



# MATHS

# **BOOKS - OBJECTIVE RD SHARMA ENGLISH**

# **ALGEBRA OF VECTORS**



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

A. 
$$\overrightarrow{AB} + \overrightarrow{AC}$$
  
B.  $\overrightarrow{0}$   
C.  $2\left(\overrightarrow{AB} + \overrightarrow{BC}\right)$   
D.  $\overrightarrow{AC} + \overrightarrow{BD}$ 

#### Answer: B

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)  $\overrightarrow{PA} + \overrightarrow{PB} + 2\overrightarrow{PC} = \overrightarrow{0}$  (C)  $\overrightarrow{PA} + \overrightarrow{PB} = \overrightarrow{PC}$ (D)  $\overrightarrow{PA} + \overrightarrow{PB} = 2\overrightarrow{PC}$ 

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 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.  $\pi$ 

Answer: D

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

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

#### Answer: B

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

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

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

## Answer: C



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

A.  $\overrightarrow{0}$ 

B. 0

C. 2

D. none of these

### Answer: A

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

A.  $\overrightarrow{0}$ B.  $3\overrightarrow{GA}$ C.  $3\overrightarrow{GB}$ 

D.  $3\overrightarrow{GC}$ 

Answer: A

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10. If the vectors  $\overrightarrow{A}B=3\hat{i}+4\hat{k}\,\, ext{and}\,\,\overrightarrow{AC}=5\hat{i}-2\hat{j}+4\hat{k}$  are the sides

of a triangle ABC, then the length of the median through A is

A.  $\sqrt{18}$ 

B.  $\sqrt{72}$ 

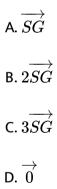
C.  $\sqrt{33}$ 

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  $\overrightarrow{SA} + \overrightarrow{SB} + \overrightarrow{SC} =$ 



# Answer: C

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

#### Answer: B



**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.  $\overrightarrow{OO'}$ 

 $C.2\overrightarrow{OO'}$ 

# 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  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  and  $\frac{\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}}{4}$  respectively, then the position vector of the orthocentre of this triangle is

A. 
$$\overrightarrow{0}$$
  
B.  $-\frac{\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}}{2}$   
C.  $\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}$   
D.  $\frac{\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{c}}{2}$ 

#### Answer: C

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  $\overrightarrow{O}A + \overrightarrow{O}B + \overrightarrow{O}C + \overrightarrow{O}D = 4\overrightarrow{O}P$ .

A. 
$$\overrightarrow{OP}$$

B.  $2\overrightarrow{OP}$ 

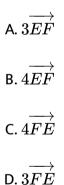
C.  $3\overrightarrow{OP}$ 

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  $\overrightarrow{A}B + \overrightarrow{A}D + \overrightarrow{C}B + \overrightarrow{C}D = 4\overrightarrow{E}F$ .



#### Answer: B

**18.** Given that the vectors  $\overrightarrow{a}$  and  $\overrightarrow{b}$  are non-collinear, the values of x and y for which the vector equality  $2\overrightarrow{u} - \overrightarrow{v} = \overrightarrow{w}$  holds true if  $\overrightarrow{u} = x\overrightarrow{a} + 2y\overrightarrow{b}, \overrightarrow{v} = -2y\overrightarrow{a} + 3x\overrightarrow{b}, \overrightarrow{w} = 4\overrightarrow{a} - 2\overrightarrow{b}$  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  $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$  be three non-zero vectors such that any two of them are non-collinear. If  $\overrightarrow{a} + 2\overrightarrow{b}$  is collinear with  $\overrightarrow{c}$  and  $\overrightarrow{b} + 3\overrightarrow{c}$  is collinear with  $\overrightarrow{a}$  then prove that  $\overrightarrow{a} + 2\overrightarrow{b} + 6\overrightarrow{c} = \overrightarrow{0}$ 

