then $m\vec{a}$ is a unit vector if

A. $m = \pm 1$

B. $m = \left|\vec{a}\right|$

C. $m = \dfrac{1}{\left|\vec{a}\right|}$

D. $m = \pm 2$

Answer: C

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5. D, E and F are the mid-points of the sides BC, CA and AB respectively of ΔABC and G is the centroid of the triangle, then $\overrightarrow{GD} + \overrightarrow{GE} + \overrightarrow{GF} =$

A. $\vec{0}$

B. $2\overrightarrow{AB}$

C. $2\overrightarrow{GA}$

D. $2\overrightarrow{GC}$

Answer: A

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6. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are the position vectors of the vertices of an equilateral triangle whose orthocentre is t the origin, then write the value of $\vec{a} + \vec{b} + \vec{\cdot}$

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

B. $\left|\vec{a}\right|^2 = \left|\vec{b}\right|^2 + \left|\vec{c}\right|^2$

C. $\vec{a} + \vec{b} = \vec{c}$

D. none of these

Answer: A

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7. If P, Q, R are three points with respective position vectors $\hat{i}+\hat{j}, \hat{i}-\hat{j}$ and $a\hat{i}+b\hat{j}+c\hat{k}$. The points P, Q, R are collinear, if

A. $a=b=c=1$

B. $a=b=c=0$

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

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

Answer: D

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8. Let ABC be a triangle, the position vectors of whose vertices are $7\hat{j}+10\hat{k}, -\hat{i}+6\hat{j}+6\hat{k}$ and $-4\hat{i}+9\hat{j}+6\hat{k}$. Then ΔABC is

A. isosceles and right angled

B. equilateral

C. right angled but not isosceles

D. none of these

Answer: A

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9. If $\vec{a} = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 6\hat{j} + 2\hat{k}$ then the vector in the direction of $\vec{a}$ and having mgnitude as $\left|\vec{b}\right|$ is

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

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

C. $\frac{7}{3}\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$

D. none of these

Answer: C

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10. $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors and $x\vec{a} + y\vec{b} + z\vec{c} = \vec{0}$ then

A. at least of one of x, y, z is zero

B. x, y, z are necessarily zero

C. none of them are zero

D. none of these

Answer: B

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11. The vector $\vec{c}$, directed along the internal bisector of the angle between the vectors $\vec{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ and $\vec{b} = -2\hat{i} - \hat{j} + 2\hat{k}$ with $\left|\vec{c}\right| = 5\sqrt{6}$, is

A. $\pm\frac{5}{3}\left(2\hat{i} + 7\hat{j} + \hat{k}\right)$

B. $\pm\frac{3}{5}\left(\hat{i} + 7\hat{j} + 2\hat{k}\right)$

C. $\pm\frac{5}{3}\left(\hat{i} - 2\hat{j} + 7\hat{k}\right)$

D. $\pm\frac{5}{3}\left(\hat{i}-7\hat{j}+2\hat{k}\right)$

Answer: D

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12. A, B have vectors $\overrightarrow{a}, \overrightarrow{b}$ relative to the origin O and X, Y divide $\overrightarrow{AB}$ internally and externally respectively in the ratio $2:1$. Then , $\overrightarrow{XY} =$

A. $\frac{3}{2}\left(\overrightarrow{b}-\overrightarrow{a}\right)$

B. $\frac{4}{3}\left(\overrightarrow{a}-\overrightarrow{b}\right)$

C. $\frac{5}{6}\left(\overrightarrow{b}-\overrightarrow{a}\right)$

D. $\frac{4}{3}\left(\overrightarrow{b}-\overrightarrow{a}\right)$

Answer: D

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13. If a vector ofmagnitude 50 is collinear with vector $\vec{b} = 6\hat{i} - 8\hat{j} - \frac{15}{2}\hat{k}$ and makes an acute anlewih positive z-axis then:

A. $24\hat{i} - 32\hat{j} - 30\hat{k}$

B. $-24\hat{i} + 32\hat{j} + 30\hat{k}$

C. $12\hat{i} - 16\hat{j} - 15\hat{k}$

D. none of these

Answer: B

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14. The vector $\vec{c}$, directed along the internal bisector of the angle between the vectors $\vec{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ and $\vec{b} = -2\hat{i} - \hat{j} + 2\hat{k}$ with $\left|\vec{c}\right| = 5\sqrt{6}$, is

