NAME: _____

ADM NO: _____ **STREAM:** _____ **DATE:** _____

GRADE 10 CORE MATHEMATICS

OPENER EXAM TERM 2, 2026

TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name, admission number, stream and date in the spaces provided above.

2. This paper consists of TWO sections: Section I and Section II.

3. Answer ALL questions in Section I (50 marks).

4. In Section II, answer any FIVE questions out of eight. Each question carries 10 marks.

5. Show all workings clearly in the spaces provided below each question.

6. Non-programmable silent electronic calculators and mathematical tables may be used.

7. All answers must be written in the spaces provided in this booklet.

SECTION I (50 MARKS)

Answer ALL questions in this section.

1. Simplify: $\sqrt{48} + \sqrt{75} - \sqrt{108}$ **(3 marks)**

2. Solve for x: $4^{x+1} = 8^{x-1}$ **(3 marks)**

3. The 3rd and 7th terms of an arithmetic progression are 10 and 22 respectively. Find the first term and the common difference. **(3 marks)**

4. Factorize completely: $6x^2 - 7x - 3$ **(3 marks)**

5. Given that log 2 = 0.3010 and log 3 = 0.4771, evaluate without tables or a calculator: log 72 **(4 marks)**

6. In triangle PQR, PQ = 8 cm, PR = 6 cm and angle QPR = 120°. **(3 marks)**

Calculate the length QR, correct to 2 decimal places.

7. Evaluate: $\log_5 125 + \log_5 (1/25)$ **(2 marks)**

8. Simplify: $(3^{n+2} - 3^n) \div (2 \times 3^n)$ **(3 marks)**

9. Rationalize the denominator and simplify: $(2 + \sqrt{3}) / (\sqrt{3} - 1)$ **(4 marks)**

10. Solve the quadratic equation: $2x^2 - 7x + 3 = 0$ **(3 marks)**

11. In a geometric progression, the 2nd term is 6 and the 5th term is 162. Find the first term and the common ratio. **(3 marks)**

12. Form a quadratic equation with integer coefficients whose roots are $x = -2$ and $x = 5$. **(3 marks)**

13. Using the sine rule, find angle B in triangle ABC where $a = 7$ cm, $b = 9$ cm and angle A = 43°. Give your answer to the nearest degree. **(4 marks)**

14. A geometric progression has a first term of 3 and a sum to infinity of 12. Find the common ratio. **(3 marks)**

15. Expand and simplify: $(\sqrt{5} + 2)^2$ **(3 marks)**

16. The sum of the first n terms of a series is given by $S_n = 2n^2 + 3n$. Find the 5^{th} term of the series. **(3 marks)**

SECTION II (50 MARKS)

Answer any FIVE questions from this section. Each question carries 10 marks.

17.

(a) An arithmetic progression has first term 5 and common difference 3. **(10marks)**

(i) Write down the first four terms of the progression. **(1 mark)**

(ii) Find the 20^{th} term. **(2 marks)**

(iii) Calculate the sum of the first 20 terms. **(2 marks)**

(b) The sum of the first n terms of a series is $S_n = 3n^2 - n$.

(i) Find the first three terms of the series. **(2 marks)**

(ii) Show that the series is an arithmetic progression and state its common difference. **(3 marks)**

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18. **(10 marks)**

(a) Find the sum of the geometric series 2 + 6 + 18 + … to 8 terms. **(3 marks)**

(b) A geometric progression has terms 128, 64, 32, …

(i) Find the 7^{th} term. **(2 marks)**

(ii) Find the sum to infinity of the series. **(2 marks)**

(c) Three consecutive terms of a geometric progression are $(x - 2)$, $(x + 2)$ and $(3x + 3)$. Find the value of x. **(3 marks)**

19. **(10 marks)**

(a) Without using tables or a calculator, evaluate: $\log_2 64 - \log_2 16 + \log_2 4$ **(3 marks)**

(b) Solve for x: $\log (2x + 3) - \log (x - 1) = 1$ **(4 marks)**

(c) Given that log 5 = 0.6990 and log 7 = 0.8451, evaluate without using tables:

(i) log 35 **(1 mark)**

(ii) log 175 **(2 marks)**

20.

(a) Simplify, leaving your answer as a power of 2: $(2^{n+3} \times 4^{n-1}) \div 8^n$ **(4 marks)**

(b) Rationalize the denominator and simplify: $(3\sqrt{2} + \sqrt{6}) / (\sqrt{2} - \sqrt{3})$ **(3 marks)**

(c) Solve the equation: $9^x - 10(3^x) + 9 = 0$ **(3 marks)**

21.

(a) Solve $x^2 - 6x + 7 = 0$ by completing the square, giving answers correct to 2 decimal places. **(4 marks)**

(b) Find the range of values of x for which: $2x^2 + 3x - 14 \leq 0$ **(3 marks)**

(c) The sum of a number and its reciprocal is 29/10. Find the possible values of the number. **(3 marks)**

22.

(a) In triangle ABC, AB = 7 cm, BC = 5 cm and angle ABC = 115°.

(i) Calculate the length AC, correct to 1 decimal place. **(3 marks)**

(ii) Find angle BAC, correct to the nearest degree. **(3 marks)**

(b) In triangle PQR, angle P = 54°, angle Q = 72° and PQ = 10 cm.
Calculate the length PR, correct to 2 decimal places.

23.

(a) A rectangular garden has a perimeter of 44 m and an area of 120 m².
Form a quadratic equation and use it to find the length and width of the garden.

(b) Solve the equation: $x^4 - 13x^2 + 36 = 0$ **(5 marks)**

24.

(a) Using logarithms (log 2 = 0.3010, log 3 = 0.4771), solve for x correct to 3 significant figures: $2^{2x+3} = 3^{x+1}$ **(5 marks)**

(b) A ball is dropped from a height of 16 m. Each time it bounces, it rises to 3/4 of the height of the previous bounce.

(i) Find the height reached after the 5^{th} bounce. **(2 marks)**

(ii) Find the total distance the ball travels before coming to rest. **(3 marks)**

END