20. If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  are three non-zero vectors, no two of which are collinear and the vector  $\overrightarrow{a} + \overrightarrow{b}$  is collinear with  $\overrightarrow{c}$ ,  $\overrightarrow{b} + \overrightarrow{c}$  is collinear with  $\overrightarrow{a}$ , then  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{a}$  b.  $\overrightarrow{b}$  c.  $\overrightarrow{c}$  d. none of these A.  $\overrightarrow{c}$ B.  $\overrightarrow{0}$ C.  $\overrightarrow{a} + \overrightarrow{c}$ 

D.  $\overrightarrow{a}$ 

#### **Answer: B**



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

A. equilateral triangle

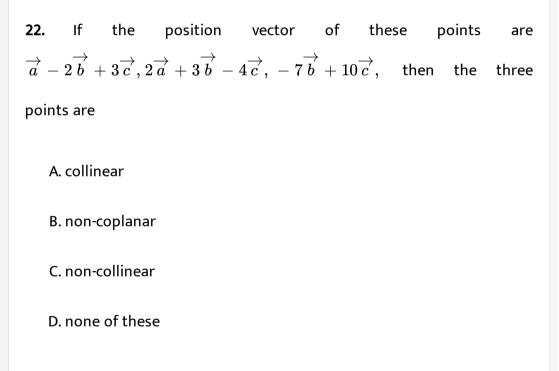
B. collinear

C. non-collinear

### D. none of these

#### Answer: B





#### Answer: A

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

A. 
$$x\overrightarrow{a} + y\overrightarrow{b} = z\overrightarrow{c}$$
  
B.  $x\overrightarrow{a} + y\overrightarrow{b} + z\overrightarrow{c} = 0$   
C.  $x\overrightarrow{a} + y\overrightarrow{b} + z\overrightarrow{c} = 0$ , where  $x + y + z = 0$   
D.  $x\overrightarrow{a} + y\overrightarrow{b} = \overrightarrow{c}$ .

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

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

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

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. 
$$rac{1}{7} \Big( 3 \hat{i} + 6 \hat{j} - 2 \hat{k} \Big)$$

$$egin{aligned} & \mathsf{B}.\,rac{1}{7}\Big(3\hat{i}-6\widehat{K}\,-2\hat{k}\Big) \ & \mathsf{C}.\,rac{1}{7}\Big(-3\hat{i}+6\hat{j}-2\hat{k}\Big) \ & \mathsf{D}.\,rac{1}{7}\Big(3\hat{i}+6\hat{j}+2\hat{k}\Big) \end{aligned}$$

### Answer: A

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**28.** If the points 
$$P\left(\overrightarrow{a}+2\overrightarrow{b}+\overrightarrow{c}\right), Q\left(2\overrightarrow{a}+3\overrightarrow{b}\right), R\left(\overrightarrow{b}+t\overrightarrow{c}\right)$$
 are

collinear, where  $\vec{a}$ ,  $\vec{b}$ ,  $\vec{c}$  are non-coplanar vectors, the value of t is

- A. -2
- B. 1/2
- $\mathsf{C}.\,1/2$
- D. 2

Answer: D

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

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  $\overrightarrow{p}$ ,  $\overrightarrow{q}$  and  $\overrightarrow{r}$  are three non- coplaner in  $\mathbb{R}^3$ , Let the components of a vector  $\overrightarrow{s}$  along  $\overrightarrow{p}$ ,  $\overrightarrow{q}$  and  $\overrightarrow{r}$  be 4,3, and 5, respectively, if the components this vector  $\overrightarrow{s}$  along  $\left(-\overrightarrow{p}+\overrightarrow{q}+\overrightarrow{r}\right)$ ,  $\left(\overrightarrow{p}-\overrightarrow{q}+\overrightarrow{r}\right)$  and  $\left(-\overrightarrow{p}-\overrightarrow{q}+\overrightarrow{r}\right)$  are x, y

and z , respectively , then the value of 2x+y+z is

A. 7

B. 8

C. 9

D. 6

# Answer: C



### 32.

$$egin{aligned} &(x,y,z)
eq(0,0,0) \ ext{and} \ \Big(\hat{i}+\hat{j}+3\hat{k}\Big)x+\Big(3\hat{i}-3\hat{j}+\hat{k}\Big)y+\Big(-4\hat{i}+5\hat{j}\Big)\ &=a\Big(x\hat{i}+y\hat{j}+z\hat{k}\Big), ext{ then the values of a are} \end{aligned}$$

