Mechanics I – Quiz 3 – Group C

2019-2020   Nov 14, 2019

KEY

Full Name:...................................KEY...

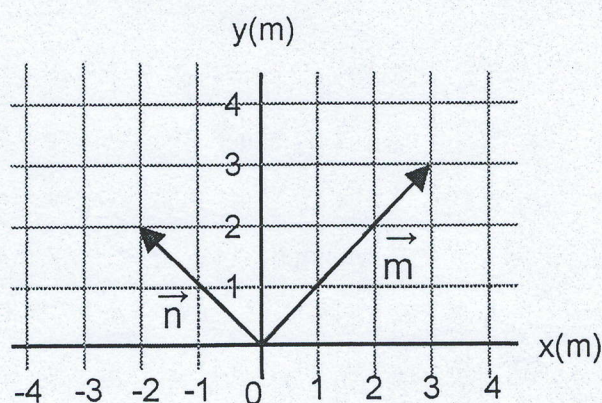**(The quiz is over 4 marks. 2+2)**

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 **m** and **n**.

2. Calculate vector **p**.

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

Answers

1-

A)
$$\vec{m} = 3\hat{\imath} + 3\hat{\jmath}$$
$$\vec{n} = -2\hat{\imath} + 2\hat{\jmath}$$

$$\vec{m} \cdot \vec{n} = (3\hat{\imath} + 3\hat{\jmath}) \cdot (-2\hat{\imath} + 2\hat{\jmath})$$
$$= -6 + 6 = 0$$

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

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

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

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

$$\Downarrow$$

$$\cos\theta = \frac{0}{3\sqrt{2} \cdot 2\sqrt{2}} = \frac{0}{12} = 0$$
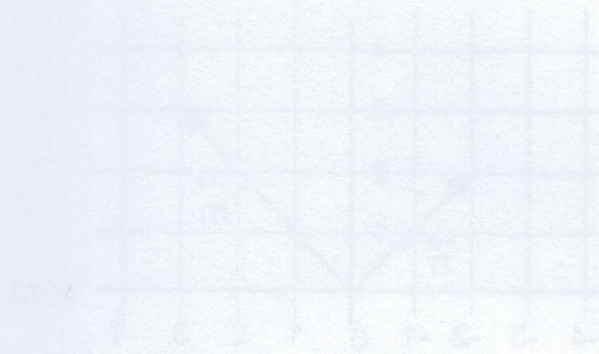
$$\theta = \cos^{-1} 0 = 90°$$

2)

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

$$\vec{p} = (3\hat{\imath} + 3\hat{\jmath}) \times (-2\hat{\imath} + 2\hat{\jmath})$$

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

$$= 12\hat{k}$$