

ALGEBRA (Q 1 & 2, PAPER 1)

2008

1 (a) Simplify fully $\frac{x^2 + 4}{x^2 - 4} - \frac{x}{x + 2}$.

(b) Given that one of the roots is an integer, solve the equation

$$6x^3 - 29x^2 + 36x - 9 = 0.$$

(c) Two of the roots of the equation $ax^3 + bx^2 + cx + d = 0$ are p and $-p$.
Show that $bc = ad$.

2. (a) Express $x^2 + 10x + 32$ in the form $(x + a)^2 + b$.

(b) α and β are the roots of the equation $x^2 - 7x + 1 = 0$.

(i) Find the value of $\alpha^2 + \beta^2$.

(ii) Find the value of $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$.

(c) Show that if a and b are non-zero real numbers, then the value of $\frac{a}{b} + \frac{b}{a}$ can never lie between -2 and 2 .

HINT: Consider the case where a and b have the same sign separately from the case where a and b have opposite signs.

ANSWERS

1 (a) $\frac{2}{x-2}$

(b) $3, \frac{1}{3}, \frac{3}{2}$

2 (a) $(x+5)^2 + 7$

(b) (i) 47 (ii) 322