If

- A. 0, -2
- B. 2, 0
- C. 0, -1

D. 1, 0

# Answer: C

**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  $\alpha$  and  $\beta$ ?

A. 
$$lpha=2,eta=2$$

B. lpha=1, eta=2

 $\mathsf{C}.\,\alpha=2,\beta=1$ 

 $\mathsf{D}.\,\alpha=1,\beta=1$ 

#### Answer: D

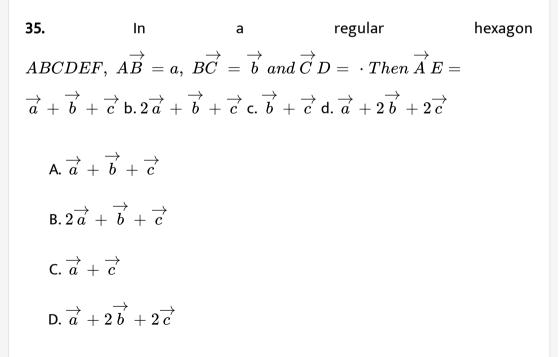
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**34.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  are the vectors forming consecutive sides of a regular of a regular hexagon *ABCDEF*, then the vector representing side *CD* is  $\overrightarrow{a} + \overrightarrow{b}$  b.  $\overrightarrow{a}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

B. 
$$\overrightarrow{a} - \overrightarrow{b}$$
  
C.  $\overrightarrow{b} - \overrightarrow{a}$   
D.  $-\left(\overrightarrow{a} + \overrightarrow{b}\right)$ 

#### Answer: C





#### Answer: C



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

A.  $2A\overrightarrow{B}$ B.  $\overrightarrow{0}$ C.  $3A\overrightarrow{B}$ D.  $4A\overrightarrow{B}$ 

### Answer: D



**37.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  and  $\overrightarrow{d}$  are the position vectors of points A, B, C, Dsuch 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,  $\lambda$  equals

A. 2

B. 4

C. 6

D. 3

Answer: B

**39.** ABCD is a parallelogram with AC 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. 3AB
- C. 2AB
- 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. 
$$\overrightarrow{a} - \overrightarrow{b}$$
  
C.  $\frac{1}{2} \left( \overrightarrow{b} - \overrightarrow{a} \right)$   
D.  $\frac{1}{2} \left( \overrightarrow{a} - \overrightarrow{b} \right)$ 

#### 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. $\overrightarrow{2OG}$ b. $\overrightarrow{4OG}$ c. $\overrightarrow{5OG}$ d. $\overrightarrow{3OG}$ A. $\overrightarrow{2OG}$ B. $\overrightarrow{4OG}$ c. $\overrightarrow{5OG}$  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  $\frac{2}{3}(\overrightarrow{a} + \overrightarrow{b})$  b.  $\frac{1}{6}(\overrightarrow{a} + \overrightarrow{b})c.\frac{1}{3}(\overrightarrow{a} + \overrightarrow{b})d.\frac{1}{2}(\overrightarrow{a} + \overrightarrow{b})1$ A.  $\frac{2}{3}(\overrightarrow{a} + \overrightarrow{b})$ B.  $\frac{1}{6}(\overrightarrow{a} + \overrightarrow{b})$ C.  $\frac{1}{3}(\overrightarrow{a} + \overrightarrow{b})$ D.  $\frac{1}{2}(\overrightarrow{a} + \overrightarrow{b})$ 