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

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

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

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

Answer: A

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15. Let $\vec{a}, \vec{b}, \vec{c}$ are three non- coplanar vectors such that

$\vec{r}_1=\vec{a}+\vec{c}, \vec{r}_2=\vec{b}+\vec{c}-\vec{a}, \vec{r}_3=\vec{c}+\vec{a}+\vec{b}, \vec{r}=2\vec{a}-3\vec{b}$

If $\vec{r}=\lambda_1\vec{r}_1+\lambda_2\vec{r}_2+\lambda_3\vec{r}_3$, then

A. $\lambda_1=7$

B. $\lambda_1+\lambda_3=3$

C. $\lambda_1+\lambda_2+\lambda_3=3$

D. $\lambda_3+\lambda_2=2$

Answer: B,A

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16. If $\vec{a}, \vec{b}, \vec{c}$ are three non- coplanar vectors such that $\vec{a} + \vec{b} + \vec{c} = \alpha \vec{d}$ and $\vec{b} + \vec{c} + \vec{d} = \beta \vec{a}$, then $\vec{a} + \vec{b} + \vec{c} + \vec{d}$ to equal to

A. $\vec{0}$

B. $\alpha \vec{a}$

C. $\beta \vec{b}$

D. $(\alpha + \beta) \vec{c}$

Answer: A

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17. $\vec{a}, \vec{b}, \vec{c}$ are three non zero vectors no two of which are collonear and the vectors $\vec{a} + \vec{b}$ be collinear with $\vec{c}$, $\vec{b} + \vec{c}$ to collinear with $\vec{a}$ then $\vec{a} + \vec{b} + \vec{c}$ the equal to ? (A) $\vec{a}$ (B) $\vec{b}$ (C) $\vec{c}$ (D) None of these

A. $\vec{a}$

B. $\vec{b}$

C. $\vec{c}$

D. $\vec{0}$

Answer: D

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18. Let α, β and γ be distinct real numbers. The points with position vectors

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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19. The points with position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}, a\hat{i}-52\hat{j}$ 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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20. If the points with position vectors $10\hat{i}+3\hat{j}, 12\hat{i}-5\hat{j}$ and $a\hat{i}+11\hat{j}$ are collinear, find the value of a.

A. -8

B. 4

C. 8

D. 12

Answer: D

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21. If C is the middle point of AB and P is any point outside AB, then

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

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

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

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

Answer: B

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22. The median AD of the ΔABC is bisected at E.BE meets AC in F. then, AF:AC is equal to

A. $3/4$

B. $1/3$

C. $1/2$

D. $1/4$

Answer: B

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23. In a trapezium, the vector $BC = \lambda AD$. We will then find that $p = AC + BD$ is collinear with AD. I $p = \mu$ AD, then

A. $\mu = \lambda + 1$

B. $\lambda = \mu + 1$

C. $\lambda + \mu = 1$

D. $\mu = 2 + \lambda$

Answer: A

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24. If $\overrightarrow{x} and \overrightarrow{y}$ are two non-collinear vectors and ABC isa triangle with side lengths $a, b, andc$ satisfying $(20a - 15b)\overrightarrow{x} + (15b - 12c)\overrightarrow{y} + (12c - 20a)\left(\overrightarrow{x} \times \overrightarrow{y}\right) = 0,$ then triangle ABC is a. an acute-angled triangle b. an obtuse-angled triangle c. a right-angled triangle d. an isosceles triangle

A. an acute angle triangle

B. an obtuse angle triangle

C. a right angle triangle

D. an isosceles triangle

Answer: C

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25. If D, E, F are respectively the mid-points of AB, AC and BC respectively in a $\Delta ABC, \quad \text{then } \overrightarrow{BE} + \overrightarrow{AF} =$

A. $\overrightarrow{DC}$

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

C. $2\overrightarrow{BF}$

D. $\frac{3}{2}\overrightarrow{BF}$

Answer: A

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26. Forces $3\overrightarrow{OA}, 5\overrightarrow{OB}$ act along OA and OB. If their resultant passes through C on AB, then

