

## FP1 Matrices Questions

$$\mathbf{A} = \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$$

(ii) Calculate the matrix product  $\mathbf{A}^2$ . (2 marks)

(b) The matrix  $\mathbf{B}$  is defined by

$$\mathbf{B} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$$

(i) Calculate  $\mathbf{B}^2 - \mathbf{A}^2$ . (3 marks)

(ii) Calculate  $(\mathbf{B} + \mathbf{A})(\mathbf{B} - \mathbf{A})$ . (3 marks)

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5 The matrix  $\mathbf{M}$  is defined by

$$\mathbf{M} = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix}$$

(a) Find the matrix:

(i)  $\mathbf{M}^2$ ; (3 marks)

(ii)  $\mathbf{M}^4$ . (1 mark)

(c) Find the matrix  $\mathbf{M}^{2006}$ . (3 marks)

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2 The matrices  $\mathbf{A}$  and  $\mathbf{B}$  are given by

$$\mathbf{A} = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{\sqrt{3}}{2} \end{bmatrix}$$

(a) Calculate:

(i)  $\mathbf{A} + \mathbf{B}$ ; (2 marks)

(ii)  $\mathbf{BA}$ . (3 marks)

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**1** The matrices **A** and **B** are given by

$$\mathbf{A} = \begin{bmatrix} 2 & 1 \\ 3 & 8 \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

The matrix  $\mathbf{M} = \mathbf{A} - 2\mathbf{B}$ .

(a) Show that  $\mathbf{M} = n \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ , where  $n$  is a positive integer. *(2 marks)*

(c) Show that

$$\mathbf{M}^2 = q\mathbf{I}$$

where  $q$  is an integer and  $\mathbf{I}$  is the  $2 \times 2$  identity matrix. *(2 marks)*

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