Answer: C

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

# Answer: C

**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 
$$A\Big(60\hat{i}+3\hat{j}\Big),\;B\Big(40\hat{i}-8\hat{j}\Big)$$
 and  $C\Big(a\hat{i}-52\hat{j}\Big)$  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. 
$$4ig(\hat{i}+\hat{j}-\hat{k}ig)$$
  
B.  $2ig(\hat{i}+\hat{j}-\hat{k}ig)$   
C.  $\hat{i}+\hat{j}-\hat{k}$ 

D. none of these

### Answer: B

**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

$$\begin{aligned} &\mathsf{A}.\,\frac{1}{15} \Big(11\hat{i}\,+\,10\hat{j}\,+\,2\hat{k}\Big) \\ &\mathsf{B}.\,-\,\frac{1}{15} \Big(11\hat{i}\,-\,10\hat{j}\,+\,2\hat{k}\Big) \\ &\mathsf{C}.\,-\,\frac{1}{15} \Big(11\hat{i}\,+\,10\hat{j}\,-\,2\hat{k}\Big) \\ &\mathsf{D}.\,-\,\frac{1}{15} \Big(11\hat{i}\,+\,10\hat{j}\,+\,2\hat{k}\Big) \end{aligned}$$

### 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.  $\hat{i}-2\hat{k}$
- $\mathsf{C.}\,2\hat{i}+\hat{k}$

D. none of these

### Answer: C

52. The vector  $\overrightarrow{c}$ , directed along the internal bisector of the angle

between the vectors  

$$\overrightarrow{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$$
 and  $\overrightarrow{b} = -2\hat{i} - \hat{j} + 2\hat{k}$  with  $|\overrightarrow{c}| = 5\sqrt{6}$ , is  
A.  $\frac{5}{3}(\hat{i} - 7\hat{j} + 2\hat{k})$   
B.  $\frac{5}{3}(5\hat{i} + 5\hat{j} + 2\hat{k})$   
C.  $\frac{5}{3}(\hat{i} + 7\hat{j} + 2\hat{k})$   
D.  $\frac{5}{3}(-5\hat{i} + 5\hat{j} + 2\hat{k})$ 

#### 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  $\overrightarrow{A}B + \overrightarrow{A}D + \overrightarrow{C}B + \overrightarrow{C}D = 4\overrightarrow{E}F$ .

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



**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

**56.** If O be the circumcentre and O' be the orthocentre of the  $\Delta ABC$ , 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  $\overrightarrow{a}$  and  $\overrightarrow{b}$  are non- collinear vectors, then points having position vectors  $x_1\overrightarrow{a} + y_1\overrightarrow{b}, x_2\overrightarrow{a} + y_2\overrightarrow{b}$  and  $x_3\overrightarrow{a} + y_3\overrightarrow{b}$  are collinear if

 $egin{array}{c|cccc} x_1 & x_2 & x_3 \ y_1 & y_2 & y_3 \ 1 & 1 & 1 \end{array} 
ight| = 0$ 

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



**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  $\overrightarrow{O}A\sin 2A + \overrightarrow{O}B\sin 2B + \overrightarrow{O}C\sin 2C$  is equal to a.  $\left(\overrightarrow{O}A + \overrightarrow{O}B + \overrightarrow{O}C\right)$ sin 2*A* b.  $3\overrightarrow{O}G$ , where *G* is the centroid of  $\rightarrow$ 

triangle ABC c.  $\overrightarrow{0}$  d. none of these

A. 
$$\left(\overrightarrow{Oa} + \overrightarrow{OB} + \overrightarrow{OC}\right) \sin 2A$$
  
B.  $\overrightarrow{OG}$ , 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). Find the value of  $\lambda$  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

$$\begin{array}{l} \mathsf{A.} \; \frac{2}{3} \Big( -6\hat{i} - 8\hat{j} - 6\hat{k} \Big) \\ \mathsf{B.} \; \frac{2}{3} \Big( 6\hat{i} + 8\hat{j} + 6\hat{k} \Big) \\ \mathsf{C.} \; \frac{1}{3} \Big( 6\hat{i} + 13\hat{j} + 18\hat{k} \Big) \\ \mathsf{D.} \; \frac{1}{3} \Big( 5\hat{j} + 12\hat{k} \Big) \end{array}$$

