MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

ADDITION OF VECTORS

Solved Example

1. A unit vector parallel to the sum of the vectors 2i + 4j - 5k, i + 2j + 3k are

A. $\frac{\pm(3i+6j-2k)}{7}$

B. $\frac{\pm(3i-6j-2k)}{7}$

C. $\frac{\pm(3i+6j+2k)}{7}$

D. $\frac{\pm(3i-6j-2k)}{7}$

Answer: A

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2. The points - 6a + 3b + 2c, 3a - 2b + 4c, 5a + 7b + 3c, - 13a + 17b - c are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: D

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3. If the position vectors of A, B are 2i + 3j + k and 3i - j + 4k repectively then the position vector of the point which divides AB in the ratio 3 : 2 is

A. $\frac{9i + 30j + 4k}{5}$

B. $\frac{8i + 7j + 3k}{5}$

C. $\frac{13i + 3j + 14k}{5}$

D. $\frac{12i + 3j + 5k}{5}$

Answer: C

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4. The vector equation of the plane passing through the point (1, 2, 3) and parallel to the vectors (-2, 3, 1), (2, -3, 4) is

A. r = s (2i + j - k) + t (i + 2j + 2k)

B. r = 2i + 2j - 3k + s (3i + 3j - 5k) + t (i + 2j + k)

C. r = (i + 2j + 3k) + s (-2i + 3j + k) + t (2i - 3j + 4k)

D. none

Answer: C

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5. If P is a point on the line passing through the point A with position vector 2i + j - 3k and parallel to i + 2j + k such that $AP = 2\sqrt{6}$ then the position vector of P is

A. 4i + 5j + k

B. 3j + 5k

C. 4i + 5j - k

D. 3j - 4k

Answer: C

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6. The points of intersection of the line r = 2a + t (b - c) with the plane r = a + p (b + c) + q (a + 2b - c) is

A. 4a + 3b - 3c

B. 4a - 3b + 3c

C. $\frac{1}{2}(4a - 3b + 3c)$

D. $\frac{1}{2}(4a + 3b - 3c)$

Answer: D

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7. Match the items of column I to that of column II

	Column I		Column
(A)	If a and b are noncollinear and $xa + yb = (y + 1)$ a $+ (2 - x)$b Then x - y equals	(p)	6
(B)	If a, b are non-collinear and $(2 - x)a + b$ and ya $+ (x - 3)$ b are equal, then $\|x - y\| =$	(q)	-1
(C)	If a, b are non-collinear and $(x - 1)a + 2b$ and $3a + xb$ are collinear, then the sum of the values of x is	(s)	1
(D)	If a, b are non-collinear and $3a + xb$ and $(1 - x)a - \frac{2}{3}$b are like vectors, then x is	(t)	2

The correct match is :

A. $A \to s, B \to p, C \to t, D \to q$

B. $A \to s, B \to q, C \to s, D \to q$

C. $A \to p, B \to q, C \to r, D \to s$

D. $A \to q, B \to p, C \to s, D \to r$

Answer: A

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8. Three vectors of magnitudes a, 2a and 3a are along the directions of the diagonals of three adjacent faces of a cube that meet in a point. Then the magnitude of their sum is

A. 4a

B. 5a

C. 6a

D. 8a

Answer: B

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9. A(2, 1, 2), B(1, 0, 0) and $C\left(1+\sqrt{3}, \sqrt{3}, -\sqrt{6}\right)$ are the vertices of a triangle. If the length of the median drawn to the side BC is equal to $\lambda\sqrt{9-2\sqrt{3+2\sqrt{6}}}$. then λ equal to

A. 4

B. 3

C. 2

D. 1

Answer: D

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Exercise 1

1. If the position vectors of P, Q are respectively 5a + 4b and 3a - 2b then QP =

A. 2a + 6a

B. 2a - 6b

C. 2a + 5b

D. 2a - 5b

Answer: A

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2. If $\overrightarrow{O}A = i + \ + k, \overrightarrow{A}B = 3i - 2j + k, \overrightarrow{B}C = i + 2j - 2k, \overrightarrow{C}D = 2i + j +$ then the position vector of D is

A. 2i + 3j + 7k

B. 7i + 2j + 3k

C. 3i + 2j + 7k

D. none

Answer: B

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3. If the position vectors of A, B, C, D are a, b, 2a + 3b, a - 2b respectively, then $\overrightarrow{A}C, \overrightarrow{D}B, \overrightarrow{B}A, \overrightarrow{D}A$ are

A. a + 3b, 3b - a, a - b, 2b

B. 2b, b - 2a, 3b + a, b - a

C. a - 3b, 3b - a, a + b, 2b

D. $-2b, b-2a, 3b-a, b-a$

Answer: A

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4. If the position vectors of A, B, C are i + 2j + 3k, j + 2k, - i + k and $\overrightarrow{A}B = \lambda\overrightarrow{A}C$ then λ=

A. 0

B. 1

C. 2

D. $1/2$

Answer: D

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5. If the position vectors of A, B, C are (-2, 1, 1), (-4, 2, 2), (6, -3, -3) and $\overrightarrow{A}B = \lambda\overrightarrow{A}C$ then λ =

A. 1

B. -2

C. 4

D. $-1/4$

Answer: D

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

A. (2, -3)

B. (-2, 3)

C. (-2, -3)

D. (2, 3)

Answer: A

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7. If the points whose position vectors are 2i + j + k, 6i - j + 2k and 14i - 5j + pk are collinear then the value of p is

A. 2

B. 4

C. 6

D. 8

Answer: B

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8. If the points with position vectors 60i + 3j, 40i - 8j and ai - 52j are collinear, then a =

A. -40

B. -20

C. 20

D. 40

Answer: A

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9. if a = 3i + 2j + k, b = 6i + mj + nk and a, b are collinear, then m, n are

