FOR OFFICIAL USE

N5

National
Qualifications
SPECIMEN ONLY

Mark

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

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.

MARKS | DO NOT WRITE IN THIS MARGIN

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 $\mathbf{u}$ and $\mathbf{v}$.

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

Calculate $|\mathbf{u} + \mathbf{v}|$, the magnitude of the resultant force.

Express your answer as a surd in its simplest form. **3**

MARKS | DO NOT WRITE IN THIS MARGIN

4. Solve the equation

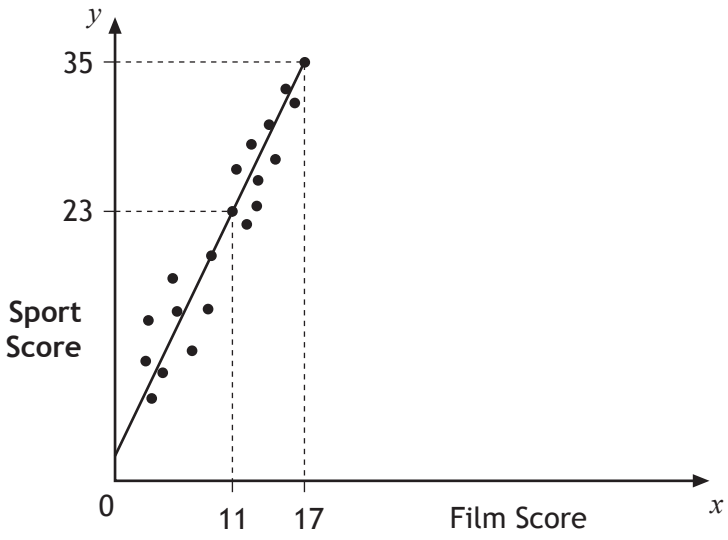
$$2x^2 + 7x - 15 = 0.$$ **3**

5. Express $\frac{4}{\sqrt{6}}$ with a rational denominator in its simplest form. **2**

MARKS | DO NOT WRITE IN THIS MARGIN

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**

MARKS | DO NOT WRITE IN THIS MARGIN

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**

MARKS | DO NOT WRITE IN THIS MARGIN

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**

MARKS | DO NOT WRITE IN THIS MARGIN

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**

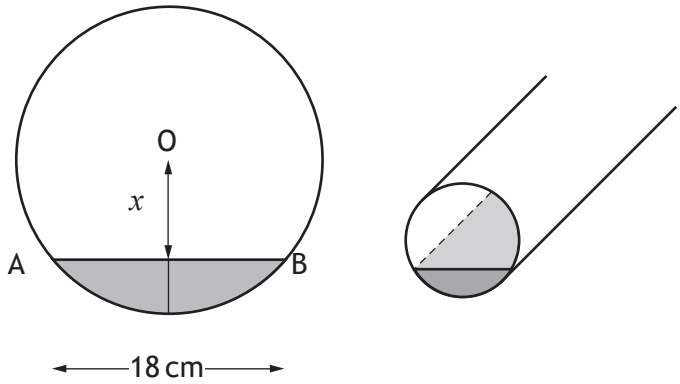
11. Express

$$\frac{4}{x+2} - \frac{3}{x-4}, \qquad x \neq -2,\ x \neq 4$$

as a single fraction in its simplest form. **3**

MARKS | DO NOT WRITE IN THIS MARGIN

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



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]

ADDITIONAL SPACE FOR ANSWERS

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