

3

1

Solve the equation $|2x - 3| = |5x + 2|$.

[3]

(b) Hence solve the equation $|2 \sec \theta - 3| = |5 \sec \theta + 2|$ for $\pi < \theta < 2\pi$. Give your answer correct to 3 significant figures. [3]

[3]

A-Level Mathematics: 9709 Mathematics November 2025 Question Paper 21

7

$$p(x) = 2x^4 + kx^3 + kx^2 + 17x + 18,$$

where k is a constant. It is given that $(x+2)$ is a factor of $p(x)$.

(a) Find the value of k .

[2]

It is given that the equation $p(x) = 0$ has exactly two real roots, denoted by α and β , where α is an integer and β is not an integer.

(b) State the value of α and show that β satisfies the equation $x = \sqrt[3]{-2x-4.5}$.

[4]

(c) Show by calculation that $-1.4 < \beta < -1.0$.

[2]

[illegible]

(d) Use an iterative formula, based on the equation in part **(b)**, to find the value of β correct to 3 significant figures. Give the result of each iteration to 5 significant figures. [3]

[3]

This image shows a full page of white paper with horizontal dotted lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

3

(a)

Solve the inequality $|3x - 4| \leq |2x + 5|$.

[4]

(b)

Hence find the largest integer N satisfying the inequality $|3 \times 7^{0.01N} - 4| \leq |2 \times 7^{0.01N} + 5|$.

[3]

4 The polynomial $p(x)$ is defined by

$$p(x) = x^4 - 10x^3 + 20x^2 - 30x + 40.$$

- (a)** Find the quotient when $p(x)$ is divided by $(x^2 + 3)$ and show that the remainder is -11 . [3]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

- (b)** Hence find the real roots of the equation $p(x) + 11 = 0$. Give your answers in exact form. [3]

[illegible]

2 (a) Use logarithms to solve the inequality $4^x < 0.05$. Give your answer in the form $x < a$, where the value of a is correct to 3 significant figures. [2]

(b) Solve the inequality $|3x + 8| < 9$. [3]

(c) Hence state the integers that satisfy both of the inequalities in parts (a) and (b). [1]

5 The polynomial $p(x)$ is defined by

$$p(x) = ax^3 + bx^2 - ax - 24,$$

where a and b are constants. It is given that $(2x - 3)$ is a factor of $p(x)$ and that the remainder is -15 when $p(x)$ is divided by $(x + 1)$.

(a) Find the values of a and b .

[4]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

(b) Hence factorise $p(x)$ completely.

[3]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(c) Hence solve the equation $p(3\operatorname{cosec}\theta) = 0$ for $90^\circ < \theta < 270^\circ$.

[2]

[illegible]

2

[2]

(b)

[3]

This image shows a full page of white paper with horizontal dashed lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

5 The polynomial $p(x)$ is defined by

$$p(x) = ax^4 + bx^3 + 13x^2 - 35x + 15,$$

where a and b are constants. It is given that $(2x - 1)$ and $(x - 3)$ are factors of $p(x)$.

(a) Find the values of a and b .

[4]

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

22 _____

(b) Hence factorise $p(x)$.

[3]

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(c) Find the least positive value of θ in radians such that $p(\cot 2\theta) = 0$.

[2]

Handwriting practice lines on page 11. The page contains 11 horizontal dotted lines for writing practice. The page number 11 is centered at the bottom.