Vector Algebra

1. The projections of a vector on the three coordinate axis are 6, –3, 2 respectively. The direction cosines of the vector are **[AIEEE-2009]**

(1) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (2) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$

(3) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$ (4) 6, –3, 2

2. If $\vec{u}, \vec{v}, \vec{w}$ are non-coplanar vectors and p, q are real numbers, then the equality $[3\vec{u}, p\vec{v}, p\vec{w}] - [p\vec{v}, \vec{w}, q\vec{u}] - [2\vec{w}, q\vec{v}, q\vec{u}] = 0$ holds for **[AIEEE-2009]**

(1) Exactly two values of (p, q)

(2) More than two but not all values of (p, q)

(3) All values of (p, q)

(4) Exactly one value of (p, q)

3. Let $\vec{a} = \hat{j} - \hat{k}$ and $\vec{c} = \hat{i} - \hat{j} - \hat{k}$. Then the vector $\vec{b}$ satisfying $\vec{a} \times \vec{b} + \vec{c} = \vec{0}$ and $\vec{a}.\vec{b} = 3$ is **[AIEEE-2010]**

(1) $-\hat{i} + \hat{j} - 2\hat{k}$ (2) $2\hat{i} - \hat{j} + 2\hat{k}$

(3) $\hat{i} - \hat{j} - 2\hat{k}$ (4) $\hat{i} + \hat{j} - 2\hat{k}$

4. If the vectors $\vec{a} = \hat{i} - \hat{j} + 2\hat{k}$. $\vec{b} = 2\hat{i} + 4\hat{j} + \hat{k}$ and $\vec{c} = \lambda\hat{i} + \hat{j} + \mu\hat{k}$ are mutually orthogonal, then (λ, μ) = **[AIEEE-2010]**

(1) (–3, 2) (2) (2, –3)

(3) (–2, 3) (4) (3, –2)

5. Let $\vec{a}, \vec{b}, \vec{c}$ be three non-zero vectors which are pairwise non-collinear. If $\vec{a} + 3\vec{b}$ is collinear with $\vec{c}$ and $\vec{b} + 2\vec{c}$ is collinear with $\vec{a}$, then $\vec{a} + 3\vec{b} + 6\vec{c}$ is **[AIEEE-2011]**

(1) $\vec{0}$ (2) $\vec{a} + \vec{c}$

(3) $\vec{a}$ (4) $\vec{c}$

6. If the vectors $p\hat{i} + \hat{j} + \hat{k}, \hat{i} + q\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + r\hat{k}$ $(p \neq q \neq r \neq 1)$ are coplanar, then the value of $pqr - (p + q + r)$ is **[AIEEE-2011]**

(1) –1 (2) –2

(3) 2 (4) 0

7. Let $\hat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\vec{c} = \hat{a} + 2\hat{b}$ and $\vec{d} = 5\hat{a} - 4\hat{b}$ are perpendicular to each other, then the angle between $\hat{a}$ and $\hat{b}$ is **[AIEEE-2012]**

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$

(3) $\frac{\pi}{2}$ (4) $\frac{\pi}{3}$

8. Let $ABCD$ be a parallelogram such that $\overrightarrow{AB} = \vec{q}, \overrightarrow{AD} = \vec{p}$ and $\angle BAD$ be an acute angle. If $\vec{r}$ is the vector that coincides with the altitude directed from the vertex B to the side AD, then $\vec{r}$ is given by **[AIEEE-2012]**

(1) $\vec{r} = -\vec{q} + \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p}$

(2) $\vec{r} = \vec{q} - \left(\frac{\vec{p}\cdot\vec{q}}{\vec{p}\cdot\vec{p}}\right)\vec{p}$

(3) $\vec{r} = -3\vec{q} + \frac{3(\vec{p}\cdot\vec{q})}{(\vec{p}\cdot\vec{p})}\vec{p}$

(4) $\vec{r} = 3\vec{q} - \frac{3(\vec{p}\cdot\vec{q})}{(\vec{p}\cdot\vec{p})}\vec{p}$

