

## Questions with Answer Keys

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## Q1 (20 July 2021 Shift 1)

Let  $\vec{a} = 2\hat{i} + \hat{j} - 2\hat{k}$  and  $\vec{b} = \hat{i} + \hat{j}$ . If  $\vec{c}$  is a vector such that  $\vec{a} \cdot \vec{c} = |\vec{c}|$ ,  $|\vec{c} - \vec{a}| = 2\sqrt{2}$  and the angle between  $(\vec{a} \times \vec{b})$  and  $\vec{c}$  is  $\frac{\pi}{6}$ , then the value of  $|(\vec{a} \times \vec{b}) \times \vec{c}|$  is :

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

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

## Q2 (20 July 2021 Shift 1)

Let  $\vec{a}, \vec{b}, \vec{c}$  be three mutually perpendicular vectors of the same magnitude and equally inclined at an angle  $\theta$ , with the vector  $\vec{a} + \vec{b} + \vec{c}$ . Then  $36 \cos^2 2\theta$  is equal to \_\_\_\_\_

## Q3 (20 July 2021 Shift 2)

In a triangle ABC, if  $|\vec{BC}| = 3$ ,  $|\vec{CA}| = 5$  and  $|\vec{BA}| = 7$ , then the projection of the vector  $\vec{BA}$  on

$\vec{BC}$  is equal to

- (1)  $\frac{19}{2}$   
 (2)  $\frac{13}{2}$   
 (3)  $\frac{11}{2}$   
 (4)  $\frac{15}{2}$

## Q4 (20 July 2021 Shift 2)

For  $p > 0$ , a vector  $\vec{v}_2 = 2\hat{i} + (p+1)\hat{j}$  is obtained by rotating the vector  $\vec{v}_1 = \sqrt{3}\hat{p}\hat{i} + \hat{j}$  by an angle  $\theta$  about origin in counter clockwise direction. If

$\tan \theta = \frac{(\alpha\sqrt{3}-2)}{(4\sqrt{3}+3)}$ , then the value of  $\alpha$  is equal to

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## Q5 (22 July 2021 Shift 1)

Let a vector  $\vec{a}$  be coplanar with vectors  $\vec{b} = 2\hat{i} + \hat{j} + \hat{k}$  and  $\vec{c} = \hat{i} - \hat{j} + \hat{k}$ . If  $\vec{a}$  is perpendicular to  $\vec{d} = 3\hat{i} + 2\hat{j} + 6\hat{k}$ , and  $|\vec{a}| = \sqrt{10}$ . Then a possible value of  $[\vec{a} \vec{b} \vec{c}] + [\vec{a} \vec{b} \vec{d}] + [\vec{a} \vec{c} \vec{d}]$  is equal to:

- (1) -42
- (2) -40
- (3) -29
- (4) -38

## Q6 (22 July 2021 Shift 1)

Let three vectors  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  be such that  $\vec{a} \times \vec{b} = \vec{c}$ ,  $\vec{b} \times \vec{c} = \vec{a}$  and  $|\vec{a}| = 2$ . Then which one of the following is not true ?

- (1)  $\vec{a} \times ((\vec{b} + \vec{c}) \times (\vec{b} - \vec{c})) = \vec{0}$
- (2) Projection of  $\vec{a}$  on  $(\vec{b} \times \vec{c})$  is 2
- (3)  $[\vec{a} \vec{b} \vec{c}] + [\vec{c} \vec{a} \vec{b}] = 8$
- (4)  $|3\vec{a} + \vec{b} - 2\vec{c}|^2 = 51$

## Q7 (25 July 2021 Shift 1)

Let the vectors

$$(2+a+b)\hat{i} + (a+2b+c)\hat{j} - (b+c)\hat{k}, (1+b)\hat{i} + 2\hat{b} - b\hat{k}$$

and  $(2+b)\hat{i} + 2\hat{b}\hat{j} + (1-b)\hat{k}$   $a, b, c \in \mathbf{R}$   
be co-planar. Then which of the following is true?

