N5

National Qualifications
SPECIMEN ONLY

SQ29/N5/01

Mathematics
Paper 1
(Non-Calculator)

Date — Not applicable

Duration — 1 hour

SQ29N501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day	Month	Year
D D	M M	Y Y

Scottish candidate number

Total marks — 40

You may NOT use a calculator.

Attempt ALL questions.

Use **blue** or **black** ink. Pencil may be used for graphs and diagrams only.

Write your working and answers in the spaces provided. Additional space for answers is provided at the end of this booklet. If you use this space, write clearly the number of the question you are attempting.

Square-ruled paper is provided at the back of this booklet.

Full credit will be given only to solutions which contain appropriate working.

State the units for your answer where appropriate.

Before leaving the examination room you must give this booklet to the Invigilator.
If you do not, you may lose all the marks for this paper.

SQA

SQ29N50101

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: $A = \frac{1}{2}ab\sin C$

Volume of a sphere: $V = \frac{4}{3}\pi r^3$

Volume of a cone: $V = \frac{1}{3}\pi r^2 h$

Volume of a pyramid: $V = \frac{1}{3}Ah$

Standard deviation: $s = \sqrt{\dfrac{\Sigma(x - \bar{x})^2}{n-1}} = \sqrt{\dfrac{\Sigma x^2 - (\Sigma x)^2/n}{n-1}}$, where n is the sample size.

1. Evaluate

$$2\frac{3}{8} \div \frac{5}{16}.$$

2

2. Multiply out the brackets and collect like terms

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

3

3. Two forces acting on a rocket are represented by vectors **u** and **v**.

$$\mathbf{u} = \begin{pmatrix} 2 \\ -5 \\ -3 \end{pmatrix} \text{ and } \mathbf{v} = \begin{pmatrix} 7 \\ 4 \\ -1 \end{pmatrix}.$$

Calculate |**u** + **v**|, the magnitude of the resultant force.

Express your answer as a surd in its simplest form.

3

4. Solve the equation

$$2x^2 + 7x - 15 = 0.$$

3

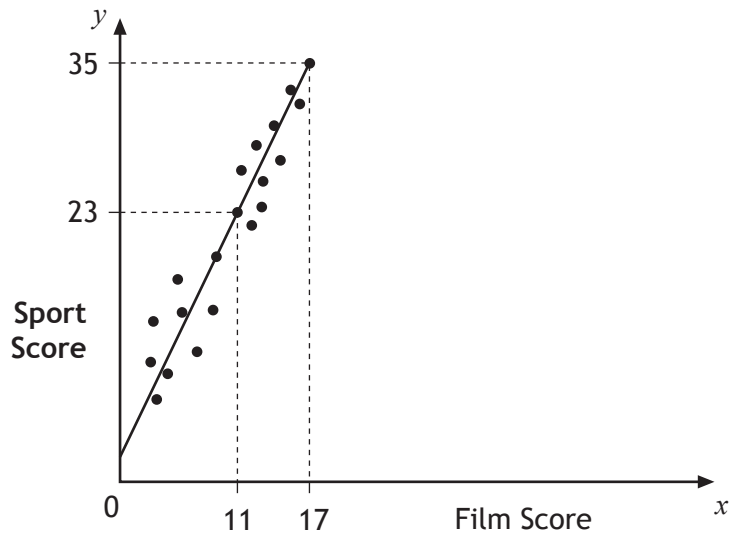**5.** Express $\dfrac{4}{\sqrt{6}}$ with a rational denominator in its simplest form.

2

6. Teams in a quiz answer questions on film and sport.

This scattergraph shows the scores of some of the teams.

A line of best fit is drawn as shown.

(a) Find the equation of this straight line. **3**

(b) Use this equation to estimate the sports score for a team with a film score of 8. **1**

Total marks 4

7. (a) Multiply out the brackets and simplify:

$$x^{\frac{1}{2}}\left(x^{-\frac{3}{2}} + x^{-\frac{1}{2}}\right).$$

2

(b) Find the exact value of this expression when $x = 6$.

1

Total marks 3

8. Change the subject of the formula $p = \dfrac{mv^2}{2}$ to v.

3

9. A parabola has equation $y = x^2 - 8x + 19$.

   (a) Write the equation in the form $y = (x - p)^2 + q$. **2**

   (b) Sketch the graph of $y = x^2 - 8x + 19$, showing the coordinates of the turning point and the point of intersection with the y-axis. **3**

   Total marks **5**

10. Brian and Bob visit a ski resort. Brian buys 3 full passes and 4 restricted passes. The total cost of his passes is £185.

    (a) Write down an equation to illustrate this information. **1**

    (b) Bob buys 2 full passes and 3 restricted passes.

        The total cost of his passes is £130.

        Write down an equation to illustrate this information. **1**

    (c) Find the cost of a restricted pass and the cost of a full pass. **3**

Total marks   **5**

11. Express

$$\frac{4}{x+2} - \frac{3}{x-4}, \qquad x \neq -2, \ x \neq 4$$
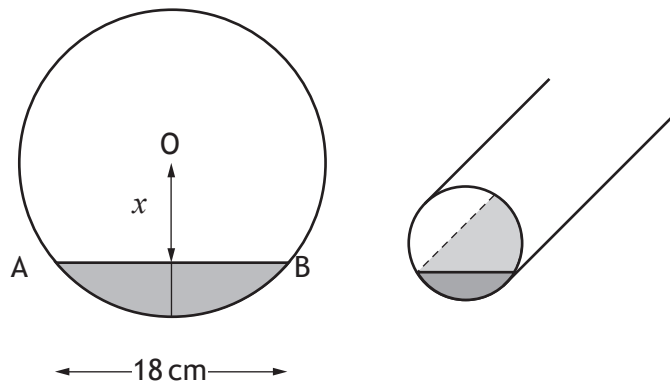
as a single fraction in its simplest form. **3**

12. A cylindrical pipe has water in it as shown.

—18 cm—

The depth of the water at the deepest point is 5 centimetres.

The width of the water surface, AB, is 18 centimetres.

The radius of the pipe is r centimetres.

The distance from the centre, O, of the pipe to the water surface is x centimetres.

(a) Write down an expression for x in terms of r. **1**

(b) Calculate r, the radius of the pipe. **3**

Total Marks 4

[END OF SPECIMEN QUESTION PAPER]