9. If the vectors $\overline{AB} = 3\hat{i} + 4\hat{k}$ and $\overline{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is **[JEE (Main)-2013]**

(1) $\sqrt{18}$ (2) $\sqrt{72}$

(3) $\sqrt{33}$ (4) $\sqrt{45}$

10. The angle between the lines whose direction consines satisfy the equations $l + m + n = 0$ and $l^2 = m^2 + n^2$ is **[JEE (Main)-2014]**

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{2}$

(3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$

11. If $\left[\vec{a}\times\vec{b}\ \ \vec{b}\times\vec{c}\ \ \vec{c}\times\vec{a}\right] = \lambda[\vec{a}\ \vec{b}\ \vec{c}]^2$ then λ is equal to **[JEE (Main)-2014]**

(1) 0 (2) 1

(3) 2 (4) 3

12. Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ be three non-zero vectors such that no two of them are collinear and $(\vec{a}\times\vec{b})\times\vec{c} = \frac{1}{3}|\vec{b}||\vec{c}|\vec{a}$. If θ is the angle between vectors $\vec{b}$ and $\vec{c}$, then a value of $\sin\theta$ is **[JEE (Main)-2015]**

(1) $\frac{2\sqrt{2}}{3}$ (2) $\frac{-\sqrt{2}}{3}$

(3) $\frac{2}{3}$ (4) $\frac{-2\sqrt{3}}{3}$

13. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\vec{a}\times(\vec{b}\times\vec{c}) = \frac{\sqrt{3}}{2}(\vec{b}+\vec{c})$. If $\vec{b}$ is not parallel to $\vec{c}$, then the angle between $\vec{a}$ and $\vec{b}$ is **[JEE (Main)-2016]**

(1) $\frac{\pi}{2}$ (2) $\frac{2\pi}{3}$

(3) $\frac{5\pi}{6}$ (4) $\frac{3\pi}{4}$

14. Let $\vec{a} = 2\hat{i}+\hat{j}-2\hat{k}$ and $\vec{b} = \hat{i}+\hat{j}$. Let $\vec{c}$ be a vector such that $|\vec{c}-\vec{a}| = 3$, $\left|(\vec{a}\times\vec{b})\times\vec{c}\right| = 3$ and the angle between $\vec{c}$ and $\vec{a}\times\vec{b}$ be 30°. Then $\vec{a}\cdot\vec{c}$ is equal to **[JEE (Main)-2017]**

(1) 2 (2) 5

(3) $\frac{1}{8}$ (4) $\frac{25}{8}$

15. Let $\vec{u}$ be a vector coplanar with the vectors $\vec{a} = 2\hat{i}+3\hat{j}-\hat{k}$ and $\vec{b} = \hat{j}+\hat{k}$. If $\vec{u}$ is perpendicular to $\vec{a}$ and $\vec{u}\cdot\vec{b} = 24$, then $|\vec{u}|^2$ is equal to **[JEE (Main)-2018]**

(1) 336 (2) 315

(3) 256 (4) 84

16. Let $\vec{a} = \hat{i}-\hat{j}, \vec{b} = \hat{i}+\hat{j}+\hat{k}$ and $\vec{c}$ be a vector such that $\vec{a}\times\vec{c}+\vec{b} = \vec{0}$ and $\vec{a}.\vec{c} = 4$, then $|\vec{c}|^2$ is equal to **[JEE (Main)-2019]**

(1) $\frac{17}{2}$ (2) $\frac{19}{2}$

(3) 9 (4) 8

17. Let $\vec{a} = \hat{i}+\hat{j}+\sqrt{2}\hat{k}, \vec{b} = b_1\hat{i}+b_2\hat{j}+\sqrt{2}\hat{k}$ and $\vec{c} = 5\hat{i}+\hat{j}+\sqrt{2}\hat{k}$ be three vectors such that the projection vector of $\vec{b}$ on $\vec{a}$ is $\vec{a}$. If $\vec{a}+\vec{b}$ is perpendicular to $\vec{c}$, then $|\vec{b}|$ is equal to **[JEE (Main)-2019]**

