# MATHS

## BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

## ALGEBRA OF VECTORS

**Illustration**

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

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

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

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

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

**Answer: D**

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**3.** If sum of two unit vectors is a unit vector; prove that the magnitude of their difference is $\sqrt{3}$

A. 1

B. 2

C. $\sqrt{3}$

D. $2\sqrt{3}$

**Answer: C**

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**4.** The non-zero vectors are $\vec{a}, \vec{b}$ and $\vec{c}$ are related by $\vec{a} = 8\vec{b}$ and $\vec{c} = -7\vec{b}$. Then the angle between $\vec{a}$ and $\vec{c}$ is

A. 0

B. $\pi/4$

C. $\pi/2$

D. $\pi$

**Answer: D**

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**5.** If $ABCDEF$ is a regular hexagon [नियमित षट्भुज] 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.** If $\overrightarrow{a}$ and $\overrightarrow{b}$ are position vectors ( स्थिति सदिश) of $A$ and $B$ respectively the position vector of a point $C$ on $AB$ produced such that $\overrightarrow{AC} = 3\overrightarrow{AB}$ is

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

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

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

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

**Answer: B**

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7. Let $\vec{A}D$ be the angle bisector of $\angle A$ of $\Delta ABC$ such that $\vec{A}D = \alpha\vec{A}B + \beta\vec{A}C$, then

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 circumcentre, G is the centroid and O' is orthocentre or triangle ABC then prove that: $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} = \overrightarrow{OO'}$

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 $\dfrac{\vec{a}+\vec{b}+\vec{c}}{4}$ respectively, then the position vector of the orthocentre of this triangle is

A. $\vec{0}$

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

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

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

**Answer: D**

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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 p[arallelogram 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 A, B, C, D be any four points and E and F be the middle points of AC and BD respectively, then $\overrightarrow{AB}+\overrightarrow{CB}+\overrightarrow{CD}+\overrightarrow{AD}$ is equal to

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 $\vec{a} + 2\vec{b} + 6\vec{c} =$

A. $\lambda\vec{a}$

B. $\lambda \vec{b}$

C. $\lambda \vec{c}$

D. $\vec{0}$

**Answer: D**

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**20.** If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors, no two f thich are collinear and the vector $\vec{a} + \vec{b}$ is collinear with $\vec{c}$, $\vec{b} + \vec{c}$ is collinear with $\vec{a}$, $then\, \vec{a} + \vec{b} + \vec{c} =$

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. non-coplanar

B. collinear

C. non-collinear

D. none of these

**Answer: B**

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**22.** If the position vector of these points are $\overrightarrow{a}-\overrightarrow{b}+3\overrightarrow{c}, 2\overrightarrow{a}+3\overrightarrow{b}-4\overrightarrow{c}, -7\overrightarrow{b}+10\overrightarrow{c}$, 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 $5\hat{i}-\hat{j}+\hat{k}$ 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 the vectors $\overrightarrow{A}B = 3\hat{i} + 4\hat{k}$ 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. $\sqrt{288}$

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 $\vec{r}$ non- coplanar vectors 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 of this vectors

$\vec{s}$ along $-\vec{p}+\vec{q}+\vec{r}, \vec{p}-\vec{q}+\vec{r}$ and $-\vec{p}-\vec{q}+\vec{r}$ are x , y and z respectively, then the value of $2x-y+z,$ is

A. 7

B. 8

C. 9

D. 6

**Answer: A**

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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 vector $\overrightarrow{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$ lies in the plane of the vectors $\overrightarrow{b} = \hat{\text{i}} + \hat{j}$ and $\overrightarrow{c} = \hat{j} + \hat{k}$ and bisects the angle between $\overrightarrow{b}$ and $\overrightarrow{c}$.

Then which one of the following gives possible values of $\alpha$ and $\beta$ ?