A. C is a mid-point of AB

B. C divides AB in the ratio $2:1$

C. $3AC = 5CB$

D. $2AC = 3CB$

Answer: C

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27. If aBCDEF is a regular hexagon with $\overrightarrow{AB} = \overrightarrow{a}$ and $\overrightarrow{BC} = \overrightarrow{b}$, then $\overrightarrow{C}F$. equals

A. $\overrightarrow{b} - \overrightarrow{a}$

B. $-\overrightarrow{b}$

C. $\overrightarrow{b} - 2\overrightarrow{a}$

D. $\overrightarrow{b} + \overrightarrow{a}$

Answer: C

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28. If A,B and C are the vertices of a triangle with position vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ respectively and G is the centroid of ΔABC, then $\overrightarrow{GA} + \overrightarrow{GB} + \overrightarrow{GC}$ is equal to

A. $\vec{0}$

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

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

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

Answer: A

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29. Let $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = 3\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{c} = d\hat{i} + \hat{j} + (2d-1)\hat{k}$. If is parallel to the plane of the vectors $\vec{a}$ and $\vec{b}$, then $11d =$

A. 2

B. 1

C. -1

D. 0

Answer: C

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30. If G is the intersection of diagonals of a parallelogram $ABCD$ and O is any point then $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} + \overrightarrow{OD} =$

a.$2\overrightarrow{O}G$

b. $4\overrightarrow{O}G$

c. $5\overrightarrow{O}G$

d. $3\overrightarrow{O}G$

A. $3\overrightarrow{OM}$

B. $4\overrightarrow{OM}$

C. $2\overrightarrow{OM}$

D. $\overrightarrow{OM}$

Answer: B

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Chapter Test

1. If the vectors $\overrightarrow{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$ and $\overrightarrow{b}$ are collinear and $\left|\overrightarrow{b}\right| = 21, \text{ then } \overrightarrow{b} =$

(A) $\pm 3\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right)$

(B) $\pm\left(2\hat{i} + 3\hat{j} - 6\hat{k}\right)$

(C) $\pm 21\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right)$

(D) $\pm 21\left(\hat{i} + \hat{j} + \hat{k}\right)$

A. $\pm 3\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right)$

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

C. $\pm 21\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right)$

D. $\pm 21(\hat{i}+\hat{j}+\hat{k})$

Answer: A

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2. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors (no two of which are collinear), such that the pairs of vectors $(\vec{a}+\vec{b}, \vec{c})$ and $(\vec{b}+\vec{c}, \vec{a})$ are collinear, then $\vec{a}+\vec{b}+\vec{c}=$

A. $\vec{a}$

B. $\vec{b}$

C. $\vec{c}$

D. $\vec{0}$

Answer: D

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3. Vectors $\vec{a}$ and $\vec{b}$ are non-collinear. Find for what value of x vectors $\vec{c} = (x-2)\vec{a} + \vec{b}$ and $\vec{d} = (2x+1)\vec{a} - \vec{b}$ are collinear?

A. $1/3$

B. $1/2$

C. 1

D. 0

Answer: A

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4. If the diagonals of a parallelogram are $3\hat{i} + \hat{j} - 2\hat{k}$ and $\hat{i} - 3\hat{j} + 4\hat{k}$, then the lengths of its sides are

A. $\sqrt{8}, \sqrt{10}$

B. $\sqrt{6}, \sqrt{14}$

C. $\sqrt{5}, \sqrt{12}$

D. none of these

Answer: B

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5. If ABCD is a quadrilateral, then $\overrightarrow{BA} + \overrightarrow{BC} + \overrightarrow{CD} + \overrightarrow{DA} =$

A. $2\overrightarrow{BA}$

B. $2\overrightarrow{AB}$

C. $2\overrightarrow{AC}$

D. $2(BC)$

Answer: A

Watch Video Solution

6. The points with position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}, a\hat{i}-52\hat{j}$ are collinear if (A) $a=-40$ (B) $a=40$ (C) $a=20$ (D) none of these

A. -40

B. 40

C. 20

D. 30

Answer: A

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7. If ABCDEF is a regualr hexagon, then $\overrightarrow{AC}+\overrightarrow{AD}+\overrightarrow{EA}+\overrightarrow{FA}=$

A. $2\overrightarrow{AB}$

B. $3\overrightarrow{AB}$

C. $\overrightarrow{AB}$

D. $\overrightarrow{0}$

Answer: B

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8. In a regular hexagon ABCDEF, $\overrightarrow{AB}+\overrightarrow{AC}+\overrightarrow{AD}+\overrightarrow{AE}+\overrightarrow{AF}=k\overrightarrow{AD}$, where k is equal to

