



General Certificate of Secondary Education
November 2025

Centre Number

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Candidate Number

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Mathematics

Unit M8 Paper 1
(Non-Calculator)

Higher Tier

[GMC81]



GMC81

THURSDAY 20 NOVEMBER, 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 fifteen** 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.

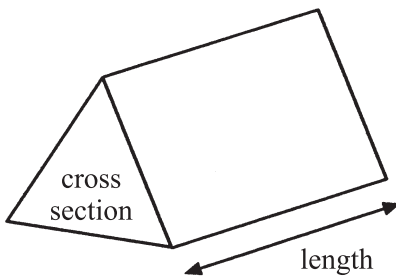
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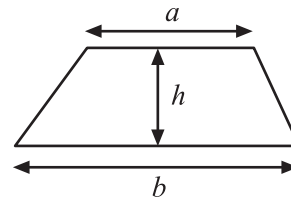
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Formula Sheet

Volume of prism = area of cross section \times length

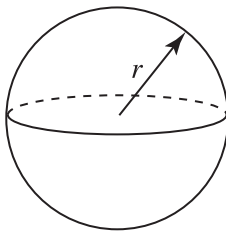


Area of trapezium = $\frac{1}{2}(a+b)h$



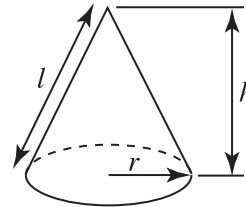
Volume of sphere = $\frac{4}{3}\pi r^3$

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

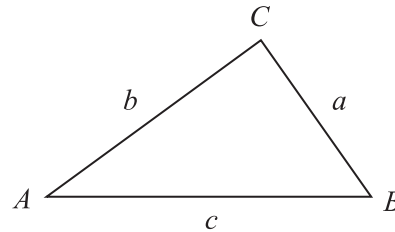


Volume of cone = $\frac{1}{3}\pi r^2 h$

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

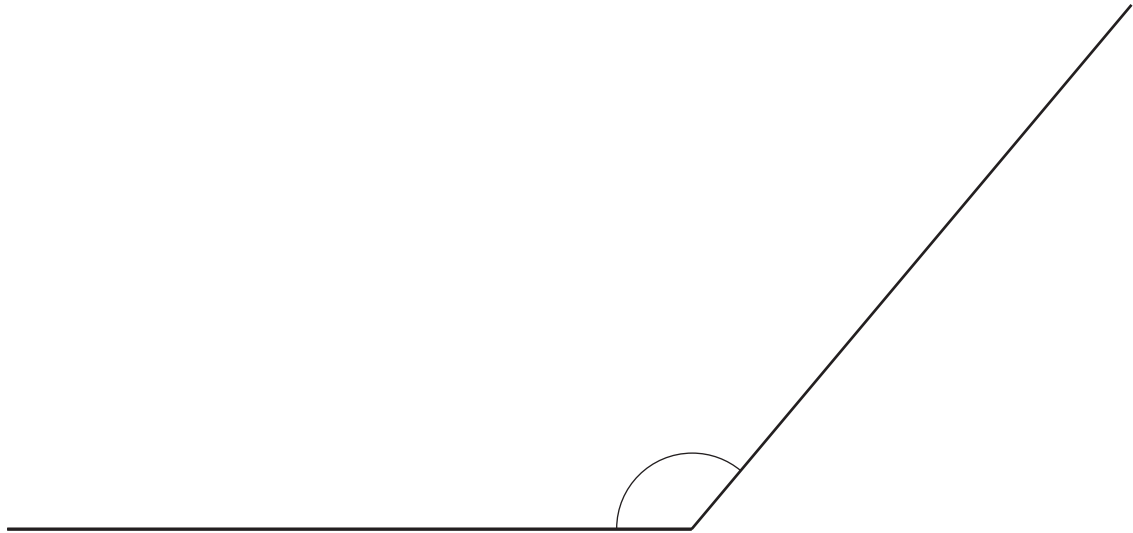
Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

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



1 Use a ruler and compasses to construct the bisector of the angle.

You must show all your construction arcs.



[2]

[Turn over



2 Jan asks some delivery drivers how much money they spend on fuel each week.

The results are shown below.

Amount, £A	Frequency
$0 < A \leq 40$	12
$40 < A \leq 80$	18
$80 < A \leq 120$	26
$120 < A \leq 160$	27
$160 < A \leq 200$	17

There are 2000 delivery drivers in the area.

Estimate how many delivery drivers in the area spend over £160 on fuel each week.

Show your working out clearly.

Answer _____ [2]



3 A college has 270 students.

120 of the students are male.

The probability that a male student plays sport is $\frac{7}{20}$

The probability that a female student plays sport is 0.4

What **fraction** of the students who play sport are male?

Answer _____ [4]

[Turn over



4 (a) Explain why 105001 is not a binary number.

Answer _____ [1]

(b) Write the number 23 as a binary number.