Answer: C

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

A. 
$$m = \pm 1$$
  
B.  $m = \left| \overrightarrow{a} \right|$   
C.  $m = \frac{1}{\left| \overrightarrow{a} \right|}$   
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. 
$$\overrightarrow{0}$$

B.  $2\overrightarrow{AB}$ 

 $\mathsf{C.}\, 2\overrightarrow{GA}$ 

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 orthocentre is t the origin, then write the value of  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{\cdot}$ 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

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

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

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  $\Delta ABC$  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. 
$$7\Big(\hat{i}+2\hat{j}+2\hat{k}\Big)$$
  
B.  $rac{7}{9}\Big(\hat{i}+2\hat{j}+2\hat{k}\Big)$   
C.  $rac{7}{3}\Big(\hat{i}+2\hat{j}+2\hat{k}\Big)$ 

D. none of these

# Answer: C

10.  $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$  are non-coplanar vectors and  $x\overrightarrow{a} + y\overrightarrow{b} + z\overrightarrow{c} = \overrightarrow{0}$  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  $\overrightarrow{c}$ , directed along the internal bisector of the angle

between the vectors  

$$\overrightarrow{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$$
 and  $\overrightarrow{b} = -2\hat{i} - \hat{j} + 2\hat{k}$  with  $|\overrightarrow{c}| = 5\sqrt{6}$ , is  
A.  $\pm \frac{5}{3}(2\hat{i} + 7\hat{j} + \hat{k})$   
B.  $\pm \frac{3}{5}(\hat{i} + 7\hat{j} + 2\hat{k})$   
C.  $\pm \frac{5}{3}(\hat{i} - 2\hat{j} + 7\hat{k})$ 

D. 
$$\pm rac{5}{3} \Big( \hat{i} - 7 \hat{j} + 2 \hat{k} \Big)$$

### Answer: D



**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

**13.** If a vector of magnitude 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.  $24\hat{i}-32\hat{j}-30\hat{k}$ 

- $\mathsf{B.}-24\hat{i}+32\hat{j}+30\hat{k}$
- C.  $12\hat{i} 16\hat{j} 15\hat{k}$

D. none of these

#### Answer: B

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



**15.** Let  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  are three non- coplanar vectors such that  $\overrightarrow{r}_1 = \overrightarrow{a} + \overrightarrow{c}$ ,  $\overrightarrow{r}_2 = \overrightarrow{b} + \overrightarrow{c} - \overrightarrow{a}$ ,  $\overrightarrow{r}_3 = \overrightarrow{c} + \overrightarrow{a} + \overrightarrow{b}$ ,  $\overrightarrow{r} = 2\overrightarrow{a} - 3\overrightarrow{b}$ If  $\overrightarrow{r} = \lambda_1 \overrightarrow{r}_1 + \lambda_2 \overrightarrow{r}_2 + \lambda_3 \overrightarrow{r}_3$ , 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

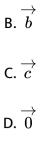
**16.** If  $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$  are three non- coplanar vectors such that  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \alpha \overrightarrow{d}$  and  $\overrightarrow{b} + \overrightarrow{c} + \overrightarrow{d} = \beta \overrightarrow{a}$ , then  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} + \overrightarrow{d}$ to equal to  $\overrightarrow{A}, \overrightarrow{0}$ 

- $\mathsf{B}.\,\alpha \overset{\longrightarrow}{a}$
- $\mathsf{C}.\beta \overset{\longrightarrow}{b}$
- D.  $(\alpha + \beta) \overrightarrow{c}$