- (1)  $2\vec{b} = \vec{a} + \vec{c}$
- (2)  $3\vec{c} = \vec{a} + \vec{b}$

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(3)  $a = b + 2c$ (4)  $2a = b + c$ **Q8 (25 July 2021 Shift 1)**Let  $\vec{p} = 2\hat{i} + 3\hat{j} + \hat{k}$  and  $\vec{q} = \hat{i} + 2\hat{j} + \hat{k}$  be two vectors.If a vector  $\vec{r} = (\alpha\hat{i} + \beta\hat{j} + \gamma\hat{k})$  is perpendicular toeach of the vectors  $(\vec{p} + \vec{q})$  and  $(\vec{p} - \vec{q})$ , and  $|\vec{r}| = \sqrt{3}$ , then  $|\alpha| + |\beta| + |\gamma|$  is equal to**Q9 (25 July 2021 Shift 2)**Let  $a, b$  and  $c$  be distinct positive numbers. If the vectors  $a\hat{i} + a\hat{j} + ck\hat{k}, \hat{i} + \hat{k}$  and  $c\hat{i} + c\hat{j} + b\hat{k}$  are co-planar,then  $c$  is equal to:(1)  $\frac{2}{a+\frac{1}{b}}$ (2)  $\frac{a+b}{2}$ (3)  $\frac{1}{a} + \frac{1}{b}$ (4)  $\sqrt{ab}$ **Q10 (25 July 2021 Shift 2)**If  $|\vec{a}| = 2, |\vec{b}| = 5$  and  $|\vec{a} \times \vec{b}| = 8$ , then  $|\vec{a} \cdot \vec{b}|$  is equal to:

(1) 6

(2) 4

(3) 3

(4) 5

**Q11 (25 July 2021 Shift 2)**If  $(\vec{a} + 3\vec{b})$  is perpendicular to  $(7\vec{a} - 5\vec{b})$  and  $(\vec{a} - 4\vec{b})$  is perpendicular to  $(7\vec{a} - 2\vec{b})$ , then the angle between  $a$  and  $b$  (in degrees) is \_\_\_\_\_

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## Q12 (27 July 2021 Shift 1)

Let  $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$  and  $\vec{b} = -\hat{i} + 2\hat{j} + 3\hat{k}$ . Then the vector product  $(\vec{a} + \vec{b}) \times ((\vec{a} - \vec{b}) \times \vec{b})$  is equal to :

- (1)  $5(34\hat{i} - 5\hat{j} + 3\hat{k})$
- (2)  $7(34\hat{i} - 5\hat{j} + 3\hat{k})$
- (3)  $7(30\hat{i} - 5\hat{j} + 7\hat{k})$
- (4)  $5(30\hat{i} - 5\hat{j} + 7\hat{k})$

## Q13 (27 July 2021 Shift 1)

Let  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ ,  $\vec{b}$  and  $\vec{c} = \hat{j} - \hat{k}$  be three vectors such that  $\vec{a} \times \vec{b} = \vec{c}$  and  $\vec{a} \cdot \vec{b} = 1$ . If the length of projection vector of the vector  $\vec{b}$  on the vector  $\vec{a} \times \vec{c}$  is  $l$ , then the value of  $3l^2$  is equal to

## Q14 (27 July 2021 Shift 2)

Let  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  be three vectors such that  $\vec{a} = \vec{b} \times (\vec{b} \times \vec{c})$ . If magnitudes of the vectors  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  are  $\sqrt{2}$ , 1 and 2 respectively and the angle between  $\vec{b}$  and  $\vec{c}$  is  $\theta$  ( $0 < \theta < \frac{\pi}{2}$ ), then the value of  $1 + \tan \theta$  is equal to:

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

## Q15 (27 July 2021 Shift 2)

Let  $\vec{a} = \hat{i} - \alpha\hat{j} + \beta\hat{k}$ ,  $\vec{b} = 3\hat{i} + \beta\hat{j} - \alpha\hat{k}$  and  $\vec{c} = -\alpha\hat{i} - 2\hat{j} + \hat{k}$ , where  $\alpha$  and  $\beta$  are integers.

