

H

National Qualifications

2026

Mathematics Paper 2

Thursday, 7 May

Instructions to Candidates

Candidates should enter their surname, forename(s), date of birth, Scottish candidate number and the name and level of the subject at the top of their first answer sheet.

Total marks – 65

Attempt ALL questions.

To earn full marks you must show your working in your answers.

State the units for your answer where appropriate.

You will not earn marks for answers obtained by readings from scale drawings.

You must clearly identify the question number you are attempting on your answer sheet.

Marks are shown in square brackets at the end of each question or part question.

An ow in the margin indicates a new question.

An asterisk indicates a question that differs in some respect to the question in the printed paper.

Tactile diagrams are produced in a **[Braille page 2]** separately bound booklet.

A separate formulae sheet is provided.

[Braille page 3] Total marks — 65

Attempt ALL questions

ow 1. The equation $x^2 + kx + (k+3) = 0$ has equal roots.

Find algebraically, the values of k . [3 marks].

ow 2.

Vectors $\mathbf{u}$ and $\mathbf{v}$ are defined as $\mathbf{u} = \begin{pmatrix} 3 \\ 2 \\ 6 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} -5 \\ -2 \\ 4 \end{pmatrix}$.

(a) Find $\mathbf{u} \cdot \mathbf{v}$. [1 mark]

(b) Calculate the acute angle between $\mathbf{u}$ and $\mathbf{v}$. [4 marks]

ow 3. A function, g , is defined on $\mathbb{R}$, the set of real numbers, by

$$g(x) = \frac{1}{5}x + 6.$$

Find the inverse function, $g^{-1}(x)$. [3 marks]

ow 4. A circle has centre $(-2, 5)$.

The point $(3, 7)$ lies on the circle.

Find the equation of the circle. [2 marks]

[Braille page 4] ow 5. A sequence is defined by the recurrence relation

$$u_{n+1} = 1.125u_n + 5, u_0 = 2.$$

(a) Calculate the value of u_1 . [1 mark]

(b) Explain why this sequence does not approach a limit as $n \rightarrow \infty$. [1 mark]

(c) Determine the smallest value of n for which $u_n > 30$. [2 marks]

ow * 6. Refer to the diagram for Question 6. The diagram shows the graph of a cubic function $y = f(x)$ which has a maximum turning point at $(-1, 0)$ and a minimum turning point at $(1, -4)$. The graph also passes through the points $(0, -2)$ and $(2, 0)$.

Describe the graph of $y = -f(x) + 1$. Make sure you describe the shape of the graph including any specific points and features. [3 marks]

ow * 7. Refer to the diagram for Question 7. The diagram shows the curve with equation $y = x^2 - x - 2$.

Calculate the shaded area. [4 marks]

[Braille page 5] ow 8. Refer to the diagram for Question 8. A and B are the points $(-2, 11)$ and $(10, -13)$.

(a) Find the equation of L , the perpendicular bisector of AB . [4 marks]

The equation of AC is $y + x = 9$.

(b) Calculate the size of the obtuse angle between L and AC . [2 marks]

ow 9. Determine the range of values of x for which the function $f(x) = 4x^3 - 12x^2 + 7$ is strictly decreasing.

Justify your answer. [4 marks]

ow 10. Solve the equation

$$3\cos 2x^\circ + 10\cos x^\circ$$

$= 1$ for $0 \leq x < 360$. [5 marks]

ow 11. Refer to the diagram for Question 11. Two variables x and y are connected by the equation $y = ab^x$.

The graph of $\log_4 y$ against x is a straight line as shown.

Find the values of a and b . [5 marks]

[Braille page 6] ow 12. A function f is defined on the set of real numbers by

$$f(x) = x^3 + 2x^2 - 4x + 1.$$

(a) Find the x -coordinates of the stationary points on the curve with equation $y = f(x)$. [3 marks]

(b) Hence, determine the maximum and minimum values of $f(x)$ in the interval $-1 \leq x \leq 1$. [3 marks]

ow 13. (a) Refer to the diagram for Question 13. Express

$$2\sin x^\circ - 7\cos x^\circ \text{ in the form } k \sin(x-a)^\circ, \text{ where } k > 0 \text{ and } 0 < a < 360. [4 \text{ marks}]$$

The diagram shows part of the curve with equation $y = 2\sin x^\circ - 7\cos x^\circ$ and the line with equation $y = 3$.

The curve and the line intersect at the point P .

(b) Find the x -coordinate of P . [3 marks]

ow 14. During a metal-working process a heated steel rod is cooled by dropping it into a container of oil.

The temperature of the rod is given by

$$T = 800e^{-0.124t} + 25,$$

where T is the temperature of the rod, in degrees Celsius, t seconds after it is dropped into the oil.

[Braille page 7] (a) Determine the temperature of the rod as it is dropped into the oil. [1 mark]

(b) Calculate the time taken for the temperature of the rod to cool to 150°C . [4 marks]

ow 15. Express

$(3\sin\theta + \cos\theta)(\sin\theta + 3\cos\theta)$ in the form $a + b\sin c\theta$, where a , b and c are integers. [3 marks]

[END OF QUESTION PAPER]