



QUESTION WORKBOOK

De Moivre's theorem and trigonometric identities

Complex numbers · Year FM

6 questions · 22 marks

PRINT EDITION

SECTION A · Warm-up

- A1** State De Moivre's theorem, and explain why a number must be in modulus-argument form before the theorem can be applied. [2]

- A2** Use De Moivre's theorem to evaluate $(1 - i)^6$. [3]

SECTION B · Standard

- B1** Evaluate $(\sqrt{3} + i)^5$, giving the answer in the form $a + bi$ with exact values. [4]

- B2** Write down the values of $(\cos \pi/12 + i \sin \pi/12)^6$ and $(\cos \pi/12 + i \sin \pi/12)^{-6}$. [2]

- B3** By expanding $(\cos \theta + i \sin \theta)^3$ and equating imaginary parts, show that $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$. [5]

SECTION C · Stretch

- C1** Let $z = \cos \theta + i \sin \theta$. Show that $16 \cos^5 \theta = \cos 5\theta + 5 \cos 3\theta + 10 \cos \theta$, and hence evaluate $\int \cos^5 \theta \, d\theta$ from 0 to $\pi/2$ exactly. [6]