(1) $\sqrt{22}$

(2) $\sqrt{32}$

(3) 4

(4) 6

18. Let $\vec{a} = 2\hat{i}+\lambda_1\hat{j}+3\hat{k}, \vec{b} = 4\hat{i}+(3-\lambda_2)\hat{j}+6\hat{k}$ and $\vec{c} = 3\hat{i}+6\hat{j}+(\lambda_3-1)\hat{k}$ be three vectors such that $\vec{b} = 2\vec{a}$ and $\vec{a}$ is perpendicular to $\vec{c}$. Then a possible value of $(\lambda_1, \lambda_2, \lambda_3)$ is **[JEE (Main)-2019]**

(1) (1, 3, 1) (2) (1, 5, 1)

(3) $\left(\frac{1}{2}, 4, -2\right)$ (4) $\left(-\frac{1}{2}, 4, 0\right)$

19. Let $\vec{\alpha} = (\lambda-2)\vec{a}+\vec{b}$ and $\vec{\beta} = (4\lambda-2)\vec{a}+3\vec{b}$ be two given vectors where vectors $\vec{a}$ and $\vec{b}$ are non-collinear. The value of λ for which vectors $\vec{\alpha}$ and $\vec{\beta}$ are collinear, is **[JEE (Main)-2019]**

(1) – 3 (2) – 4

(3) 3 (4) 4

20. Let $\vec{a} = \hat{i} + 2\hat{j} + 4\hat{k}, \vec{b} = \hat{i} + \lambda\hat{j} + 4\hat{k}$ and $\vec{c} = 2\hat{i} + 4\hat{j} + (\lambda^2 - 1)\hat{k}$ be coplanar vectors. Then the non-zero vector $\vec{a} \times \vec{c}$ is **[JEE (Main)-2019]**

(1) $-14\hat{i} + 5\hat{j}$ (2) $-10\hat{i} - 5\hat{j}$

(3) $-14\hat{i} - 5\hat{j}$ (4) $-10\hat{i} + 5\hat{j}$

21. Let $\sqrt{3}\hat{i} + \hat{j}, \hat{i} + \sqrt{3}\hat{j}$ and $\beta\hat{i} + (1-\beta)\hat{j}$ respectively be the position vectors of the points *A*, *B* and *C* with respect to the origin *O*. If the distance of *C* from the bisector of the acute angle between *OA* and *OB* is $\frac{3}{\sqrt{2}}$, then the sum of all possible values of β is **[JEE (Main)-2019]**

(1) 3 (2) 1

(3) 4 (4) 2

22. The sum of the distinct real values of μ, for which the vectors, $\mu\hat{i} + \hat{j} + \hat{k}$, $\hat{i} + \mu\hat{j} + \hat{k}$, $\hat{i} + \hat{j} + \mu\hat{k}$ are co-planar, is **[JEE (Main)-2019]**

(1) 2 (2) 1

(3) –1 (4) 0

23. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors, out of which vectors $\vec{b}$ and $\vec{c}$ are non-parallel. If α and β are the angles which vector $\vec{a}$ makes with vectors $\vec{b}$ and $\vec{c}$ respectively and $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{1}{2}\vec{b}$, the $|\alpha - \beta|$ is equal to **[JEE (Main)-2019]**

(1) 90° (2) 45°

(3) 30° (4) 60°

24. The magnitude of the projection of the vector $2\hat{i} + 3\hat{j} + \hat{k}$ on the vector perpendicular to the plane containing the vectors $\hat{i} + \hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 3\hat{k}$, is: **[JEE (Main)-2019]**

(1) $\sqrt{\frac{3}{2}}$ (2) $3\sqrt{6}$

(3) $\frac{\sqrt{3}}{2}$ (4) $\sqrt{6}$

25. The vector equation of plane through the line of intersection of the planes $x + y + z = 1$ and $2x + 3y + 4z = 5$ which is perpendicular to the plane $x - y + z = 0$ is **[JEE (Main)-2019]**

