



Rewarding Learning

General Certificate of Secondary Education
2025

Centre Number

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Candidate Number

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Mathematics

Unit M8 Paper 1
(Non-Calculator)

Higher Tier

[GMC81]



GMC81

WEDNESDAY 4 JUNE, 9.15am – 10.30am

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page, on blank pages or tracing paper.

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing or sketching should be completed using an HB pencil.

All working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

You **must not** use a calculator for this paper.

Answer **all fourteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a ruler, compasses and a protractor.

The Formula Sheet is on page 2.

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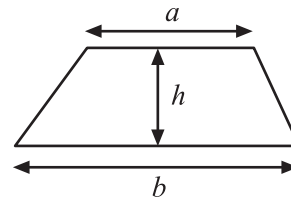
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Formula Sheet

Volume of prism = area of cross section \times length



Area of trapezium = $\frac{1}{2}(a+b)h$



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

Surface area of sphere = $4\pi r^2$

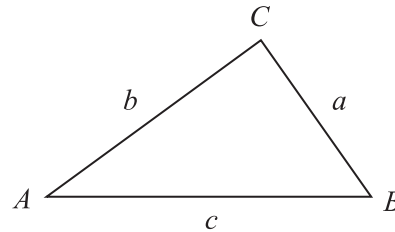


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

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



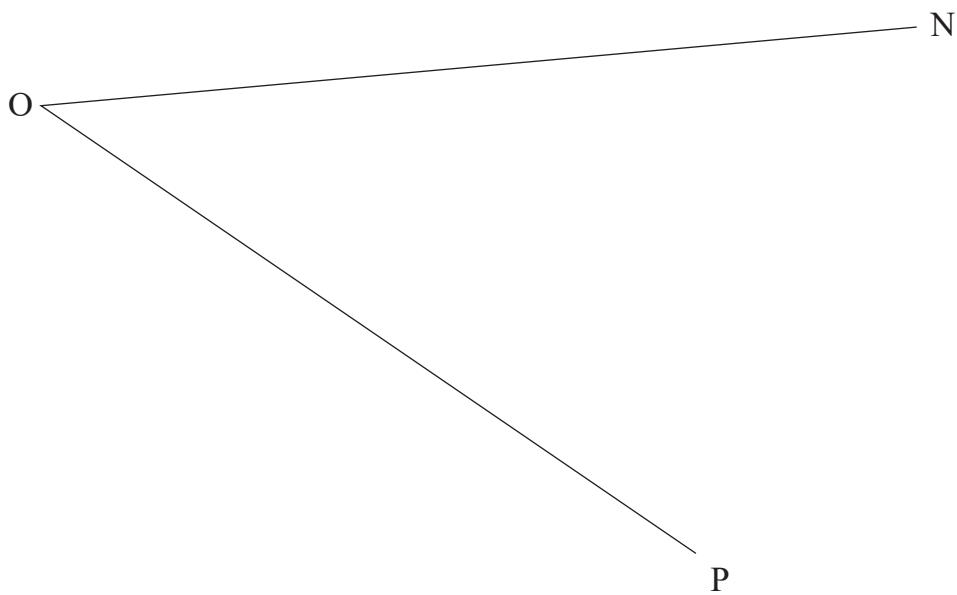
1 The exterior angle of a regular polygon is 9°

How many sides has the polygon?

Answer _____ [2]

2 Using a ruler and compasses only, construct the bisector of the angle NOP below.

Do not rub out your construction arcs.



[2]

[Turn over



3 Jacqui and Gil each flip a coin a number of times.

Jacqui says, "The coin was 'Heads' 6 times out of 13, so I think it is a fair coin."

Gil says, "The coin was 'Heads' 15 times out of 32, so I think it is a fair coin."

Whose conclusion is more reliable?

Explain your answer clearly.

Answer _____ because _____
_____ [2]



4 (a) Write the binary number 10111 as a decimal number.

Answer _____ [1]

(b) Write the decimal number 34 as a binary number.

Answer _____ [1]

[Turn over



5 A parallelogram is enlarged by scale factor 5

- (a) How many times bigger is the perimeter of the enlargement than the perimeter of the original?

Answer _____ [1]

- (b) How many times bigger is the area of the enlargement than the area of the original?

Answer _____ [1]



6 Given that

$$2x + 3y = 10$$

$$5x - 2y = 44$$

work out the value of $9x + 5y$

A solution by trial and improvement will not be accepted.

Answer _____ [5]

[Turn over



7 The volume of water in a reservoir was 9×10^8 cubic metres.

The volume increased by 30%

Work out the new volume.

Give your answer in **standard form**.

Answer _____ cubic metres [3]



8 Write down the value of

(a) 3^0

Answer _____ [1]

(b) 5^{-1}

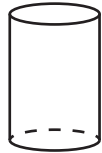
Answer _____ [1]

(c) 10^{-3}

Answer _____ [1]



9



A



B

A and B are similar shapes.

The ratio of the surface area of A to the surface area of B is 1 : 9

(a) What is the ratio of the height of A to the height of B?

Answer _____ [1]

(b) What is the ratio of the volume of A to the volume of B?

Answer _____ [1]



10 y is inversely proportional to the square of $(x - 1)$

$$y = 5 \text{ when } x = 3$$

Work out the values of x when $y = 80$

Answer $x =$ _____ or _____ [6]

[Turn over



11 Solve the equation $x\sqrt{50} - x\sqrt{2} = 5$

Give your answer as a surd with a rationalised denominator.

Answer _____ [5]



12 Work out the value of $0.8\dot{1} - 0.\dot{5}$ as a fraction in its lowest terms.

Answer _____ [4]

[Turn over



13 A circle has centre $(0, 0)$.

The equation of the tangent to the circle at the point P is $y = 3x + 20$

(a) Find the equation of the radius OP.

Answer _____ [2]



(b) Find the coordinates of the point P.

Answer P = (_____ , _____) [3]

(c) Hence find the equation of the circle.

Answer _____ [1]

[Turn over



$$14 \quad A = (3 - \sqrt{2})(5 + \sqrt{3}) - (3\sqrt{3} - 5\sqrt{2})$$

$$B = (2 - \sqrt{27})^2 + 12\sqrt{3}$$

$$C = (\sqrt{83} + \sqrt{77})(\sqrt{83} - \sqrt{77})$$

Prove that one of A, B and C is irrational, one is prime and one is neither prime nor irrational.

[6]





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Question Number	Marks
1	
2	
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Total Marks	
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Examiner Number

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