#### Answer: A

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



#### Answer: D

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**18.** Let  $\alpha, \beta$  and  $\gamma$  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

**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

 $\mathsf{C.}\,a=20$ 

D. none of these

#### Answer: A



**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

22. The median AD of the  $\Delta ABC$  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.  $\mu=\lambda+1$ 

 $\mathsf{B}.\,\lambda=\mu+1$ 

 $\mathsf{C}.\,\lambda+\mu=1$ 

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, andc satisfying  $(20a - 15b)\overrightarrow{x} + (15b - 12c)\overrightarrow{y} + (12c - 20a)(\overrightarrow{x} \times \overrightarrow{y}) = 0$ , 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

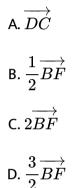
B. an obtuse angle triangle

C. a right angle triangle

D. an isosceles triangle

#### Answer: C

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



#### Answer: A

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

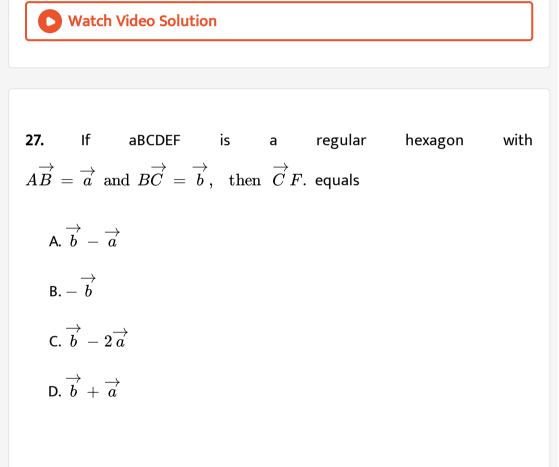
A. C is a mid-point of AB

B. C divides AB in the ratio 2:1

 $\mathsf{C.}\, 3AC = 5CB$ 

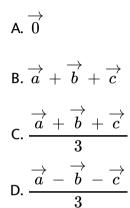
D.2AC = 3CB

Answer: C



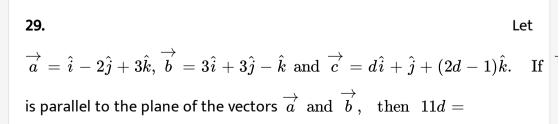
Answer: C

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



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#### Answer: A



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. $\overrightarrow{2OG}$ b. $\overrightarrow{4OG}$ c. $\overrightarrow{5OG}$ d. $\overrightarrow{3OG}$ A. $\overrightarrow{3OM}$ B. $\overrightarrow{4OM}$ 

C.  $2\overrightarrow{OM}$ 

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

#### 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. 
$$\overline{0}$$

#### Answer: D

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

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

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

D. none of these

#### Answer: B



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



 $\mathrm{B.}\, 2 \overrightarrow{AB}$ 

 $\mathsf{C.}\, 2 \overrightarrow{AC}$ 

D.2(BC)

#### Answer: A



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.  $2\overrightarrow{AB}$ 

 $\mathsf{B.}\, 3 \overrightarrow{AB}$ 

C.  $\overrightarrow{AB}$ 

D.  $\stackrel{\rightarrow}{0}$ 

#### Answer: B



**8.** In a regular hexagon ABCDEF,  $\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF} = \overrightarrow{kAD}$ ,

where k is equal to

A.  $\overrightarrow{3AG}$ B.  $\overrightarrow{2AG}$ C.  $\overrightarrow{6AG}$ D.  $\overrightarrow{4AG}$ 

Answer: C



**9.** If P, Q , R are the mid-points of the sides AB, BC and CA of  $\Delta ABC$  and O

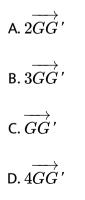
is point whithin the triangle, then  $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} =$ 

