Exercise 2

Paper 1 style · No calculator

2 6 marks AHL 2.12 ●●● Demanding

The roots of the equation $x^3 + px^2 + qx - 216 = 0$, where $p, q \in \mathbb{R}$, are α, 3α and 9α.

(a) Find the value of α. **[3]**

(b) Hence find the value of p and the value of q. **[3]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

product of the roots $= 27\alpha^3$ **A1**

$27\alpha^3 = 216$ **M1**

$\alpha = 2$ **A1**

Total 3 marks

MARKSCHEME (b)

sum $2 + 6 + 18 = 26 = -p$: $p = -26$ **A1**

$q = 2 \times 6 + 6 \times 18 + 2 \times 18$ **(M1)**

$q = 156$ **A1**

Total 3 marks