

# Mechanics I – Quiz 3 – Group C

2019-2020

Nov 14, 2019

Full Name:.....

KEY

(The quiz is over 4 marks. 2+2 )

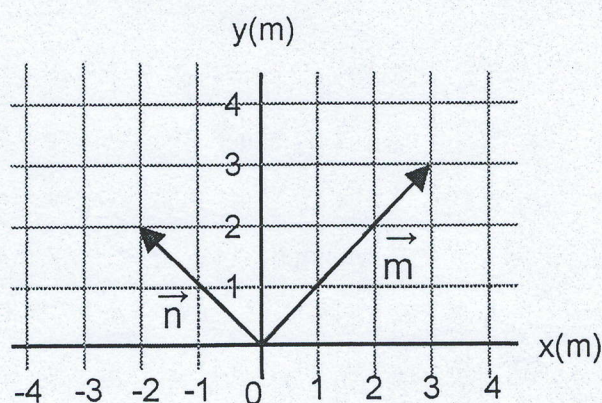
1. Look at the graph and answer the questions.

A) Write the vector components of  $\vec{m}$  and  $\vec{n}$  in terms of unit vectors.

B) Calculate the angle between the vectors  $\vec{m}$  and  $\vec{n}$ .

2. Calculate vector  $\vec{p}$ .

$$\vec{p} = \vec{m} \times \vec{n}$$



Answers

1 -

$$\begin{aligned} \vec{m} &= 3\hat{i} + 3\hat{j} \\ \vec{n} &= -2\hat{i} + 2\hat{j} \end{aligned}$$

$$\begin{aligned} \vec{m} \cdot \vec{n} &= (3\hat{i} + 3\hat{j}) \cdot (-2\hat{i} + 2\hat{j}) \\ &= -6 + 6 = 0 \end{aligned}$$

$$|\vec{m}| = \sqrt{3^2 + 3^2} = 3\sqrt{2}$$

$$|\vec{n}| = \sqrt{(-2)^2 + 2^2} = 2\sqrt{2}$$

$$\vec{m} \cdot \vec{n} = |\vec{m}| |\vec{n}| \cos \theta$$

$$\cos \theta = \frac{\vec{m} \cdot \vec{n}}{|\vec{m}| |\vec{n}|}$$

$\Downarrow$

$$\cos \theta = \frac{0}{3\sqrt{2} \cdot 2\sqrt{2}} = \frac{0}{12} = 0$$

$$\theta = \cos^{-1} 0 = 90^\circ$$

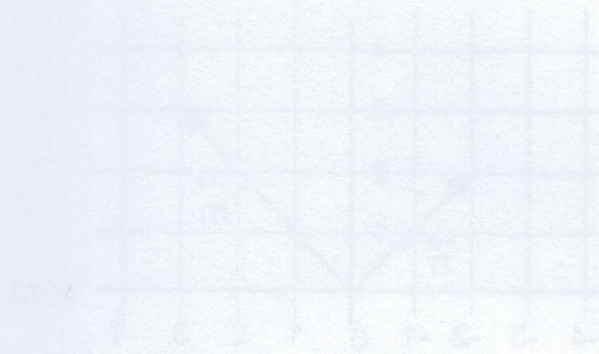


$$2) \quad \vec{p} = \vec{m} \times \vec{n}$$

$$\vec{p} = (3\hat{i} + 3\hat{j}) \times (-2\hat{i} + 2\hat{j})$$

$$= 6\hat{k} - (-6)\hat{k}$$

$$= 12\hat{k}$$



$$\vec{m} \cdot \vec{n} = |\vec{m}| |\vec{n}| \cos \theta$$

$$\cos \theta = \frac{\vec{m} \cdot \vec{n}}{|\vec{m}| |\vec{n}|}$$



$$\cos \theta = \frac{0}{3\sqrt{2} \cdot 2\sqrt{2}} = 0$$

$$\theta = \cos^{-1}(0) = 90^\circ$$

$$\vec{m} = 3\hat{i} + 3\hat{j} \quad (A)$$

$$\vec{n} = -2\hat{i} + 2\hat{j}$$

$$\vec{m} \cdot \vec{n} = (3\hat{i} + 3\hat{j}) \cdot (-2\hat{i} + 2\hat{j})$$

$$= -6 + 6 = 0$$

$$|\vec{m}| = \sqrt{3^2 + 3^2} = 3\sqrt{2}$$

$$|\vec{n}| = \sqrt{(-2)^2 + 2^2} = 2\sqrt{2}$$