A. m = 2, n = 10

B. m = 10, n = 2

C. m = 4, n = 2

D. m = 2, n = 4

Answer: C

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10. The vectors a and b are noncollinear, If a + (x + 1) b and (2x - 3) b - a are collinear, then the value of x is

A. $3/2$

B. $-3/2$

C. $-2/3$

D. $2/3$

Answer: D

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11. If a, b are noncollinear vectors and A = (x + 4y) a + (2x + y + 1)b, B = (y - 2x +2) a + (2x - 3y - 1) b and 3A = 2B, then (x, y) =

A. (2, 1)

B. (2, -1)

C. (-2, -1)

D. (-2, 1)

Answer: B

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12. Let a, b and c be three non zero vectors, no two of which are collinear. If the vector a + 2b is collinear with c, and b + 3c is collinear with a, then a

+ 2b + 6c =

A. λa

B. λb

C. λc

D. 0

Answer: D

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13. Three non-zero non-collinear vectors a, b, c are such that a + 3b is collinear with c, while 3b + 2c is collinear with a. Then a + 3b + 2c =

A. 2a

B. 3b

C. 4c

D. 0

Answer: D

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14. If a, b and c are non-coplanar vectors and if d is such that $d = \frac{1}{x}(a+b+c)$ and $a = \frac{1}{y}(b+c+d)$ where x and y are non-zero real numbers, then $\frac{1}{xy}(a+b+c+d) =$

A. $-a$

B. 0

C. 2a

D. 3c

Answer: B

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15. If the vectors 2i + 3j, 5i + 6j, 8i + λj have their initial point at (1, 1) then the value of λ so that the vectors terminated on one line is

A. 5

B. 9

C. 4

D. 0

Answer: B

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16. The length of the line segment joining the points 2i - 2j + 3k, 5i + 2j + 3k is

A. 3

B. 4

C. 5

D. 6

Answer: C

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17. If the position vectors of A and B are 3i - 2j + k and 2i + 4j - 3k then $\left|\overrightarrow{AB}\right|$

A. $\sqrt{14}$

B. $\sqrt{29}$

C. $\sqrt{43}$

D. $\sqrt{53}$

Answer: D

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18. The distance between the points (5, 3, 1), (3, 2, -1) is

A. 3

B. 4

C. 5

D. 6

Answer: A

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19. The distance between the points i + 6j + 7k, -3i + 4j + 3k is

A. 3

B. 4

C. 5

D. 6

Answer: D

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20. If a = 2i + 5j + 6k, b = -2i + 3j + 2k then the magnitude of a - b is

A. 4

B. 6

C. 9

D. 12

Answer: B

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21. If a = 3i - 2j + k, b = 2i - 4j - 3k, c = -i + 2j + 2k then a + b + c =

A. 3i - 4j

B. 3i + 4j

C. 4i - 4j

D. 4i + 4j

Answer: C

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22. If $a = i - j + 2k, b = 2i + 3j + k, c = i - k,$ then magnitude of $a + 2b - 3c$ is

A. $\sqrt{87}$

B. $\sqrt{78}$

C. $\sqrt{89}$

D. $\sqrt{101}$

Answer: B

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23. If a = i + j + k, b = 2i + 3j, c = 3i + 5j - 3k and d = k + j, then the ratio of moduli of b - a and d - c is

A. $1:3$

B. $2:1$

C. $3:1$

D. $1:2$

Answer: A

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24. If the position vectors of A, B are 2i - 9j - 4k, 6i - 3j + 8k then the unit vector in the direction of $\overrightarrow{AB}$ is

A. $\frac{2i+j+2k}{3}$

B. $\frac{-i-2j+2k}{3}$

C. $\frac{2i+3j+6k}{7}$

D. $\frac{-i+2j+6k}{7}$

Answer: C

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25. If the position vectors of A = (2, 3, 5), B = (1, 1, 7) then the unit vector in the direction of $\overrightarrow{A}B$ is

A. $\frac{2i+j+2k}{3}$

B. $\frac{-i-2j+2k}{3}$

C. $\frac{2i+3j+6k}{7}$

D. $\frac{-i+2j+6k}{7}$

Answer: B

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26. If a = 3i - 2j + k, b = -i + j + k then the unit vector parallel to the vector a + b is

A. $\frac{2}{3}i - \frac{1}{3}j + \frac{2}{3}k$

B. $\frac{2}{5}i - \frac{1}{5}j + \frac{2}{5}k$

C. (2)/(sqrt(3))i-(1)/(sqrt(3))j+(2)/(3)k`

D. $-\frac{2}{\sqrt{3}}i + \frac{1}{\sqrt{3}}j - \frac{2}{\sqrt{3}}k$

Answer: A

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27. If a = 3i - 2j + k and b = i + 2j + 5k, then the unit vector along a - b is

A. $\frac{\sqrt{2}i + 4j + 4k}{\sqrt{34}}$

B. $\frac{i - 2j - 2k}{3}$

C. $\frac{-2i + 4j + 4k}{6}$

D. $\frac{\sqrt{2}i + 4j - 4k}{\sqrt{340}}$

Answer: B

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28. If a = i + j - 2k, b = -i + 2j + k, c = i - 2j + 2k, then a unit vector parallel to a + b + c =

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

B. (i+j+k)/(sqrt(3))`

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

D. $\frac{i - j + k}{\sqrt{3}}$

Answer: B

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29. If a = i + j, b = j + k and c = i + k then a unit vector in the direction of a - 2b + 3c is

A. $\frac{1}{\sqrt{2}}(4i - j + k)$

B. $\frac{1}{3\sqrt{2}}(4i - j + k)$

C. $\frac{1}{3\sqrt{2}}(4i + j - k)$

D. $\frac{1}{3\sqrt{3}}(4i - 2j - k)$

Answer: B

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30. If $\lambda(2i - 4j + 4k)$ is a unit vector then λ =