Answer _____ [1]

(c) Jim says that the binary number 110001 is a square number when it is changed into a decimal number.

Is Jim correct?

Show your working out clearly.

Answer _____ because _____ [2]



5 The first 6 terms in sequence P are

3, 5, 7, 9, 11, 13, ...

The first 6 terms in sequence Q are

1, 5, 9, 13, 17, 21, ...

Joanne adds the first term of sequence P to the first term of sequence Q.

She adds the second term of sequence P to the second term of sequence Q.

She continues in this way to produce a new sequence.

(a) Write down the n th term for this new sequence.

Answer _____ [2]

(b) Find the 20th term for this new sequence.

Answer _____ [1]

[Turn over



6 E and F are independent events.

The probability of E happening = x

The probability of F happening = y

What is the probability of E and F happening?

Circle the correct answer.

xy

$x - y$

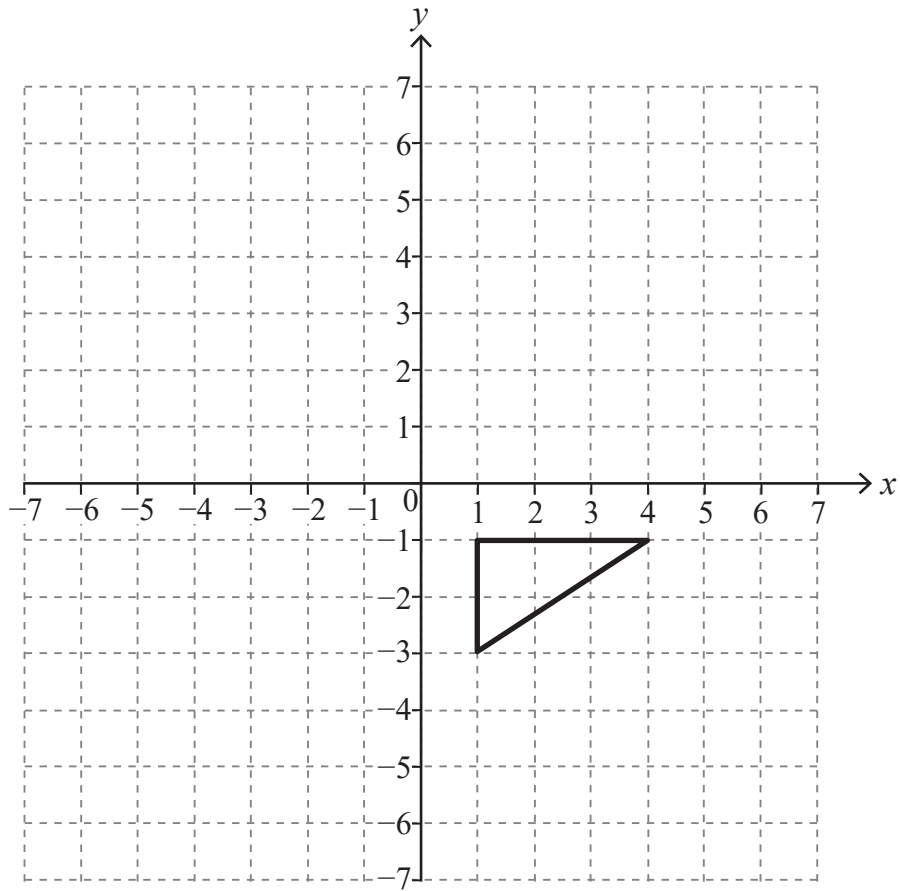
$x + y$

$1 - xy$

[1]



7 Reflect the triangle in the line $y = x$.



[2]

[Turn over



8 $A = (8 \times 10^{-5}) + (2 \times 10^2)$

$B = (8 \times 10^{-5}) \times (2 \times 10^2)$

$C = (8 \times 10^{-5}) \div (2 \times 10^2)$

Write A, B, C in order of size, beginning with the smallest.

Show your working out clearly.

Answer _____ , _____ , _____ [3]



9 Mary works in a garage and in a café.

Last week she worked 5 hours in the garage and 8 hours in the café.

She earned £155

This week she worked 4 hours in the garage and 6 hours in the café.

She earned £119

How much does she earn per hour in the garage and per hour in the café?

A solution by trial and improvement will not be accepted.