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# Vector Algebra

JEE Main 2021 (July) Chapter-wise Questions

## **Questions with Answer Keys**

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## Vector Algebra

JEE Main 2021 (July) Chapter-wise Questions

## Hints and Solutions

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$$|\vec{a}| = 3 = a; \vec{a} \cdot \vec{c} = c$$

Now  $|\vec{c} - \vec{a}| = 2\sqrt{2}$

$$\Rightarrow c^2 + a^2 = 2\vec{c} \cdot \vec{a} \equiv 8$$

$$\Rightarrow c^2 + 9 - 2(c) = 8$$

$$\Rightarrow z^2 - 2z + 1 = 0 \Rightarrow z = 1 = |\vec{z}|$$

$$\Rightarrow c^2 - 2c + 1 = 0 \Rightarrow c =$$

Given

$$(\vec{a} \times \vec{b}) = |\vec{a} \times \vec{b}| |\vec{c}| \sin \frac{\pi}{6}$$

$$= (3)(1)(1/2)$$

$$= 3/2$$

Q2

$$|\vec{a} + \vec{b} + \vec{c}|^2 = |\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2(\vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c} + \vec{b} \cdot \vec{c})$$

$$\Rightarrow |\vec{a} + \vec{b} + \vec{c}| = \sqrt{3}$$

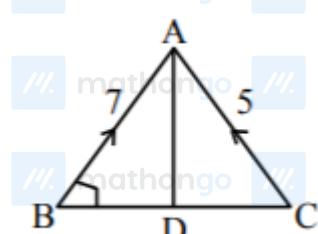
$$\vec{a} \cdot (\vec{a} + \vec{b} + \vec{c}) = |\vec{a}| + |\vec{a} + \vec{b} + \vec{c}| \cos \theta$$

$$\omega = (\omega_1 + \omega_2 + \omega_3)$$

$$\Rightarrow \cos 2\theta = -\frac{1}{6}$$

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Q3



Projection of BA

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## Hints and Solutions

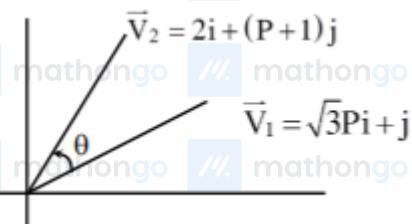
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on BC is equal to  $\vec{BA} \cdot \vec{BC}$

$$= |\vec{BA}| \cos \angle ABC = |\vec{BA}| \frac{\vec{BA} \cdot \vec{BC}}{|\vec{BA}| |\vec{BC}|} = \frac{\vec{BA} \cdot \vec{BC}}{|\vec{BC}|}$$

$$= 7 \left| \frac{7^2 + 3^2 - 5^2}{2 \times 7 \times 3} \right| = \frac{11}{2}$$

Q4



$$|\vec{V}_1| = |\vec{V}_2|$$

$$3P^2 + 1 = 4 + (P + 1)^2$$

$$2P^2 - 2P - 4 = 0 \Rightarrow P^2 - P - 2 = 0$$

$$P = 2, -1 \text{ (rejected)}$$

$$\cos \theta = \frac{\vec{V}_1 \cdot \vec{V}_2}{|\vec{V}_1| |\vec{V}_2|} = \frac{2\sqrt{3}P + (P + 1)}{\sqrt{(P + 1)^2 + 4\sqrt{3}P^2 + 1}}$$

$$\cos \theta = \frac{4\sqrt{3} + 3}{\sqrt{13}\sqrt{13}} = \frac{4\sqrt{3} + 3}{13}$$

$$\tan \theta = \frac{\sqrt{112 - 24\sqrt{3}}}{4\sqrt{3} + 3} = \frac{6\sqrt{3} - 2}{4\sqrt{3} + 3} = \frac{\alpha\sqrt{3} - 2}{4\sqrt{3} + 3}$$

$$\Rightarrow \alpha = 6$$

Q5

$$\vec{a} = \lambda \vec{b} + \mu \vec{c} = \hat{i}(2\lambda + \mu) + \hat{j}(\lambda - \mu) + \hat{k}(\lambda + \mu)$$

$$\vec{a} \cdot \vec{d} = 0 = 3(2\lambda + \mu) + 2(\lambda - \mu) + 6(\lambda + \mu)$$

