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MATHS

BOOKS - CENGAGE

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

A. 25

B. 125

C. 625

D. none of these

Answer: C

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2. Let $\overrightarrow{u} = 2\hat{i} - \hat{j} + \hat{k}$, $\overrightarrow{v} = -3\hat{j} + 2\hat{k}$ be vectors and $\overrightarrow{w}$ be a unit vector in the xy-plane. Then the maximum possible value of $\left|\left(\overrightarrow{u} \times \overrightarrow{v}\right)\right| . \left|\overrightarrow{w}\right|$ 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 $\left(\vec{a}\times\vec{b}\right).\left(\vec{b}\times\vec{c}\right)+\left(\vec{b}\times\vec{c}\right).\left(\vec{c}\times\vec{a}\right)+\left(\vec{c}\times\vec{a}\right).\left(\vec{a}\times\vec{b}\right)$ 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 $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{a}.\vec{b}=1$ 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 $\vec{a}.\vec{b}=0, (\vec{a}-\vec{c}).(\vec{b}+\vec{c})=0$ 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. $\vec{a}$ and $\vec{b}$ are two vectors such that $\left|\vec{a}\right| = 1, \left|\vec{b}\right| = 4$ and $\vec{a}. Vecb = 2. If \vec{c} = \left(2\vec{a} \times \vec{b}\right) - 3\vec{b}$ then find angle between $\vec{b}$ and $\vec{c}$.

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. $\left(1 + \vec{a}.\vec{a}\right)\left(1 + \vec{b}.\vec{c}\right)$

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

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

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

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 $|\vec{a}| = |\vec{b}| = 1$ 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 vectors A,B,C, of $\triangle ABC$ and $|\vec{a}| = |\vec{b}| = 1, \overrightarrow{OA}.\overrightarrow{OB} = -3$ (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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