A. $3\overrightarrow{AG}$

B. $2\overrightarrow{AG}$

C. $6\overrightarrow{AG}$

D. $4\overrightarrow{AG}$

Answer: C

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9. If P, Q , R are the mid-points of the sides AB, BC and CA of ΔABC and O is point whithin the triangle, then $\overrightarrow{OA}+\overrightarrow{OB}+\overrightarrow{OC}=$

A. $2\left(\overrightarrow{OP}+\overrightarrow{OQ}+\overrightarrow{OR}\right)$

B. $\overrightarrow{OP}+\overrightarrow{OQ}+\overrightarrow{OR}$

C. $4\left(\overrightarrow{OP}+\overrightarrow{OQ}+\overrightarrow{OR}\right)$

D. $6\left(\overrightarrow{OP}+\overrightarrow{OQ}+\overrightarrow{OR}\right)$

Answer: B

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10. If G is the centroid of the ΔABC and if G' is the centroid of another $\Delta A'B'C'$, then prove that $AA' + BB' + CC' = 3GG'$

A. $2\overrightarrow{GG'}$

B. $3\overrightarrow{GG'}$

C. $\overrightarrow{GG'}$

D. $4\overrightarrow{GG'}$

Answer: B

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11. In a quadrilateral ABCD, $\overrightarrow{AB} + \overrightarrow{DC} =$

A. $\overrightarrow{AB} + \overrightarrow{CB}$

B. $\overrightarrow{AC} + \overrightarrow{BD}$

C. $\overrightarrow{AC} + \overrightarrow{DB}$

D. $\overrightarrow{AD} - \overrightarrow{CB}$

Answer: C

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12. If ABCDE is a pentagon, then

$\overrightarrow{AB} + \overrightarrow{AE} + \overrightarrow{BC} + \overrightarrow{DC} + \overrightarrow{ED} + \overrightarrow{AC}$ is equal to

A. $4\overrightarrow{AC}$

B. $2\overrightarrow{AC}$

C. $3\overrightarrow{AC}$

D. $5\overrightarrow{AC}$

Answer: C

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

A. $4\overrightarrow{AB}$

B. $3\overrightarrow{AB}$

C. $2\overrightarrow{AB}$

D. $\overrightarrow{AB}$

Answer: C

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14. In a ΔABC, if $\overrightarrow{AB} = \hat{i} - 7\hat{j} + \hat{k}$ and $\overrightarrow{BC} = 3\hat{j} + \hat{j} + 2\hat{k}$, then $\left|\overrightarrow{CA}\right| =$

A. $\sqrt{61}$

B. $\sqrt{52}$

C. $\sqrt{51}$

D. $\sqrt{41}$

Answer: A

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15. If vectors $\overrightarrow{AB} = -3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a ΔABC, then the length of the median throught A is

A. $3\sqrt{2}$

B. $6\sqrt{2}$

C. $5\sqrt{2}$

D. $\sqrt{33}$

Answer: D

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16. The position vectors of P and Q are respectively $\vec{a}$ and $\vec{b}$. If R is a point on $\overrightarrow{PQ}$ such that $\overrightarrow{PR} = 5\overrightarrow{PQ}$, then the position vector of R, is

A. $5\vec{b} - 4\vec{a}$

B. $5\vec{b} + 4\vec{a}$

C. $4\vec{b} - 5\vec{a}$

D. $4\vec{b} + 5\vec{a}$

Answer: A

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17. If the points whose position vectors are $2\hat{i}+\hat{j}+\hat{k}, 6\hat{i}-\hat{j}+2\hat{k}$ and $14\hat{i}-5\hat{j}+p\hat{k}$ are collinear, then p =

A. 2

B. 4

C. 6

D. 8

Answer: B

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18. The ratio in which $\hat{i}+2\hat{j}+3\hat{k}$ divides the join of $-2\hat{i}+3\hat{j}+5\hat{k}$ and $7\hat{i}-\hat{k}$, is

A. $1:2$

B. $2:3$

C. $3:4$

D. $1:4$

Answer: A

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19. If OACB is a parallelogrma with $\overrightarrow{OC} = \overrightarrow{a}$ and $\overrightarrow{AB} = \overrightarrow{b}$ then $\overrightarrow{OA}$ is equal to