A. $\pm 1/6$

B. $1/6$

C. 6

D. 16

Answer: A

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31. If the vector a = 2i + 3j + 6k and b are collinear and |b| = 21, then b =

A. $\pm(2i + 3j + 6k)$

B. $\pm 3(2i + 3j + 6k)$

C. (i + j + k)

D. $\pm 21(2i + 3j + 6k)$

Answer: B

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32. If 2i + 3j - 6k, 6i - 2j + 3k, 3i - 6j - 2k represent the sides of a triangle then the perimeter of the triangle is

A. 14

B. 21

C. 7

D. 6

Answer: B

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33. The points whose position vectors are $2i + 3j + 4k$, $3i + 4j + 2k$ and $4i + 2j + 3k$ are the vertices of

A. vertices of a right angled triangle

B. vertices of an isosceles triangle

C. vertices of an equilateral triangle

D. collinear

Answer: C

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34. The three points whose position vectors are $i + 2j + 3k$, $3i + 4j + 7k$ and $-3i - 2j - 5k$

A. form the vertices of an equilateral triangle

B. form the vertices of a right angled triangle

C. are collinear

D. form the vertices of an isosceles triangle

Answer: C

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35. The points whose position vectors are $2i + 3j + 4k$, $3i + 4j + 2k$ and $4i + 2j + 3k$ are the vertices of

A. an isosceles triangle

B. right angled triangle

C. equilateral triangle

D. right angled isosceles triangle

Answer: C

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36. If the position vectors of the vertices of a triangle are $2i - j + k$, $i - 3j - 5k$, $3i - 4j - 4k$ then it is

A. equilateral triangle

B. isosceles triangle

C. right angled isosceles triangle

D. right angled triangle

Answer: D

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37. The points (1,1 ,1) ,(1,2,3),(2-1, 1) form

A. an equilateral triangle

B. an isosceles triangle

C. a right angled triangle

D. a right angled isosceles triangle

Answer: B

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38. The points 2a + 3b + c, a + b, 6a + 11b + 5c are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: D

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39. The points $2i + j + k$, $6i - j + 2k$, $14i - 5j + 4k$ are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: A

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40. The points (1, 2, 3), (3, 4, 7), (-3, -2, -5) are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: A

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41. If the points whose position vectors are -2i + 3j + 5k, i + 2j + 3k, λi - k are collinear, then λ =

A. 1

B. 2

C. 5

D. 7

Answer: D

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42. The vectors $5a + 6b + 7c$, $7a - 8b + 9c$, $3a + 20b + 5c$ are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: B

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43. The points $-a + 4b - 3c$, $3a + 2b + 5c$, $-3a + 8b - 5c$, $-3a + 2b + c$ are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: C

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44. The points $2i + j - k, i + j + k, 2i + 2j + k, 2j + 5k$ are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: B

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45. The points $i + j + k, i + 2j, 2i + 2j + k, 2i + 3j + 2k$ are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: C

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46. The points (2, -1, 3), (-1, 2, -4), (-12, -1, -3), (6, 2, -1) are

A. collinear

B. coplanar but not collinear

C. noncoplanar

D. none

Answer: B

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47. The vectors 3a - 2b - 4c, -a + 2c, - 2a + b + 3c are

A. linearly dependent

B. linearly independent

C. collinear

D. none

Answer: A

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48. If the vectors 2a - b + c, a + 2b - 3c, 3a + mb + 5c are linearly dependent, then m =

A. 2

B. -2

C. 4

D. -4

Answer: D

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49. If a = i + j + k, b = 4i + 3j + 4k, c = i + $\alpha j + \beta k$ are linearly dependent and $|c| = \sqrt{3}$ then

A. $\alpha = 1, \beta = -1$

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

C. $\alpha = -1, \beta = \pm 1$

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

Answer: D

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50. If a = i + 4j, b = 2i - 3j and c = 5i + 9j then c =

A. $2a + b$

B. $a + 2b$

C. $a + 3b$

D. $3a + b$

Answer: D

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51. If $a = 2i - j + 3k$, $b = -i + 4j - 2k$, $c = 5i + j + 7k$ and $xa + yb = c$ then $(x, y) =$

A. $(3, 1)$

B. $(3, -1)$

C. $(-3, 1)$

D. $(-3, -1)$

Answer: A

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52. The linear relation between the vectors a + 3b + 4c, a - 2b + 3c, a + 5b - 2c, 6a + 14b + 4c is

A. 1(a + 3b + 4c) + 2(a - 2b + 3c) + 2(a + 5b - 2c) - 1(6a + 14b + 4c) = 0

B. 1(a + 3b + 4c) + 2(a - 2b + 3c) + 3(a + 5b - 2c) - 2(6a + 14 + 4c) = 0

C. 1(a + 3b + 4c) + 2(a - 2b + 3c) + 3(a + 5b - 2c) - 1(6a + 14b + 4c) = 0

D. none

Answer: C

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53. The values of λ such that (x, y, z) $\neq$ (0, 0, 0) and (i + j + 3k) x + (3i - 3j + k) y + (-4i + 5j) $z = \lambda$ (xi + yj + zk) are

A. 0, 1

B. 0, -1

C. 1, -1

D. 0, 1, -1

Answer: B

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54. If the position vectors of A, B are 2a + 3b - c, 4a - b + 5c, then the position vector of midpoint of $\overline{AB}$ is

A. 3a + b + 2c

B. 3a - b + 2c

C. 3a + b - 2c

D. 3a - b - 2c

Answer: A

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55. If the position vectors of A, B are i + j + k and i + j - 4k repectively then the position vector of the point which divides $\overline{AB}$ in the ratio 2 : 3 is