$$\Rightarrow 14\lambda + 7\mu = 0 \Rightarrow \mu = -2\lambda$$

$$\Rightarrow \vec{a} = (0)\hat{i} - 3\lambda\hat{j} + (-\lambda)\hat{k}$$

$$\Rightarrow |\vec{a}| = \sqrt{10}|\lambda| = \sqrt{10} \Rightarrow |\lambda| = 1$$

$$\Rightarrow \lambda = 1 \text{ or } -1$$

$$[\vec{a} \vec{b} \vec{c}] = 0$$

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## Hints and Solutions

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$$\begin{aligned} [\vec{a} \cdot \vec{b} \cdot \vec{c}] + [\vec{a} \cdot \vec{b} \cdot \vec{d}] + [\vec{a} \cdot \vec{c} \cdot \vec{d}] &= \left[ \begin{array}{c} \vec{a} \\ \vec{b} + \vec{c} \\ \vec{d} \end{array} \right] \\ &= \begin{vmatrix} 0 & -3\lambda & \lambda \\ 3 & 0 & 2 \\ 3 & 2 & 6 \end{vmatrix} \\ &= 3\lambda(12) + \lambda(6) = 42\lambda = -42 \end{aligned}$$

**Q6**

$$\begin{aligned} (1) \vec{a} \times ((\vec{b} + \vec{c}) \times (\vec{b} - \vec{c})) &= \vec{a}(-\vec{b} \times \vec{c} + \vec{c} \times \vec{b}) = -2(\vec{a} \times (\vec{b} \times \vec{c})) \\ &= -2(\vec{a} \times \vec{a}) = \vec{0} \\ (2) \text{Projection of } \vec{a} \text{ on } \vec{b} \times \vec{c} &= \frac{\vec{a} \cdot (\vec{b} \times \vec{c})}{|\vec{b} \times \vec{c}|} = \frac{\vec{a} \cdot \vec{a}}{|\vec{a}|} = |\vec{a}| = 2 \end{aligned}$$

$$\begin{aligned} (3) |\vec{a}\vec{b}\vec{c}| + |\vec{c}\vec{a}\vec{b}| &= 2|\vec{a}\vec{b}\vec{c}| = 2\vec{a} \cdot (\vec{b} \times \vec{c}) \\ &= 2\vec{a} \cdot \vec{a} = 2|\vec{a}|^2 = 8 \\ (4) \vec{a} \times \vec{b} &= \vec{c} \text{ and } \vec{b} \times \vec{c} = \vec{a} \end{aligned}$$

$$\begin{aligned} \Rightarrow \vec{a}, \vec{b}, \vec{c} \text{ are mutually } \perp \text{ vectors.} \\ \therefore |\vec{a} \times \vec{b}| = |\vec{c}| \Rightarrow |\vec{a}| |\vec{b}| = |\vec{c}| \Rightarrow |\vec{b}| = |\vec{c}|/2 \\ \text{Also, } |\vec{b} \times \vec{c}| = |\vec{a}| \Rightarrow |\vec{b}| |\vec{c}| = 2 \Rightarrow |\vec{c}| = 2 \& |\vec{b}| = 1 \\ |3\vec{a} + \vec{b} - 2\vec{c}|^2 &= (3\vec{a} + \vec{b} - 2\vec{c}) \cdot (3\vec{a} + \vec{b} - 2\vec{c}) \\ &= 9|\vec{a}|^2 + |\vec{b}|^2 + 4|\vec{c}|^2 \\ &= (9 \times 4) + 1 + (4 \times 4) \\ &= 36 + 1 + 16 = 53 \end{aligned}$$

**Q7**

$$\begin{vmatrix} a+b+2 & a+2b+c & -b-c \\ b+1 & 2b & -b \\ b+2 & 2b & 1-b \end{vmatrix} = 0$$

If the vectors are co-planar,

Now  $R_3 \rightarrow R_3 - R_2, R_1 \rightarrow R_1 - R_2$

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## Hints and Solutions

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$$\begin{aligned} & \left| \begin{array}{ccc} a+1 & a+c & -c \\ b+1 & 2b & -b \end{array} \right| = 0 \\ & \left| \begin{array}{ccc} 1 & 0 & 1 \end{array} \right| = 1 \\ & = (a+1)2b - (a+c)(2b+1) - c(-2b) \\ & = 2ab + 2b - 2ab - a - 2bc - c + 2bc \\ & = 2b - a - c = 0 \end{aligned}$$