(1) $\vec{r} \cdot (\hat{i} - \hat{k}) + 2 = 0$ (2) $\vec{r} \cdot (\hat{i} - \hat{k}) - 2 = 0$

(3) $\vec{r} \times (\hat{i} - \hat{k}) + 2 = 0$ (4) $\vec{r} \times (\hat{i} + \hat{k}) + 2 = 0$

26. Let $\vec{a} = 3\hat{i} + 2\hat{j} + x\hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$, for some real *x*. Then $|\vec{a} \times \vec{b}| = r$ is possible if **[JEE (Main)-2019]**

(1) $3\sqrt{\frac{3}{2}} < r < 5\sqrt{\frac{3}{2}}$ (2) $\sqrt{\frac{3}{2}} < r \le 3\sqrt{\frac{3}{2}}$

(3) $0 < r \le \sqrt{\frac{3}{2}}$ (4) $r \ge 5\sqrt{\frac{3}{2}}$

27. Let $\vec{\alpha} = 3\hat{i} + \hat{j}$ and $\vec{\beta} = 2\hat{i} - \hat{j} + 3\hat{k}$. If $\vec{\beta} = \vec{\beta}_1 - \vec{\beta}_2$, where $\vec{\beta}_1$ is parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ is perpendicular to $\vec{\alpha}$, then $\vec{\beta}_1 \times \vec{\beta}_2$ is equal to **[JEE (Main)-2019]**

(1) $\frac{1}{2}(3\hat{i} - 9\hat{j} + 5\hat{k})$ (2) $\frac{1}{2}(-3\hat{i} + 9\hat{j} + 5\hat{k})$

(3) $-3\hat{i} + 9\hat{j} + 5\hat{k}$ (4) $3\hat{i} - 9\hat{j} - 5\hat{k}$

28. If a unit vector $\vec{a}$ makes angles $\frac{\pi}{3}$ with $\hat{i}$, $\frac{\pi}{4}$ with $\hat{j}$ and $\theta \in (0, \pi)$ with $\hat{k}$, then a value of θ is **[JEE (Main)-2019]**

(1) $\frac{5\pi}{12}$ (2) $\frac{2\pi}{3}$

(3) $\frac{\pi}{4}$ (4) $\frac{5\pi}{6}$

29. The distance of the point having position vector $-\hat{i} + 2\hat{j} + 6\hat{k}$ from the straight line passing through the point (2, 3, –4) and parallel to the vector, $6\hat{i} + 3\hat{j} - 4\hat{k}$ is **[JEE (Main)-2019]**

(1) 7 (2) $4\sqrt{3}$

(3) 6 (4) $2\sqrt{13}$

30. If the volume of parallelopiped (non-zero) formed by the vectors $\hat{i}+\lambda\hat{j}+\hat{k}, \hat{j}+\lambda\hat{k}$ and $\lambda\hat{i}+\hat{k}$ is minimum, then λ is equal to **[JEE (Main)-2019]**

(1) $\frac{1}{\sqrt{3}}$ (2) $-\sqrt{3}$

(3) $\sqrt{3}$ (4) $-\frac{1}{\sqrt{3}}$

31. Let $\vec{a}=3\hat{i}+2\hat{j}+2\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}-2\hat{k}$ be two vectors. If a vector perpendicular to both the vectors $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$ has the magnitude 12 then one such vector is **[JEE (Main)-2019]**

(1) $4(-2\hat{i}-2\hat{j}+\hat{k})$ (2) $4(2\hat{i}+2\hat{j}-\hat{k})$

(3) $4(2\hat{i}+2\hat{j}+\hat{k})$ (4) $4(2\hat{i}-2\hat{j}-\hat{k})$

32. Let $\alpha \in R$ and the three vectors

$\vec{a} = \alpha\hat{i} + \hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} - \alpha\hat{k}$ and

