



QUESTION WORKBOOK

Groups and their axioms

Further Pure 2 · Year FM

6 questions · 20 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 State the four axioms a set and a binary operation must satisfy to form a group. [2]

A2 Show that $\{1, 3, 5, 7\}$ under multiplication modulo 8 is a group, and state the order of each element. [3]

SECTION B · Standard

B1 Build the Cayley table for $\{1, 2, 3, 4\}$ under multiplication modulo 5, show the set is a group, and find a generator. [4]

- B2** Explain the difference between the order of a group and the order of an element, using the symmetries of an equilateral triangle. [3]

- B3** Show that the set of matrices with rows $(1, n)$ and $(0, 1)$, for integer n , forms a group under matrix multiplication, and say which familiar group it matches. [4]

SECTION C · Stretch

- C1** Explain why $\{0, 1, 2, 3\}$ under multiplication modulo 4 is not a group, and why removing 0 does not repair it. [4]