A. i + j + k

B. i + j - k

C. i - j + k

D. i - j - k

Answer: B

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56. If A = i + 2j + 3k and B = 2i - j + 4k, then the position vectors of the points of trisection are

A. (4/3, 1, 10/3), (5/3, 0, 11/3)

B. (-4/3, -1, -10/3), (-5/3, 0, -11/3)

C. (4/3, -1, -10/3), (-5/3, 0, 11/3)

D. none

Answer: A

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57. A point $C = \frac{5a + 4b - 5c}{3}$ divides the line joining A = a - 2b + 3c and B in the ratio 2 : 1, then the poistion vector of B is

A. 2a - 3b + 4c

B. 2a + 3b - 4c

C. 2a - 3b - 4c

D. none

Answer: B

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58. The ratio in which i + 2j + 3k divides the join of -2i + 3j + 5k and 7i - k is

A. $-3:2$

B. $1:2$

C. $2:3$

D. $-4:3$

Answer: B

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59. If A = i + 2j + 3k, B = 2i + 4j + 7k and C = 2i + 3j + 5k are collinear, then the ratio in which B divides $\overline{AC}$ is

A. 2 : 1 externally

B. 2 : 1 internally

C. 4 : 1 externally

D. 4 : 1 internally

Answer: A

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60. The ratio in which the line segment joining the points with position vectors i + 2j + 3k, -3i + 6j - 8k is divided by xy-plane, is

A. $-3:8$

B. $8:1$

C. $3:8$

D. $2:8$

Answer: C

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61. If the position vectors of A, B are i + 2j - 3k, 3i - 2j + 5k respectively then the position vector of C in AB produced such that 2 AC = 3 AB is

A. $4i - 4j + 9k$

B. $2i - 2j + 3k$

C. $2i - 2j + 9k$

D. $4i - 4j + 3k$

Answer: A

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62. If the position vectors of A, B are $2a - 3b$, $3a + 2b$ respectively then the position of vector of C in AB produced such that $AC = 2\ AB$ is

A. $3a + 2b$

B. $3b - 2a$

C. $4a + 7b$

D. $5b - 2a$

Answer: C

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

A. 5b - 4a

B. 5b + 4a

C. 4b - 5a

D. 4b + 5a

Answer: A

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64. If the vectors AB = -3i + 4k and AC = 5i - 2j + 4k are the sides of a triangle ABC, then the length of the median through A is

A. $\sqrt{14}$

B. $\sqrt{18}$

C. $\sqrt{25}$

D. $\sqrt{29}$

Answer: B

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65. If the position vectors of A, B, C are 2i - 2j + k, 2i + j - k, -2i + j + 15k respectively then the length of the median through A is

A. 3

B. 5

C. 7

D. 11

Answer: C

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66. The position vector of a point lying on the line joining the points whose position vectors are $\bar{i}+\bar{j}-\bar{k}$ and $\bar{i}-\bar{j}+\bar{k}$ is

A. j

B. i

C. k

D. o

Answer: B

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67. In Δ ABC, P, Q, R are points on BC, CA and AB respectively, dividing them in the ratio 1 : 4, 3 : 2 and 3 : 7. The point S divides AB in the ratio 1 : 3. Then $\frac{|AP+BQ+CR|}{\left|\overrightarrow{C}S\right|}=$

A. $1/5$

B. $2/5$

C. $5/2$

D. $7/10$

Answer: B

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

A. PQ and RS bisect each other

B. PQ and PR bisect each other

C. PQ and RS trisect each other

D. QS and PR trisect each other

Answer: D

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69. The position vector of the centroid of the triangle formed by the points i + j + k, i - j + k, -i + j + k is

A. $\frac{i+j+3k}{3}$

B. $\frac{i-j+3k}{3}$

C. $\frac{i+j-3k}{3}$

D. $\frac{i-j-3k}{3}$

Answer: A

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70. The position vector of the centroid of the triangle formed by the points 2a + 3b, 5a + 4b, 2a - b is

A. 3a + 2b

B. 3b - 2a

C. 4a + 7b

D. 5b - 2a

Answer: A

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71. If C is the midpoint of AB and P is any point outside AB, then

A. PA + PB = 2 PC

B. PA + PB = PC

C. PA + PB + 2 PC = O

D. PA + PB + PC = O

Answer: A

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72. If A, B, C are the vertices of a triangle then $\overrightarrow{A}B + \overrightarrow{B}C + \overrightarrow{C}A =$

A. O

B. $\overrightarrow{A}C$

C. $2\overrightarrow{A}C$

D. $3\overrightarrow{A}C$

Answer: A

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73. If G is the centroid of Δ ABC then $\overrightarrow{G}A + \overrightarrow{G}B + \overrightarrow{G}C =$

A. O

B. $\overrightarrow{O}G$

C. $2\overrightarrow{O}G$

D. $3\overrightarrow{O}G$

Answer: A

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74. If G is the centroid of Δ ABC, G' is the centroid of Δ A' B' C' then $\overrightarrow{A}A' + \overrightarrow{B}B' + \overrightarrow{C}C' =$

A. O

B. $\overrightarrow{G}G'$

C. $2\overrightarrow{G}G$

D. $3\overrightarrow{G}G$

Answer: D

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75. If D is the midpoint of the side BC of Δ ABC then $\overrightarrow{A}B + \overrightarrow{A}C =$

A. $\overrightarrow{A}\,D$

B. $2\overrightarrow{A}\,D$

C. $3\overrightarrow{A}\,D$

D. $4\overrightarrow{A}\,D$

Answer: B

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76. If D, E, F are the midpoints of BC, CA, AB of Δ ABC, then $\overrightarrow{A}\,D + \overrightarrow{B}\,E + \overrightarrow{C}\,F =$