Answer Garage £ _____ per hour, Café £ _____ per hour [5]

[Turn over



10 Change $0.\dot{7}\dot{0}$ to a fraction.

Answer _____ [2]

11 (a) Simplify the expression $(2mn^4)^3$

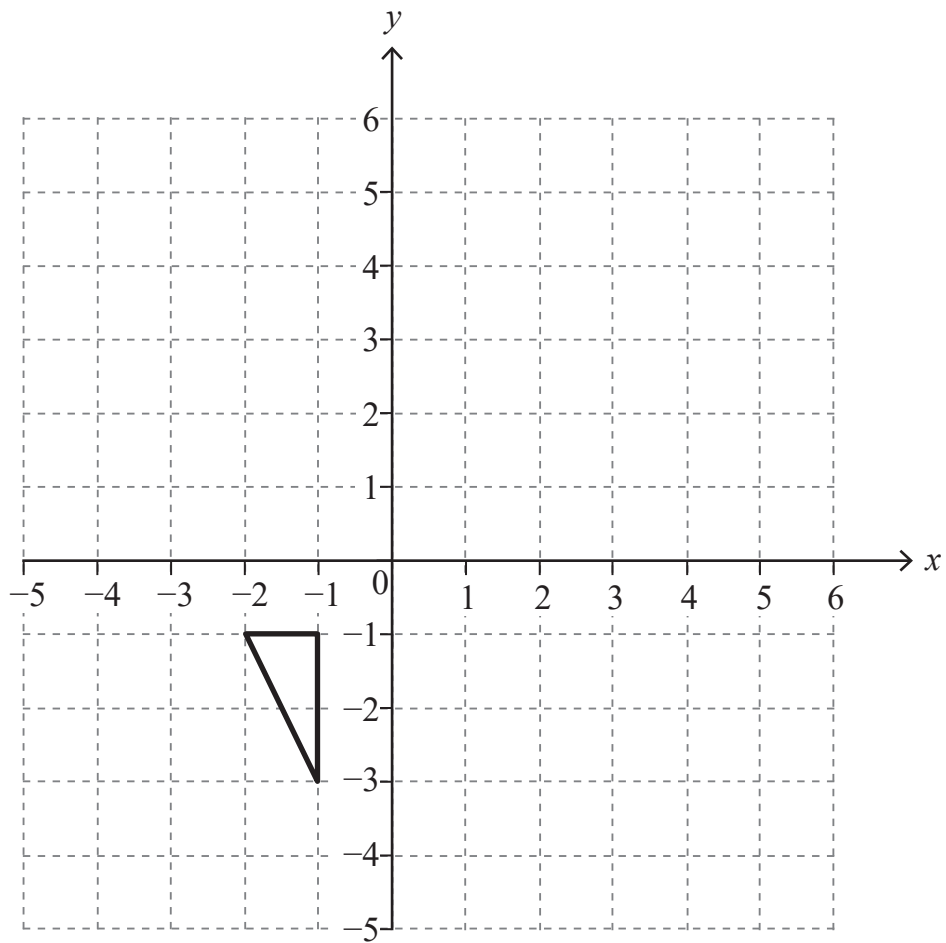
Answer _____ [2]

(b) Show that $32^{-\frac{2}{5}} = \frac{1}{4}$

[2]



12 Enlarge the triangle by scale factor -3 using centre $(0, -1)$.



[3]

[Turn over



13 T is inversely proportional to the **cube** of x .

$$T = 1000 \text{ when } x = 2$$

(a) Express T in terms of x .

Answer _____ [3]

(b) Calculate x when $T = 8$

Answer _____ [2]



14 A bag contains 8 red counters and 3 yellow counters.

Two counters are taken from the bag at random.

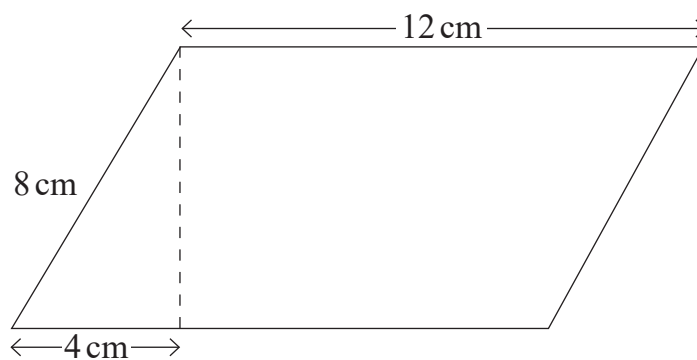
What is the probability that they are the same colour?

Answer _____ [4]

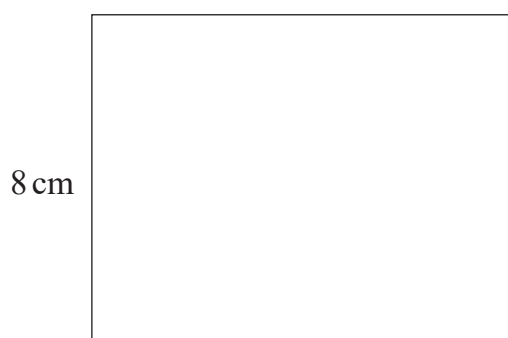
[Turn over



15



diagrams not
drawn accurately



The parallelogram and the rectangle have equal areas.

Calculate the length of the diagonal of the rectangle, giving your answer in the form $a\sqrt{b}$





Answer _____ cm [6]

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Question Number	Marks
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Total Marks	
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Examiner Number

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