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



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



Answer: B

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. 
$$4\overrightarrow{AC}$$

 $\mathsf{B.}\, 2 \overrightarrow{AC}$ 

 $\mathsf{C.}\, 3 \overrightarrow{AC}$ 

D.  $\overrightarrow{5AC}$ 

Answer: C







B.  $3\overrightarrow{AB}$ 

 $\mathsf{C.}\, 2 \overrightarrow{AB}$ 

D.  $\overrightarrow{AB}$ 

# Answer: C

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.** 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  $\Delta ABC$ , 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  $\overrightarrow{a}$  and  $\overrightarrow{b}$ . If R is a point on  $\overrightarrow{PQ}$  such that  $\overrightarrow{PR} = 5\overrightarrow{PQ}$ , then the position vector of R, is

A.  $5\overrightarrow{b} - 4\overrightarrow{a}$ B.  $5\overrightarrow{b} + 4\overrightarrow{a}$ C.  $4\overrightarrow{b} - 5\overrightarrow{a}$ D.  $4\overrightarrow{b} + 5\overrightarrow{a}$ 

#### Answer: A

17.	lf	the	points	whose	position	vectors	are
$2\hat{i}+$	$\hat{j}+\hat{k},$	$6\hat{i}-\hat{j}$ -	$+ 2\hat{k}  ext{ and } 1$	$14\hat{i}-5\hat{j}+p$	$p\hat{k}$ are colline	ar, 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



**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

- 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.  $2\overrightarrow{AB}$ 

 $\overset{\rightarrow}{\text{B. 0}}$ 

C.  $3\overrightarrow{AB}$ 

D.  $4\overrightarrow{AB}$ 

# Answer: D



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



**23.** If the position vector of a point A is  $\overrightarrow{a} + 2\overrightarrow{b}$  and  $\overrightarrow{a}$  divides AB in

the ratio 2:3, then the position vector of B, is

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

#### Answer: C

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**24.** 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



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

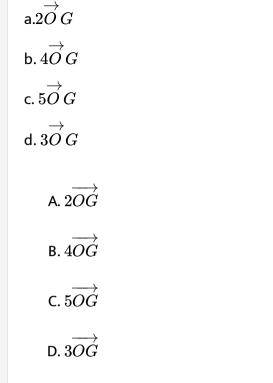
A. 
$$\frac{2}{3} \left( \overrightarrow{a} + \overrightarrow{b} \right)$$
  
B.  $\frac{1}{6} \left( \overrightarrow{a} + \overrightarrow{b} \right)$   
C.  $\frac{1}{3} \left( \overrightarrow{a} + \overrightarrow{b} \right)$   
D.  $\frac{1}{2} \left( \overrightarrow{a} + \overrightarrow{b} \right)$ 

#### Answer: C



**26.** If G is the intersection of diagonals of a parallelogram ABCD and O

is any point then  $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} + \overrightarrow{OD} =$ 



#### Answer: B

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27. The vector  $\coslpha\coseta\hat{i}+\coslpha\sineta\hat{j}+\sinlpha\hat{k}$  is a

A. null vector

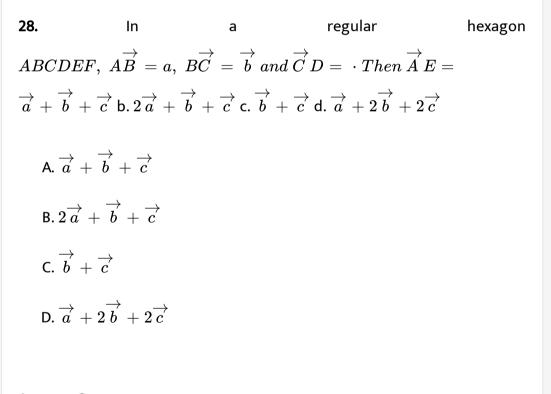
B. unit vector

C. constant vector

#### D. none of these

#### Answer: B

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#### Answer: C

**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