A. O

B. $3\overrightarrow{O}\,D$

C. $3\overrightarrow{O}\,E$

D. $\overrightarrow{O}\,D + \overrightarrow{O}\,E + \overrightarrow{O}\,F$

Answer: A

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77. If D, E are the midpoints of AB, AC of Δ ABC and $\overrightarrow{DE} = \lambda\overrightarrow{BC}$ then λ =

A. 1

B. 2

C. $1/2$

D. 3

Answer: C

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78. If D, E are the midpoints of AB, AC of Δ ABC, then $\overrightarrow{BE} + \overrightarrow{DC} =$

A. $\overrightarrow{BC}$

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

C. $2\overrightarrow{BC}$

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

Answer: D

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79. If S is the circumcentre, G the centroid, O the orthocentre of Δ ABC, then $\overrightarrow{S}A + \overrightarrow{S}B + \overrightarrow{S}C =$

A. $\overrightarrow{SG}$

B. $\overrightarrow{OS}$

C. $\overrightarrow{SO}$

D. $\overrightarrow{OG}$

Answer: C

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80. If S is the circumcentre, O is the orthocentre of Δ ABC then $\overrightarrow{O}A + \overrightarrow{O}B + \overrightarrow{O}C =$

A. $\overrightarrow{S}O$

B. $2\overrightarrow{S}O$

C. $\overrightarrow{O}S$

D. $2\overrightarrow{O}S$

Answer: D

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81. If A = (3, 2, 5), B = (3, 3, 5) and C = (3, 4, 8) are the vertices of a triangle ABC, then its centroid is

A. (3, 3, 5)

B. (3, 4, 7)

C. (3, 4, 6)

D. (3, 3, 6)

Answer: D

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82. If 4i + 7j + 8k, 2i + 3j + 4k, 2i + 5j + 7k are position vectors of A, B, C of Δ ABC then position vector of the point where the bisector of angle A meets BC is

A. $2i + \frac{11}{3}j + \frac{17}{3}k$

B. $2i + \frac{7}{2}j + 6k$

C. $6i + 11j + 17k$

D. $2i + 4j + \frac{5}{2}k$

Answer: B

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83. P, Q, R are the midpoints of the sides AB, BC and CA of the triangle ABC and O is a point within the triangle, then OA + OB + OC =

A. 2(OP + OQ + OR)

B. OP + OQ + OR

C. 4(OP + OQ + OR)

D. none

Answer: B

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84. If the position vectors of A, B are i + 2j - 3k, 3i - 2j + 5k respectively then the position vector of C in AB produced such that 2 AC = 3 AB is

A. (1/3) (-4i + 5j + 17k)

B. (1/3) (4i - 5j + 17k)

C. (1/3) (4i + 5j - 17k)

D. none

Answer: A

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85. If a, b, c are position vectors of three vertices of an equilateral triangle whose orthocentre is at the origin, then

A. a + b + c = o

B. $a^2 + b^2 = c^2$

C. a + b = c

D. none

Answer: A

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86. a and b are unit vectors along OA, OB and OC bisects the angle AOB. The unit vector along OC is

A. $\frac{a+b}{2}$

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

C. $\frac{a+b}{|a+b|}$

D. $\frac{a-b}{|a-b|}$

Answer: C

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87. Let O be the origin and A, B be two points p, q are vectors represented by OA and OB and their magnitudes are p, q. The unit vector bisecting the angle AOB is

A. $\frac{p/p+q/q}{|p/p|+|q/q|}$

B. $\frac{p/p+q/q}{|p/p+q/q|}$

C. $\frac{p/p+q/q}{|p+q|}$

D. $\frac{p+q}{2}$

Answer: B

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88. The vector ai + bj + ck is a bisector of the angle between the vectors i + j and j + k if

A. a = b

B. a = c

C. c = a + b

D. a = b = c

Answer: B

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89. If $\overrightarrow{O}A = i + 3j - 2k, \overrightarrow{O}B = 3i + j - 2k$ and C is a point on AB such that OC bisects angle AOB then $\overrightarrow{O}C =$

A. 4(i + j - k)

B. 2(i + j - k)

C. i + j - k

D. none

Answer: B

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90. If 4i + 7j + 8k, 2i + 3j + 4k, 2i + 5j + 7k are position vectors of A, B, C of Δ ABC then position vector of the point where the bisector of angle A meets BC is

A. (2, 13/3, 6)

B. (-2, 13/3, 6)

C. (2, - 13/3, 6)

D. (2, 13/3, -6)

Answer: A

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91. Let A (4, 7, 8), B (2, 3, 4) and C (2, 5, 7) be the position vectors of the vertices of a triangle ABC. The length of the internal bisector of the angle at A is

A. $\frac{3}{2}\sqrt{34}$

B. $\frac{2}{3}\sqrt{34}$

C. $\frac{1}{2}\sqrt{34}$

D. $\frac{1}{3}\sqrt{34}$

Answer: B

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92. Let vector of magnitude $3\sqrt{6}$ along the internal bisector of the angle between the vectors 4i - 7j + 4k and i + 2j - 2k is

A. $\pm(7i + 2j + 2k)$

B. $\pm(7i - j + 2k)$

C. $\pm(7i - j - 2k)$

D. none

Answer: C

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118. The vector equation to the line passing through the points (-2, 3, 5), (1, 2, 3) is

A. $r = (1 - t)(-2i + 3j + 5k) + t(i + 2j + 3k)$

B. $r = (1 - t)(2i + j + 3k) + t(-4i + 3j - k)$

C. $r = (1 - t)(2i - 3j + 4k) + t(4i + 2j - 3k)$

D. none

Answer: A

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119. The vector equation to the line passing through the points $2i + j + 3k$, $-4i + 3j - k$ is