$\vec{c} = \alpha\hat{i} - 2\hat{j} + 3\hat{k}$. Then the set

$S = \{\alpha : \vec{a}, \vec{b}$ and $\vec{c}$ are coplanar$\}$

[JEE (Main)-2019]

(1) Contains exactly two numbers only one of which is positive
(2) Is singleton
(3) Contains exactly two positive numbers
(4) Is empty

33. A vector $\vec{a}=\alpha\hat{i}+2\hat{j}+\beta\hat{k}$ $(\alpha,\beta\in R)$ lies in the plane of the vectors, $\vec{b}=\hat{i}+\hat{j}$ and $\vec{c}=\hat{i}-\hat{j}+4\hat{k}$. If $\vec{a}$ bisects the angle between $\vec{b}$ and $\vec{c}$, then

[JEE (Main)-2020]

(1) $\vec{a}\cdot\hat{i}+3=0$ (2) $\vec{a}\cdot\hat{i}+1=0$

(3) $\vec{a}\cdot\hat{k}+2=0$ (4) $\vec{a}\cdot\hat{k}+4=0$

34. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\vec{a}+\vec{b}+\vec{c}=\vec{0}$. If $\lambda=\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$ and $\vec{d}=\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}$ then the ordered pair, $(\lambda, \vec{d})$ is equal to **[JEE (Main)-2020]**

(1) $\left(\frac{3}{2}, 3\vec{a}\times\vec{c}\right)$ (2) $\left(-\frac{3}{2}, 3\vec{c}\times\vec{b}\right)$

(3) $\left(-\frac{3}{2}, 3\vec{a}\times\vec{b}\right)$ (4) $\left(\frac{3}{2}, 3\vec{b}\times\vec{c}\right)$

35. Let the volume of a parallelopiped whose coterminous edges are given by $\vec{u}=\hat{i}+\hat{j}+\lambda\hat{k}$, $\vec{v}=\hat{i}+\hat{j}+3\hat{k}$ and $\vec{w}=2\hat{i}+\hat{j}+\hat{k}$ be 1 cu. unit. If θ be the angle between the edges $\vec{u}$ and $\vec{w}$, then $\cos\theta$ can be **[JEE (Main)-2020]**

(1) $\frac{5}{7}$ (2) $\frac{5}{3\sqrt{3}}$

(3) $\frac{7}{6\sqrt{6}}$ (4) $\frac{7}{6\sqrt{3}}$

36. Let $a, b\ c \in R$ be such that $a^2 + b^2 + c^2 = 1$. If $a\cos\theta = b\cos\left(\theta+\frac{2\pi}{3}\right) = c\cos\left(\theta+\frac{4\pi}{3}\right)$, where $\theta=\frac{\pi}{9}$, then the angle between the vectors $a\hat{i}+b\hat{j}+c\hat{k}$ and $b\hat{i}+c\hat{j}+a\hat{k}$ is

[JEE (Main)-2020]

(1) 0 (2) $\frac{\pi}{9}$

(3) $\frac{2\pi}{3}$ (4) $\frac{\pi}{2}$

37. Let x_0 be the point of local maxima of

$f(x) = \vec{a}\cdot(\vec{b}\times\vec{c})$, where

$\vec{a} = x\hat{i}-2\hat{j}+3\hat{k}$, $\vec{b}=-2\hat{i}+x\hat{j}-\hat{k}$

and $\vec{c}=7\hat{i}-2\hat{j}+x\hat{k}$. Then the value

of $\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a}$ at $x = x_0$ is

[JEE (Main)-2020]

(1) 14 (2) –30

(3) –4 (4) –22

38. If the volume of a parallelopiped, whose coterminus edges are given by the vectors $\vec{a}=\hat{i}+\hat{j}+n\hat{k}, \vec{b}=2\hat{i}+4\hat{j}-n\hat{k}$ and $\vec{c}=\hat{i}+n\hat{j}+3\hat{k}$ $(n\geq 0)$, is 158 cu.units, then