Q8 mathongo mathongo mathongo mathongo mathongo mathongo mathongo mathongo

$$\begin{aligned} \vec{p} &= 2\hat{i} + 3\hat{j} + \hat{k} \quad (\text{Given}) \\ \vec{q} &= \hat{i} + 2\hat{j} + \hat{k} \end{aligned}$$

$$\begin{aligned} \text{Now } (\vec{p} + \vec{q}) \times (\vec{p} - \vec{q}) &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 5 & 2 \\ 1 & 1 & 0 \end{vmatrix} \\ &= -2\hat{i} - 2\hat{j} - 2\hat{k} \end{aligned}$$

$$\begin{aligned} \Rightarrow \vec{r} &= \pm \sqrt{3} \frac{((\vec{p} + \vec{q}) \times (\vec{p} - \vec{q}))}{|(\vec{p} + \vec{q}) \times (\vec{p} - \vec{q})|} = \pm \frac{\sqrt{3}(-2\hat{i} - 2\hat{j} - 2\hat{k})}{\sqrt{2^2 + 2^2 + 2^2}} \\ \vec{r} &= \pm(-\hat{i} - \hat{j} - \hat{k}) \end{aligned}$$

According to question

$$\vec{r} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$$

$$\text{So } |\alpha| = 1, |\beta| = 1, |\gamma| = 1$$

$$\Rightarrow |\alpha| + |\beta| + |\gamma| = 3$$

Q9 mathongo mathongo mathongo mathongo mathongo mathongo mathongo mathongo

Because vectors are coplanar

$$\begin{vmatrix} a & a & c \end{vmatrix}$$

$$\text{Hence } \begin{vmatrix} 1 & 0 & 1 \end{vmatrix} = 0$$

$$\begin{vmatrix} c & c & b \end{vmatrix}$$

$$\Rightarrow c^2 = ab \Rightarrow c = \sqrt{ab}$$

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Q10 mathongo mathongo mathongo mathongo mathongo mathongo mathongo mathongo

$$|\vec{a}| = 2, |\vec{b}| = 5$$

$$|\vec{a} \times \vec{b}| = |\vec{a}| |\vec{b}| \sin \theta = \pm 8$$

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$$\sin \theta = \pm \frac{4}{5}$$

$$\therefore \vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta \\ = 10 \cdot \left( \pm \frac{3}{5} \right) = \pm 6 \\ |\vec{a} \cdot \vec{b}| = 6$$

**Q11**

$$(\vec{a} + 3\vec{b}) \perp (7\vec{a} - 5\vec{b})$$

$$(\vec{a} + 3\vec{b}) \cdot (7\vec{a} - 5\vec{b}) = 0 \\ 7|\vec{a}|^2 - 15|\vec{b}|^2 + 16\vec{a} \cdot \vec{b} = 0 \quad \dots (1)$$

$$(\vec{a} - 4\vec{b}) \cdot (7\vec{a} - 2\vec{b}) = 0$$

$$7|\vec{a}|^2 + 8|\vec{b}|^2 - 30\vec{a} \cdot \vec{b} = 0 \quad \dots (2)$$

from (1) & (2)

$$|\vec{a}| = |\vec{b}|$$

$$\cos \theta = \frac{|\vec{b}|}{2|\vec{a}|} \therefore \theta = 60^\circ$$

**Q12**

$$\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$$

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

$$\vec{a} + \vec{b} = 3\hat{j} + 5\hat{k}; \vec{a} \cdot \vec{b} = -1 + 2 + 6 = 7$$

$$((\vec{a} \times ((\vec{a} - \vec{b}) \times \vec{b})) \times \vec{b})$$

$$((\vec{a} \times (\vec{a} \times \vec{b} - \vec{b} \times \vec{b})) \times \vec{b})$$

$$(\vec{a} \times (\vec{a} \times \vec{b} - 0)) \times \vec{b}$$

$$(\vec{a} \times (\vec{a} \times \vec{b})) \times \vec{b}$$

$$((\vec{a} \cdot \vec{b})\vec{a} - (\vec{a} \cdot \vec{a})\vec{b}) \times \vec{b}$$

$$(\vec{a} \cdot \vec{b})\vec{a} \times \vec{b} - (\vec{a} \cdot \vec{a})(\vec{b} \times \vec{b})$$

$$(\vec{a} \cdot \vec{b})(\vec{a} \times \vec{b})$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} i & j & k \\ 1 & 1 & 2 \\ -1 & 2 & 3 \end{vmatrix} = -\hat{i} - 5\hat{j} + 3\hat{k}$$