A. $r = (1 - t)(-2i + 3j + 5k) + t(i + 2j + 3k)$

B. $r = (1 - t)(2i + j + 3k) + t(-4i + 3j - k)$

C. $r = (1 - t)(2i - 3j + 4k) + t(4i + 2j - 3k)$

D. none

Answer: B

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120. The vector equation to the line passing through the points $a + 2b + 3c$, $2a + 3b - 4c$ is

A. $r = (1 - t)(a + 2b + 3c) + t(2a - 3b + 4c)$

B. $r = (1 - t)(a + 2b - 3c) + t(2a + 3b - 4c)$

C. $r = (1 - t)(a + 2b + 3c) + t(2a + 3b - 4c)$

D. $r = (1 - t)(a + 2b - 3c) + t(2a - 3b + 4c)$

Answer: C

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121. The cartesian equation of the line passing through the points $2i + j + 3k, \ -4i + 3j - k$ is

A. $\frac{x-2}{3} = \frac{y-1}{-1} = \frac{z-3}{2}$

B. $\frac{x-2}{2} = \frac{y-1}{-1} = \frac{z-3}{2}$

C. $\frac{x+2}{3} = \frac{y+1}{-1} = \frac{z-3}{2}$

D. $\frac{x+2}{3} = \frac{y+1}{-1} = \frac{z+3}{2}$

Answer: A

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122. The lineas r = (6 - 6s) a + (4s - 4) b + (4 - 8s) c and r = (2t - 1) a + (4t - 2) b - (2t + 3) c intersect at

A. 4c

B. $-4c$

C. 3c

D. $-2c$

Answer: B

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123. If the position vectors of A, B, C, D are $3\bar{i}+2\bar{j}+\bar{k}, 4\bar{i}+5\bar{j}+5\bar{k}, 4\bar{i}+2\bar{j}-2\bar{k}, 6\bar{i}+5\bar{j}-\bar{k}$ respectively then the position vector of the point of intersection of lines AB and CD is

A. 2i + j + 3k

B. 2i - j + 3k

C. 2i + j + 3k

D. 2i - j - 3k

Answer: D

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124. Find the equation of the line parallel to the vector $2\bar{i} - \bar{j} + 2\bar{k}$, and which passes through the point A whose position vector is $3\bar{i} + \bar{j} - \bar{k}$. If P is a point on this line such that AP = 15, find the position vector of P.

A. 13i - 4j + 9k

B. 13i + 4j + 9k

C. 13i + 4j - 9k

D. 13i - 4j - 9k

Answer: A

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125. The vector equation of the plane passing through the point 2i + 2j - 3k and parallel to the vectors 3i + 3j - 5k, i + 2j + k is

A. $r = s(2i + j - k) + t(i + 2j + 2k)$

B. $r = 2i + 2j - 3k + s(3i + 3j - 5k) + t(i + 2j + k)$

C. $r = (i + 2j + 3k) + s(-2i + 3j + k) + t(2i - 3j + 4k)$

D. none

Answer: B

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126. The vector equation of the plane passing through the point (1, -2, -3) and parallel to the vectors (2, -1, 3), (2, 3, -6) is

A. $r = (i - 2j - 3k) + s(2i - j + 3k) + t(2i + 3j - 6k)$

B. $r = (1 - s - t)(i - 2j - 3k) + s(2i - j + 3k) + t(2i + 3j - 6k)$

C. $r = (i - 2j - 3k) + s(4j - 9k)$

D. $r = (4j - 9k) + s(i - 2j - 3k)$

Answer: A

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127. The vector equation of the plane passing through the points (1, -2, 5), (0, -5, -1), (-3, 5, 0) is

A. $r = (1 - s - t)(i - 2j + 5k) + s(-5j - k) + t(-3i + 5j)$, s, t are scalars

B. $r = (1 - s - t)(i + 2j + 3k) + s(3i + 2j + k) + t(2i + j + 3k)$, s, t are scalars

C. $r = (1 - s - t)(2i + j + k) + s(i - j - k) + t(-i + j + 2k)$, s, t are scalars

D. $r = (1 - s - t)(i - 2j + 5k) + s(-5j - k) + t(-3i + 5j)$, s, t are scalars

Answer: A

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128. The vector equation of the plane passing through the points $i + 2j + 5k$, $-5j + k$, $-3i + 5j$ is

A. $r = (1 - s - t)(i - 2j + 5k) + s(-5j - k) + t(-3i + 5j)$, s, t are scalars

B. $r = (1 - s - t)(i + 2j + 3k) + s(3i + 2j + k) + t(2i + j + 3k)$, s, t are scalars

C. $r = (1 - s - t)(2i + j + k) + s(i - j - k) + t(-i + j + 2k)$, s, t are scalars

D. $r = (1 - s - t)(i - 2j + 5k) + s(-5j - k) + t(-3i + 5j)$, s, t are scalars

Answer: A

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129. Subtract $3a-2b+4c$ from the sum of $-2a+b-5c$ and $3a-2b+c$

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130. If a, b are two points then $r = (1 - p)\,a + p\,b$ represents

A. line

B. plane

C. plane passing through origin

D. sphere

Answer: A

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131. If a, b, c are three noncollinear points then r = (1 - p - q) a + pb + qc represents If a, b are two points then r = (1 - p) a + p b represents

A. line

B. plane

C. plane passing through origin

D. sphere

Answer: B

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132. If $r = \alpha a + \beta b + \gamma c$ represents a plane passing through the points a, b, c then

A. $\alpha = \beta = \gamma$

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

C. $\alpha + \beta + \gamma = 1$

D. $\alpha - \beta = \beta - \gamma = \gamma - \alpha$

Answer: C

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133. If $r = \alpha a + \beta b + \gamma c$ represents a plane passing through the points a, b, c then

