



QUESTION WORKBOOK

Matrix algebra and transformations

Matrices · Year FM

7 questions · 27 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** Write down the 2×2 matrices for a rotation of 90° anticlockwise about the origin and for a reflection in the line $y = x$. [2]

- A2** Let A have rows $(2, 1)$, $(0, 3)$ and B have rows $(1, -1)$, $(2, 0)$. Find AB and BA, and comment. [3]

SECTION B · Standard

- B1** Find the image of the point $(3, 1)$ under the rotation of 90° anticlockwise about the origin. [3]

- B2** A transformation reflects in the x -axis and then rotates 90° anticlockwise. Find the single matrix representing the combined transformation and identify it. [4]

- B3** A linear transformation sends $(1, 0)$ to $(2, 0)$ and $(0, 1)$ to $(1, 3)$. Write down its matrix, and find the image of $(2, 5)$. [3]

- B4** Using the matrix with rows $(0, -1)$, $(1, 0)$, show that applying the 90° rotation four times returns every point to where it started, and explain what this says about the matrix. [4]

SECTION C · Stretch

- C1** R is a rotation of 90° anticlockwise about the x-axis and S is a rotation of 90° anticlockwise about the z-axis, both viewed from the positive end of the axis. Find the matrix representing S followed by R, use it to find the image of $(1, 2, 3)$, and show that R followed by S is a different transformation. [8]