



MATHS

BOOKS CENGAGE MATHS (HINGLISH)

CROSS PRODUCTS

Dpp 2 2

1. Let \vec{a} and \vec{b} be two vectors of equal magnitude 5 units. Let \vec{p} , \vec{q} be vectors such that $\vec{p} = \vec{a} - \vec{b}$ and $\vec{q} = \vec{a} + \vec{b}$. If

$$|\vec{p} \times \vec{q}| = 2 \left\{ \lambda - (\vec{a} \cdot \vec{b})^2 \right\}^{\frac{1}{2}}, \text{ then value of } \lambda \text{ is}$$

A. 25

B. 125

C. 625

D. none of these

Answer: C



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2. Let $\vec{u} = 2\hat{i} - \hat{j} + \hat{k}$, $\vec{v} = -3\hat{j} + 2\hat{k}$ be vectors and \vec{w} be a unit vector in the xy-plane. Then the maximum possible value of $\left|(\vec{u} \times \vec{v}) \cdot \vec{w}\right|$ is

A. $\sqrt{5}$

B. $\sqrt{12}$

C. $\sqrt{13}$

D. $\sqrt{17}$

Answer: D



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3. Let \vec{a} , \vec{b} and \vec{c} are three unit vectors in a plane such that they are equally inclined to each other, then the value of $(\vec{a} \times \vec{b}) \cdot (\vec{b} \times \vec{c}) + (\vec{b} \times \vec{c}) \cdot (\vec{c} \times \vec{a}) + (\vec{c} \times \vec{a}) \cdot (\vec{a} \times \vec{b})$ can be

A. $\frac{9}{4}$

B. $-\frac{9}{4}$

C. $\frac{3}{4}$

D. $-\frac{3}{4}$

Answer: A



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4. The coordinates of the mid-points of the sides of ΔPQR , are $(3a, 0, 0)$, $(0, 3b, 0)$ and $(0, 0, 3c)$ respectively, then the area of ΔPQR is

A. $18\sqrt{b^2c^2 + c^2a^2 + a^2b^2}$

B. $9\sqrt{b^2c^2 + c^2a^2 + a^2b^2}$

C. $\frac{9}{12}\sqrt{b^2c^2 + c^2a^2 + a^2b^2}$

D. $\frac{9}{2}\sqrt{b^2c^2 + c^2a^2 + a^2b^2}$

Answer: A



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5. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{a} \cdot \vec{b} = 1$ and $\vec{a} \times \vec{b} = \hat{j} - \hat{k}$ then $|\vec{b}|$

A. 3

B. 9

C. 10

D. 12

Answer: A



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6. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} \cdot \vec{b} = 0, (\vec{a} - \vec{c}) \cdot (\vec{b} + \vec{c}) = 0$ and $\vec{c} = \lambda \vec{a} + \mu \vec{b} + \omega (\vec{a} \times \vec{b})$, where λ, μ, ω are scalars, then

A. $\mu^2 + \omega^2 = 1$

B. $\lambda + \mu = 1$

C. $(\mu + 1)^2 + \mu^2 + \omega^2 = 1$

D. $\lambda^2 + \mu^2 = 1$

Answer: C



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7. Let $\triangle ABC$ be a given triangle. If $\left| \overrightarrow{BA} - t\overrightarrow{BC} \right| \geq \left| \overrightarrow{AC} \right|$ for any $t \in R$, then $\triangle ABC$ is

A. Equilateral

B. Right angled

C. Isosceles

D. None of these

Answer: B



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8. If \vec{a}, \vec{b} are vectors perpendicular to each other and $|\vec{a}| = 2, |\vec{b}| = 3, \vec{c} \times \vec{a} = \vec{b}$, then the least value of $2|\vec{c} - \vec{a}|$ is

A. 1

B. 2

C. 3

D. 4

Answer: C



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9. If \vec{a} and \vec{b} are two vectors such that $|\vec{a}| = 1$, $|\vec{b}| = 4$, $\vec{a} \cdot \vec{b} = 2$. If $\vec{c} = (2\vec{a} \times \vec{b}) - 3\vec{b}$, then the angle between \vec{a} and \vec{c} is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{6}$

C. $\frac{3\pi}{4}$

D. $\frac{5\pi}{6}$

Answer: D

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10. If \vec{a} and \vec{b} are non-zero, non parallel vectors, then the value of

$\left| \vec{a} + \vec{b} + \vec{a} \times \vec{b} \right|^2 + \left| \vec{a} + \vec{b} - \vec{a} \times \vec{b} \right|^2$ equals

A. $(1 + \vec{a} \cdot \vec{a})(1 + \vec{b} \cdot \vec{c})$

B. $2(1 + \vec{a} \cdot \vec{a})(1 + \vec{b} \cdot \vec{b})$

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

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

Answer: C



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11. If $a^2 + b^2 + c^2 = 1$ where, $a, b, c \in R$, then the maximum value of $(4a - 3b)^2 + (5b - 4c)^2 + (3c - 5a)^2$ is

A. 25

B. 50

C. 144

D. none of these

Answer: B



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12. Three vectors \vec{a} , \vec{b} , \vec{c} are such that $\vec{a} \times \vec{b} = 4(\vec{a} \times \vec{c})$ and $|\vec{a}| = |\vec{b}| =$ and $|\vec{c}| = \frac{1}{4}$. If the angle between \vec{b} and \vec{c} is $\frac{\pi}{3}$ then \vec{b} is

A. $\vec{a} + 4\vec{c}$

B. $\vec{a} - 4\vec{c}$

C. $4\vec{c} - \vec{a}$

D. $2\vec{c} - \vec{a}$

Answer: A:C



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13. If $2\vec{a}$, $3\vec{b}$, $2(\vec{a} \times \vec{b})$ are position vectors of the vertices A, B, C, of $\triangle ABC$ and $|\vec{a}| = |\vec{b}| = 1$, $\vec{OA} \cdot \vec{OB} = -3$ (where O is the origin), then

A. Triangle ABC is right-angled triangle

B. Angle B is 90°

C. $A = \cos^{-1}\left(\sqrt{\frac{7}{19}}\right)$

D. The position vector of orthocenter is $2\left(\vec{a} \times \vec{b}\right)$

Answer: A::C::D



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