A. $\alpha = \beta = \gamma$

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

C. $\alpha + \beta + \gamma = 1$

D. $\alpha - \beta = \beta - \gamma = \gamma - \alpha$

Answer: C

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134. The point of intersection of the lines $l_1 : r(t) = (i - 6j + 2k) + t(i + 2j + k), l_2 : R(u) = (4j + k) + u(2i + j +$ is

A. (4, 4, 5)

B. (6, 4, 7)

C. (8, 8, 9)

D. (10, 12, 11)

Answer: C

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135. P, Q, R and S are four points with the position vectors $3\bar{i} - 4\bar{j} + 5\bar{k}, 4\bar{k}, -4\bar{i} + 5\bar{j} + \bar{k}$ and $-3\bar{i} + 4\bar{j} + 3\bar{k}$ respectively. Then the line PQ meets the line RS at the point.

A. 3i + 4j + 3k

B. $-3i+4j+3k$

C. $-i+4j+k$

D. i + j + k

Answer: B

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Exercise 2 Set 1

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

II : If a = i + 4j, b = 2i - 3j and c = 5i + 9j then c = 3a + b

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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2. I : If $a = 3i - 2j + k$, $b = 2i - 4j - 3k$, $c = -i + 2j + 2k$ then $a + b + c = 4i + 4j$

II : If $a = i - j + 2k$, $b = 2i + 3j + k$, $c = i - k$, then magnitude of $a + 2b - 3c$ is $\sqrt{78}$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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3. If a, b are noncollinear vectors and $A = (x + 4y)\,a + (2x + y + 1)b$, $B = (y - 2x + 2)\,a + (2x - 3y - 1)\,b$ and $3A = 2B$, then $(x, y) =$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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4. I : If $a = i + 4j$, $b = 2i - 3j$, $c = 5i + 9j$ then $c = 3a + b$

II : If $a = 3i - 6j + 2k$ then the length of the vector is 3.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: A

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5. I : If G is the centroid of the Δ ABC, G' is the centroid of the Δ A'B'C' then $\overline{AA'} + \overline{BB'} + \overline{CC'} = 3\overline{GG'}$

II : If S is the circumcentre, 'O' is the orthocentre of Δ ABC then $\overline{SA} + \overline{SB} + \overline{SC} = \overline{SO}$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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6. I : The three points with position vectors i - 2j + 3k, 2i + 3j - 4k and -7j + 10k are collinear.

II : The vectors a - 2b + 3c, 2a + 3b - 4c, -7b + 10c are coplanar.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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7. I : If a, b are two points then r = (1 - s)a + sb represents a line.

II : If a, b, c are three noncollinear points then r = (1 - s - t)a + sb + tc represents a plane

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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8. I : If $r\alpha a + \beta b$ represents a line passing through the points a, b then $\alpha + \beta = 1$.

II : If $r = \alpha a + \beta b + \gamma c$ represents a plane passing through the points a, b, c then $\alpha + \beta + \gamma = 1$.

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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9. I : Two non-zero, non-collinear vectors are linearly independent.

II : Any three coplanar vectors are linearly dependent. which one is true?

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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10. Statement I : The points $4i + 5j + k$, $-j - k$, $3i + 9j + 4k$ and $-4i + 4j + 4k$ are coplanar.

Statement II : The given points from the vertices of a parallelogram.

Which of the following is true ?

A. Both statements are true and statement II is correct explanation of staement I

B. Both statements are true and statement II is not a correct explanation of statement I

C. Statement I is true and Statement II is false

D. Statement I is false and Statemetn II is true

Answer: C

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Exercise 2 Set 2

1. If a = 2i + 3j - k, b = -i + 2j + k, then the ascending order of the following :

$(A) \quad |a+b| \quad (B) \quad |a-b|$

$(C) \quad |3a+b| \quad (D) \quad |a+2b|$

A. $B < A < D < C$

B. $B < D < C < A$

C. $C < D < A < B$

D. $A < D < C < B$

Answer: A

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2. If a = 2i + 2j + k, b = i + j, c = 3i + 4k, d = 12i + 3j + 4k then the descending order of their magnitudes is

A. $|d|, |c|, |a|, |b|$

B. $|a|, |b|, |c|, |d|$

C. $|d|, |a|, |c|, |b|$

D. $|a|, |b|, |d|, |c|$

Answer: A

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3. The ascending order of magnitudes of the vectors

$(A)\ \frac{i-2j}{2}$ $(B)\ \frac{2i+j+k}{\sqrt{6}}$

$(C)\ 2i-j+2k$ $(D)\ 3i-4j+6k$

A. $A < B < C < D$

B. $B < A < C < D$

C. $A < D < C < D$

D. $A < C < B < D$

Answer: B

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4. If m_1, m_2, m_3 and m_4 are respectively the magnitudes of the vectors

$a_1 = 2i - j + k, a_2 = 3i - 4j - 4k, a_3 = i + j - k$ and $a_4 = -i + 3j +$

then the correct order of m_1, m_2, m_3, m_4 is :

A. $m_3 < m_1, < m_4 < m_2$

B. $m_3 < m_1 < m_2 < m_4$

C. $m_3 < m_4 < m_1 < m_2$

D. $m_3 < m_4 < m_2 < m_1$

Answer: A

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Exercise 2 Set 3

1. Match the following

$I.$	$\mathrm{A} = (2, 3, 4), \mathrm{B} = (3, 4, 2), \mathrm{C} = (4, 2, 3)$	(a)	$\Delta$is isosceles
$II.$	$\mathrm{A} = (2, -1, 1, 1), \mathrm{B} = (1, -3, -5), \mathrm{C} = (3, -4, -4)$	(b)	ΔABC is equ
$III.$	$\mathrm{A} = (1, 1, 1), \mathrm{B} = (1, 2, 3), \mathrm{C} = (2, -1, 1)$	(c)	A, B, C are c
$IV.$	$\mathrm{A} = (1, 2, 3), \mathrm{B} = (3, 4, 7), \mathrm{C} = (-3, -2, -5)$	(d)	ΔABC is righ