[JEE (Main)-2020]

(1) $n = 7$ (2) $\vec{b}\cdot\vec{c}=10$

(3) $n = 9$ (4) $\vec{a}\cdot\vec{c}=17$

39. Let $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ be two vectors. If $\vec{c}$ is a vector such that $\vec{b} \times \vec{c} = \vec{b} \times \vec{a}$ and $\vec{c} \cdot \vec{a} = 0$, then $\vec{c} \cdot \vec{b}$ is equal to

[JEE (Main)-2020]

(1) $-\frac{1}{2}$ (2) $-\frac{3}{2}$

(3) -1 (4) $\frac{1}{2}$

40. If the vectors, $\vec{p} = (a+1)\hat{i} + a\hat{j} + a\hat{k}$, $\vec{q} = a\hat{i} + (a+1)\hat{j} + a\hat{k}$, and $\vec{r} = a\hat{i} + a\hat{j} + (a+1)\hat{k}\ (a \in \mathbb{R})$ are coplanar and $3(\vec{p} \cdot \vec{q})^2 - \lambda\left|\vec{r} \times \vec{q}\right|^2 = 0$, then the value of λ is ____________. **[JEE (Main)-2020]**

41. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three vectors such that $|\vec{a}| = \sqrt{3}, |\vec{b}| = 5, \vec{b} \cdot \vec{c} = 10$ and the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$. If $\vec{a}$ is perpendicular to the vector $\vec{b} \times \vec{c}$, then $\left|\vec{a} \times \left(\vec{b} \times \vec{c}\right)\right|$ is equal to ________.

[JEE (Main)-2020]

42. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\left|\vec{a} - \vec{b}\right|^2 + \left|\vec{a} - \vec{c}\right|^2 = 8$. Then $\left|\vec{a} + 2\vec{b}\right|^2 + \left|\vec{a} + 2\vec{c}\right|^2$ is equal to **[JEE (Main)-2020]**

43. Let the position vectors of points 'A' and 'B' be $\hat{i} + \hat{j} + \hat{k}$ and $2\hat{i} + \hat{j} + 3\hat{k}$, respectively. A point 'P' divides the line segment AB internally in the ratio λ : 1 (λ > 0). If O is the origin and $\overrightarrow{OB} \cdot \overrightarrow{OP} - 3\left|\overrightarrow{OA} \times \overrightarrow{OP}\right|^2 = 6$, then λ is equal to ________. **[JEE (Main)-2020]**

44. If $\vec{a} = 2\hat{i} + \hat{j} + 2\hat{k}$, then the value of $\left|\hat{i} \times (\vec{a} \times \hat{i})\right|^2 + \left|\hat{j} \times (\vec{a} \times \hat{j})\right|^2 + \left|\hat{k} \times (\vec{a} \times \hat{k})\right|^2$ is equal to _______. **[JEE (Main)-2020]**

45. Let the vectors $\vec{a}, \vec{b}, \vec{c}$ be such that $|\vec{a}| = 2, |\vec{b}| = 4$ and $|\vec{c}| = 4$. If the projection of $\vec{b}$ on $\vec{a}$ is equal to the projection of $\vec{c}$ on $\vec{a}$ and $\vec{b}$ is perpendicular to $\vec{c}$, then the value of $\left|\vec{a} + \vec{b} - \vec{c}\right|$ is ________. **[JEE (Main)-2020]**

46. If $\vec{a}$ and $\vec{b}$ are unit vectors, then the greatest value of $\sqrt{3}\left|\vec{a} + \vec{b}\right| + \left|\vec{a} - \vec{b}\right|$ is ______.

[JEE (Main)-2020]

47. If $\vec{x}$ and $\vec{y}$ be two non-zero vectors such that $|\vec{x} + \vec{y}| = |\vec{x}|$ and $2\vec{x} + \lambda\vec{y}$ is perpendicular to $\vec{y}$, then the value of λ is _________ .

[JEE (Main)-2020]

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