

H

National Qualifications

2026

Mathematics

Paper 1 (Non-calculator)

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 – 55

Attempt ALL questions.

You must NOT use a calculator.

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 **[Braille page 2]** paper.

Tactile diagrams are produced in a separately bound booklet.

A separate formulae sheet is provided.

**[Braille page 3]** Total marks — 55

Attempt ALL questions

ow 1. Express  $2x^2+20x+3$  in the form  $p(x+q)^2+r$ . [3 marks]

ow 2. Find  $\int \left( 15x^{\frac{2}{3}} + \frac{7}{x^2} \right) dx, x > 0$ . [4 marks]

ow 3. Refer to the diagram for Question 3. A circle has equation

$$x^2+y^2+2x-4y-20 = 0.$$

Point A(2, 6) lies on the circle.

Find the equation of the tangent to the circle at A. [4 marks]

ow 4. Refer to the diagram for Question 4. The diagram shows two right-angled triangles with angles  $p$  and  $q$  as marked.

- (a) Determine the exact value of  $\sin q$ . [1 mark]
- (b) Find the exact value of:
  - (i)  $\sin(p+q)$  [4 marks]
  - (ii)  $\cos(p+q)$ . [2 marks]
- (c) Hence find the exact value of  $\tan(p+q)$ . [1 mark]

**[Braille page 4]** ow 5. Functions  $f$  and  $g$  are defined on  $\mathbb{R}$ , the set of real numbers, by  $f(x) = 2x^2 + 5$  and  $g(x) = x + 3$ .

- (a) Find an expression for:
  - (i)  $f(g(x))$  and [2 marks]
  - (ii)  $g(f(x))$ . [1 mark]
- (b) State the range of  $g(f(x))$ . [1 mark]

ow \* 6. The points  $A$ ,  $B$ ,  $C$  and  $D$  are such that

$$\overrightarrow{AB} = \mathbf{u}, \overrightarrow{BC} = \mathbf{v} \text{ and } \overrightarrow{DC} = \mathbf{w}.$$

- The point  $M$  is the mid-point of  $AB$ .
- The point  $N$  divides  $CD$  with the ratio  $1:2$ .

Express the vector  $\overrightarrow{MN}$  in terms of  $\mathbf{u}$ ,  $\mathbf{v}$ , and  $\mathbf{w}$ . [2 marks]

ow 7. Determine the gradient of the tangent to the curve with equation

$$y = 2x + 4\sqrt{x}, \quad x > 0, \text{ at the point where } x = 9. \text{ [4 marks]}$$

ow 8. Solve

$$\log_2 x + \log_2 (x + 2) = 3, \text{ where } x > 0. \text{ [4 marks]}$$

**[Braille page 5]** ow 9. (a) Show that the points  $D(-1, 6, 1)$ ,  $E(1, 2, 7)$  and  $F(2, 0, 10)$  are collinear. [3 marks]

Point  $G$  is such that  $F$  divides  $DG$  in the ratio  $3:4$ .

(b) Find the coordinates of G. [2 marks]

ow 10. Find

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} 6 \sin\left(3x - \frac{\pi}{2}\right) dx. \text{ [4 marks]}$$

ow 11. (a) (i) Show that  $(x+2)$  is a factor of

$$x^3 + 7x^2 + 18x + 16. \text{ [2 marks]}$$

(ii) Explain why  $(x+2)$  is the only linear factor of

$$x^3 + 7x^2 + 18x + 16.$$

Give a reason for your answer. [2 marks]

(b) Find the coordinates of the point(s) where the curves with equations

$$y = 2x^3 + 20x^2 + 27x + 9 \text{ and}$$

$$y = 6x^2 - 9x - 23 \text{ intersect. [4 marks]}$$

**[Braille page 6]** ow \* 12. Refer to the diagram for Question 12. An exponential

function,  $f$ , is defined for  $x \in \mathbb{R}$ .

The diagram shows the graph of  $y = f(x)$ .

The graph shows a strictly increasing function passing through the points  $(0, -3)$ ,  $(1, -1)$  and  $(2, 5)$ . The graph has an asymptote at  $y = -4$ .

The inverse function,  $f^{-1}(x)$ , exists.

(a) Describe the graph of the inverse function. Make sure you describe the shape of the graph including any specific points and features. [2 marks]

The inverse function is of the form

$$f^{-1}(x) = \log_a(x+b).$$

(b) (i) Determine the values of  $a$  and  $b$ . [2 marks]

(ii) State the domain of the inverse function,  $f^{-1}(x)$ . [1 mark]

[END OF QUESTION PAPER]