A. a, d, c b

B. a, b, d, c

C. a, b, c, d

D. b, d, a, c

Answer: D

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2. If S is circumcentre and 'O' is orthocentre of ΔABC, then match the following

$I.$	$SA+SB+SC$	(a)	$\frac{1}{2}OS$
$II.$	$OA+OB+OC$	(b)	$2OS$
$III.$	$AO+OB+OC$	(c)	$2AS$
$IV.$	OG	(d)	$\frac{2}{3}OS$
		(e)	SO

A. a, e, c, b

B. e, b, d, c

C. e, b, c, d

D. b, d, c, e

Answer: C

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3. If D, E, F are the midpoints of sides BC, CA, AB of triangle ABC and G is the centroid then match the following

I	$AD+BE+CF$	(a)	CB
II	$GA+GB$	(b)	$3OG$
$III.$	$AB+CA$	(c)	O
$IV.$	$OD+OE+OF$	(d)	$-\frac{2}{3}(AD+BE)$
		(e)	$3\ \mathrm{OE}$

A. c, d, a, b

B. d, b, a, c

C. c, d, e, a

D. b, c, e, a

Answer: A

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4. D, E and F are the mid points of the sides BC, CA and AB respectively of ΔABC. 'O' is any point Match List-I to List-II.

	List I		List II
(I)	$\mathrm{OA}+\mathrm{OB}+\mathrm{OC}$ is equal to.....	(a)	$OD+OE+OF$
(II)	$\mathrm{AD}+\mathrm{BE}+\mathrm{CF}$ is equal to	(b)	O
(III)	$OE+OF+\mathrm{DO}$ is	(c)	OA
(IV)	$AD+\frac{2}{3}BE+\frac{1}{3}\mathrm{CF}$ equal	(d)	$\frac{1}{2}C$

The correct match is

A. $I \to a, II \to b, III \to c, IV \to d$

B. $I \to a, II \to c, III \to d, IV \to d$

C. $I \to c, II \to d, III \to a, IV \to b$

D. $I \to c, II \to a, III \to b, IV \to d$

Answer: A

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Exercise 2 Set 4

1. A : If the positon vectors of A, B are (2, 3, 5), (1, 1, 7) then the unit vector in the direction of $\overrightarrow{AB}$ is $\frac{-i-2j+2k}{3}$

R : Unit vector in the direction of $\overrightarrow{AB}$ is $\frac{\overrightarrow{AB}}{\left|\overrightarrow{AB}\right|}$

A. A, R are correct, R is correct explanation of A

B. A, R are correct, R is not correct explanation of A

C. A is correct, R is false

D. A is false, R is correct

Answer: A

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2. A : If $a=i+j+k, b=4i+3j+4k, c=i+\alpha j+\beta k$ are linearly dependent and $|c|=\sqrt{3}$ then $\alpha=\pm 1, \beta=1$

R : For coplanar vectors every vector can be expressed as linear combination of other.

A. A, R are correct, R is correct explanation of A

B. A, R are correct, R is not correct explanation of A

C. A is correct, R is false

D. A is false, R is correct

Answer: A

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3. A : $(a, b) = \theta \Rightarrow (5a, -3b) = \pi - \theta$

R : $m > 0, n < 0, (ma, nb) = \pi - (a, b)$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are ture but R is not the correct explanation of A.

C. A is ture, but R is false

D. A is false, but R is true

Answer: A

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4. A : The centroid of the triangle formed by the points 2a + 3b, 5a + 4b, 2a - b is 3a + 2b.

R : The centroid of the triangle formed by the points a, b, c is $\frac{a+b+c}{3}$

A. A, R are correct, R is correct explanation of A

B. A, R are correct, R is not correct explanation of A

C. A is correct, R is false

D. A is false, R is correct

Answer: A

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5. A : ABCD is a parallelogram. If G is the point of intersection of its diagonals and 'O' is any point then OA + OB + OC + OD = 4OG

R : In a parallelogram diagonals bisect each other.

A. A, R are correct, R is correct explanation of A

B. A, R are correct, R is not correct explanation of A

C. A is correct, R is false

D. A is false, R is correct

Answer: A

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6. A : The vector equation of the line passing through the point 2i + 3j - 4k and parallel to the vector 6 + 3j - 4k is r = (2i + 3j - 4k) + t(6i + 3j - 4k).

R : The vector equation of the line passing through the point a and parallel to the vector b is r = a + tb

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are ture but R is not the correct explanation of A.

C. A is ture, but R is false

D. A is false, but R is true

Answer: A

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7. A : The vector equation of the plane passing through the point $2i + 2j - 3k$ and parallel to the vectors $3i + 3j - 5k$, $i + 2j + k$ is $r = 2i + 2j - 3k + s(3i + 3j - 5k) + t(i + 2j + k)$

R : The vector equation of the plane passing through the points a, b, c is $r = (1 - s - t)\,a + sb + tc$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are ture but R is not the correct explanation of A.

C. A is ture, but R is false

D. A is false, but R is true

Answer: B

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8. Observe the following statements :

Assertion (A) : Three vectors are coplanar if one of them is expressible as a linear combination of the other two.

Reason (R) : Any three coplanar vectors are linearly dependent.

Then which of the following is true?

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are ture but R is not the correct explanation of A.

C. A is ture, but R is false

D. A is false, but R is true

Answer: B

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