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

B. $\overrightarrow{q} - \overrightarrow{b}$

C. $\frac{1}{2}\left(\overrightarrow{b} - \overrightarrow{a}\right)$

D. $\frac{1}{2}\left(\overrightarrow{a} - \overrightarrow{b}\right)$

Answer: D

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20. The position vectors of the points A, B, C are $2\hat{i}+\hat{j}-\hat{k}, 3\hat{i}-2\hat{j}+\hat{k}$ and $\hat{i}+4\hat{j}-3\hat{k}$ respectively . These points

A. form an isosceles triangle

B. form a right triangle

C. are collinear

D. form a scalene triangle

Answer: C

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21. If ABCDEF is regular hexagon, then AD+EB+FC is

A. $2\overrightarrow{AB}$

B. $\overrightarrow{0}$

C. $3\overrightarrow{AB}$

D. $4\overrightarrow{AB}$

Answer: D

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22. If 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, then p =

A. 7

B. -37

C. -7

D. 37

Answer: B

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23. 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. $\vec{a} - \vec{b}$

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

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

D. $\vec{b}$

Answer: C

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24. If $\vec{a}, \vec{b}, \vec{c}$ and $\vec{d}$ are the position vectors of points A, B, C, D such that no three of them are collinear and $\vec{a} + \vec{c} = \vec{b} + \vec{d}, \, then \, ABCD$ is a a. rhombus b. rectangle c. square d. parallelogram

A. rhombus

B. rectangle

C. square

D. parallelogram

Answer: D

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25. Let G be the centroid of Δ ABC , If $\overrightarrow{AB} = \overrightarrow{a}, \overrightarrow{AC} = \overrightarrow{b}$, then the $\overrightarrow{AG}$, in terms of $\overrightarrow{a}$ and $\overrightarrow{b}$, is

A. $\frac{2}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

B. $\frac{1}{6}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

C. $\frac{1}{3}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

D. $\frac{1}{2}\left(\overrightarrow{a} + \overrightarrow{b}\right)$

Answer: C

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26. If G is the intersection of diagonals of a parallelogram $ABCD$ and O is any point then $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} + \overrightarrow{OD} =$

a. $2\vec{O}G$

b. $4\vec{O}G$

c. $5\vec{O}G$

d. $3\vec{O}G$

A. $2\overrightarrow{OG}$

B. $4\overrightarrow{OG}$

C. $5\overrightarrow{OG}$

D. $3\overrightarrow{OG}$

Answer: B

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27. The vector $\cos\alpha\cos\beta\hat{i} + \cos\alpha\sin\beta\hat{j} + \sin\alpha\hat{k}$ is a

A. null vector

B. unit vector

C. constant vector

D. none of these

Answer: B

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28. In a regular hexagon $ABCDEF,\ \overrightarrow{AB}=a,\ \overrightarrow{BC}=\overrightarrow{b}\ and\ \overrightarrow{C}D=\ \cdot Then\ \overrightarrow{A}E=$ $\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}$ b. $2\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}$ c. $\overrightarrow{b}+\overrightarrow{c}$ d. $\overrightarrow{a}+2\overrightarrow{b}+2\overrightarrow{c}$

A. $\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}$

B. $2\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}$

C. $\overrightarrow{b}+\overrightarrow{c}$

D. $\overrightarrow{a}+2\overrightarrow{b}+2\overrightarrow{c}$

Answer: C

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29. If three points A, B and C have position vectors $\hat{i} + x\hat{j} + 3\hat{k}, 3\hat{i} + 4\hat{j} + 7\hat{k}$ and $y\hat{i} - 2\hat{j} - 5\hat{k}$ respectively are collinear, then (x, y) =

A. (2, -3)

B. (-2, 3)

C. (-2, -3)

D. (2, 3)

Answer: A

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30. If the position vectors of the vertices of a triangle of a triangle are $2\hat{i} - \hat{j} + \hat{k}, \hat{i} - 3\hat{j} - 5\hat{k}$ and $3\hat{i} - 4\hat{j} - 4\hat{k},$ then the triangle is

A. equilateral

B. isosceles

C. right angled but not isosceles

D. right angled

Answer: D

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