

QQQ – Core Pure 1 – Chapter 4 – Roots of Polynomials (Version 2)

Total Marks: 25

(25 = Platinum, 23 = Gold, 20 = Silver, 17 = Bronze)

1. The roots of the equation $x^2 - px - 6 = 0$ are α and β

Find $\alpha^2 + \beta^2$ in terms of p

Circle your answer.

[1 mark]

- $p^2 - 6$
- $p^2 + 6$
- $p^2 - 12$
- $p^2 + 12$

(Total 1 marks)

AQA A2 June 2022 Paper 2 Q3

2. The roots of the equation

$$5x^3 + 2x^2 - 3x + p = 0$$

are α , β and γ

Given that p is a constant, state the value of $\alpha\beta + \beta\gamma + \gamma\alpha$

Circle your answer.

[1 mark]

- $-\frac{3}{5}$
- $-\frac{2}{5}$
- $\frac{2}{5}$
- $\frac{3}{5}$

(Total 1 marks)

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3. In this question you must show detailed reasoning.

The equation $x^2 - kx + 2k = 0$, where k is a non-zero constant, has roots α and β .

Find $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ in terms of k , simplifying your answer.

[4]

(Total 4 marks)

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4. The roots of the equation $4x^4 - 2x^3 - 3x + 2 = 0$ are α, β, γ and δ . By using a suitable substitution, find a quartic equation whose roots are $\alpha + 2, \beta + 2, \gamma + 2$ and $\delta + 2$ giving your answer in the form $at^4 + bt^3 + ct^2 + dt + e = 0$, where a, b, c, d , and e are integers.

[5]

(Total 5 marks)

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5. In this question you must show detailed reasoning.

The equation $z^3 + 2z^2 + kz + 3 = 0$, where k is a constant, has roots $\alpha, \frac{1}{\alpha}$ and β .

Determine the roots in exact form.

[6]

(Total 6 marks)

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6. The roots of the equation

$$x^3 - 2x^2 + 4x - 5 = 0$$

are p, q and r .

Without solving the equation, find the value of

(i) $\frac{2}{p} + \frac{2}{q} + \frac{2}{r}$

(ii) $(p - 4)(q - 4)(r - 4)$

(iii) $p^3 + q^3 + r^3$

(8)

(Total 8 marks)

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