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 vector representing side $CD$ is

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 regualr hexagon ABCDEF, $\vec{AB} = \vec{a}, \vec{BC} = \vec{b}$ and $\vec{CD} = \vec{c}$. Then $\vec{AE} =$

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 a regular hexagon , then $\vec{AD} + \vec{EB} + \vec{FC}$ equals

A. $2\vec{AB}$

B. $\vec{0}$

C. $3\vec{AB}$

D. $4\vec{AB}$

**Answer: D**

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**37.** 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

**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, $\lambda$ equals

A. 2

B. 4

C. 6

D. 3

**Answer: B**

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**39.** ABCD is a parallelogram with AC and BD as diagonals. 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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**40.** If $OACB$ is a parallelogram with $\overrightarrow{OC} = \vec{a}$ and $\overrightarrow{AB} = \vec{b}$, then $\overrightarrow{OA}$ is equal to

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

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 $\vec{OA} + \vec{OB} + \vec{OC} + \overrightarrow{OD} =$

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 $\Delta$ ABC , If $\overrightarrow{AB} = \vec{a}, \overrightarrow{AC} = \vec{b}$, then the $\overrightarrow{AG}$, in terms of $\vec{a}$ and $\vec{b}$, is

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

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

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

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

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

A. $\vec{a}$

B. $\vec{b}$

C. $\vec{c}$

D. none of these

**Answer: D**

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

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 $\overrightarrow{c}$ and the vector $3\hat{i}+4\hat{j}$, then the vector along $\overrightarrow{c}$ 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 $\overrightarrow{r}=3\hat{i}+2\hat{j}-5\hat{k}, \overrightarrow{a}=2\hat{i}-\hat{j}+\hat{k}, \overrightarrow{b}=\hat{i}+3\hat{j}-2\hat{k}$ and $\overrightarrow{c}=2\hat{i}+\hat{j}-3\hat{k}$ such that $\hat{r}=x\overrightarrow{a}+y\overrightarrow{b}+z\overrightarrow{c}$ 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 $EandF$ are the mid-points of $ACandBD$ 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 circumcentre, G is the centroid and O' is orthocentre or triangle ABC then prove that: $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} = \overrightarrow{OO'}$

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.** Let O, O' and G be the circumcentre, orthocentre and centroid of a $\Delta ABC$ and S be any point in the plane of the triangle.

Statement -1: $\overrightarrow{O'A}+\overrightarrow{O'B}+\overrightarrow{O'C}=2\overrightarrow{O'O}$

Statement -2: $\overrightarrow{SA}+\overrightarrow{SB}+\overrightarrow{SC}=3\overrightarrow{SG}$

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

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

Statement -2 : Three points with position vectors $\vec{a}, \vec{b}, \vec{c}$ are collinear iff there exist scalars x, y, z not all zero such that $x\vec{a}+y\vec{b}+z\vec{c}=\vec{0},\quad \text{where } x+y+z=0.$

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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## Exercise

**1.** A point O is the centre of a circle circumscribed about a triangle ABC. Then,

$\overrightarrow{OA}\sin 2A + \overrightarrow{OB}\sin 2B + \overrightarrow{OC}\sin 2C$ is equal to

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

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

C. $\overrightarrow{0}$

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). The value of $\lambda$ so that the vectors terminate on one straight line, is

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 vecrtor iof modulus $\vec{a}$ $and\, m$ is a non zero scalar such that $ma$ is a unit vector, write the value of $m \cdot$

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 $\Delta ABC$ 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 $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ are the position vectors of the vertices of an equilateral triangle whose orthocenter is at the origin, then

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

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

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

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 respectively

$7\hat{j}+10\hat{k}, \ -\hat{i}+6\hat{j}+6\hat{k}$ and $-4\hat{i}+9\hat{j}+6\hat{k}$. Then, $\Delta ABC$ 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 $\overrightarrow{a} = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\overrightarrow{b} = 3\hat{i} + 6\hat{j} + 2\hat{k}$ then the vector in the direction of $\overrightarrow{a}$ and having mgnitude as $\left|\overrightarrow{b}\right|$ 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 $\vec{c} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ 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 $\vec{a}, \vec{b}$ relative to the origin O and X, Y divide $\overrightarrow{AB}$ internally and externally respectively in the ratio $2:1$. Then , $\overrightarrow{XY} =$