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$$\therefore 7(-\hat{i} - 5\hat{j} + 3\hat{k})$$
$$(\vec{a} + \vec{b}) \times (7(-\hat{i} - 5\hat{j} + 3\hat{k}))$$
$$7(0\hat{i} + 3\hat{j} + 5\hat{k}) \times (-\hat{i} - 5\hat{j} + 3\hat{k})$$
$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 3 & 5 \\ -1 & -5 & 3 \end{vmatrix}$$
$$\Rightarrow 34\hat{i} - (5)\hat{j} + (3\hat{k})$$
$$\Rightarrow 34\hat{i} - 5\hat{j} + 3\hat{k}$$
$$\therefore 7(34\hat{i} - 5\hat{j} + 3\hat{k})$$

**Q13**

$$\vec{a} \times \vec{b} = \vec{c}$$

Take Dot with  $\vec{c}$

$$(\vec{a} \times \vec{b}) \cdot \vec{c} = |\vec{c}|^2 = 2$$

Projection of  $\vec{b}$  or  $\vec{a} \times \vec{c}$  is  $\ell$

$$\frac{|\vec{b} \cdot (\vec{a} \times \vec{c})|}{|\vec{a} \times \vec{c}|} = \ell$$
$$\therefore \ell = \frac{2}{\sqrt{6}} \Rightarrow \ell^2 = \frac{4}{6}$$
$$3\ell^2 = 2$$

**Q14**

$$\vec{a} = (\vec{b} \cdot \vec{c})\vec{b} - (\vec{b} \cdot \vec{c})\vec{c}$$
$$= 1.2 \cos \theta \vec{b} - \vec{c}$$
$$\Rightarrow \vec{a} = 2 \cos \theta \vec{b} - \vec{c}$$
$$|\vec{a}|^2 = (2 \cos \theta)^2 + 2^2 - 2 \cdot 2 \cos \theta \vec{b} \cdot \vec{c}$$
$$\Rightarrow 2 = 4 \cos^2 \theta + 4 - 4 \cos \theta \cdot 2 \cos \theta$$
$$\Rightarrow -2 = -4 \cos^2 \theta$$
$$\Rightarrow \cos^2 \theta = \frac{1}{2}$$
$$\Rightarrow \sec^2 \theta = 2$$
$$\Rightarrow \tan^2 \theta = 1$$

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## Hints and Solutions

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- $\Rightarrow \theta = \frac{\pi}{4}$
- $1 + \tan \theta = 2.$
- Q15** mathongo  $\vec{a} = (1, -\alpha, \beta)$   
 $\vec{b} = (3, \beta, -\alpha)$   
 $\vec{c} = (-\alpha, -2, 1); \alpha, \beta \in I$
- $\vec{a} \cdot \vec{b} = -1 \Rightarrow 3 - \alpha\beta - \alpha\beta = -1$   
 $\Rightarrow \alpha\beta = 2$
- 12** mathongo  $\begin{matrix} 2 & 1 \\ -1 & -2 \end{matrix}$
- $\vec{b} \cdot \vec{c} = 10$   
 $\Rightarrow -3\alpha - 2\beta - \alpha = 10$
- $\Rightarrow 2\alpha + \beta + 5 = 0$
- $\therefore \alpha = -2; \beta = -1$
- $[\vec{a} \vec{b} \vec{c}] = \begin{vmatrix} 1 & 2 & -1 \\ 3 & -1 & 2 \\ 2 & -2 & 1 \end{vmatrix}$
- $= 1(-1 + 4) - 2(3 - 4) - 1(-6 + 2)$   
 $= 3 + 2 + 4 = 9$

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