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

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

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

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

**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 $\vec{c} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ 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. $\overrightarrow{b}$

C. $\overrightarrow{c}$

D. $\overrightarrow{0}$

**Answer: D**

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

A. are collinear

B. form an equilateral triangle

C. form a scalene triangle

D. form a right angled triangle

**Answer: B**

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**19.** The points with position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}, 40\hat{i}-8\hat{j}, a\hat{i}-52\hat{j}$ are collinear iff (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 $a\cdot$

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 triangle ABC is bisected at E and BE meets AC at F. Find AF:FC.

A. $3/4$

B. $1/3$

C. $1/2$

D. $1/4$

**Answer: B**

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**23.** In a trapezium ABCD the vector $\overrightarrow{BC} = \lambda\overrightarrow{AD}$. If $\overrightarrow{p} = \overrightarrow{AC} + \overrightarrow{BD}$ is coillinear with $\overrightarrow{AD}$ such that $\overrightarrow{p} = \mu\overrightarrow{AD}$, 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 is a triangle with side lengths a,b and c satisfying (20a-15b) $\overrightarrow{x}$ + (15b-12c) $\overrightarrow{y}$ + (12c-20a) $\overrightarrow{x} \times \overrightarrow{y}$ is:

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 $\Delta ABC$, 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 $\overrightarrow{CE}$ 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, C are vertices of a triangle whose position vectors are $\overrightarrow{a}, \overrightarrow{b}$ and $\overrightarrow{c}$ respectively and G is the centroid of $\Delta ABC$, then $\overrightarrow{GA} + \overrightarrow{GB} + \overrightarrow{GC}$, is

A. $\overrightarrow{0}$

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

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

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

**Answer: A**

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

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 $\left|\overrightarrow{b}\right| = 21$, 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. $\pm 21\left(\hat{i} + \hat{j} + \hat{k}\right)$

**Answer: A**

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

A. $\overrightarrow{a}$

B. $\overrightarrow{b}$

C. $\overrightarrow{c}$

D. $\overrightarrow{0}$

**Answer: D**

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

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**6.** If the points with position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}$ and $a\hat{i}-52\hat{j}$ are collinear, then a =

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.** ABCDEF is a regular hexagon. Find the vector $\vec{A}B + \vec{A}C + \vec{A}D + \vec{A}E + \vec{A}F$ in terms of the vector $\vec{A}D$

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 $\Delta ABC$ 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 $\Delta ABC$ and $G'$ is the centroid of $\Delta A'B'C'$ then $\overrightarrow{AA'} + \overrightarrow{BB'} + \overrightarrow{CC'} =$

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 $\Delta ABC$, 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.** In a $\Delta$ ABC, if $\overrightarrow{AB} = 3\hat{i} + 4\hat{k}, \overrightarrow{AC} = 5\hat{i} + 2\hat{j} + 4\hat{k},$ then the length of median through 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 parallelogramwith $\overrightarrow{OC}=\vec{a}$ and $\overrightarrow{AB}=\vec{b}$, then $\overrightarrow{OA}=$

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

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: A**

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**21.** If ABCDEF is a regular hexagon then $\overrightarrow{AD}+\overrightarrow{EB}+\overrightarrow{FC}$ equals :

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 $\Delta$ ABC , If $\overrightarrow{AB}=\vec{a}, \overrightarrow{AC}=\vec{b}$, then the $\overrightarrow{AG}$, in terms of $\vec{a}$ and $\vec{b}$, is

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

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

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

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

**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. $2\overrightarrow{OG}$

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, $\vec{A}B = a, \vec{B}C = b$ and $\vec{C}D = c. Then, \vec{A}E =$

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

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

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

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

**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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