



Rewarding Learning

General Certificate of Secondary Education

Centre Number

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Candidate Number

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Mathematics

Unit M8 Paper 1
(Non-Calculator)

Higher Tier



[GMC81]
Assessment

GMC81

TIME

1 hour 15 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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.**

Answer **all sixteen** questions.

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

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

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.

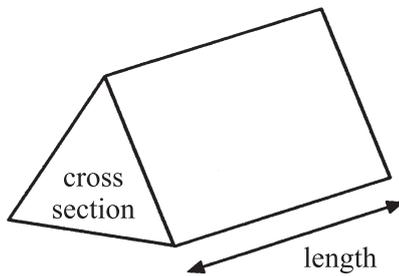
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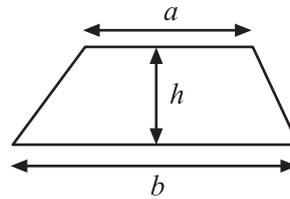
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Formula Sheet

Volume of prism = area of cross section \times length

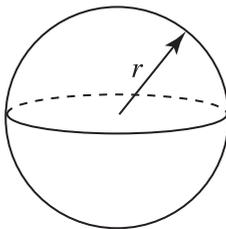


Area of trapezium = $\frac{1}{2}(a+b)h$



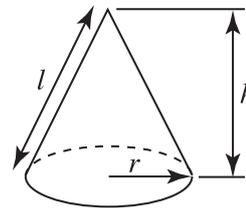
Volume of sphere = $\frac{4}{3}\pi r^3$

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

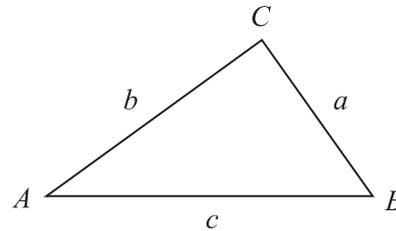


Volume of cone = $\frac{1}{3}\pi r^2 h$

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 Simplify each of the following.

(a) $4p^3 \times 3p^4$

Answer _____ [1]

(b) $(q^2)^3 \div q^8$

Answer _____ [1]

2 Find the n th term of the sequence

7, 4, 1, -2,

Answer n th term = _____ [2]

[Turn over



3 Tony tests a six-sided dice which he thinks is biased towards the even numbers.

He carries out an experiment by rolling the dice.

He records the results as E (even) or O (odd).

E O E O E E O E E O E O

(a) What is the relative frequency of an even number?

Answer _____ [1]

(b) How could Tony improve the experiment?

Answer _____ [1]

4 Make y the subject of

$$3y - 12 = 4x$$

Answer $y =$ _____ [2]



5 A rectangle has a length of $3x$ cm and a width of $(x + 5)$ cm.

The length is greater than the width.

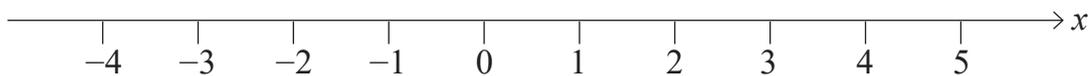
(a) Write this information as an inequality in x .

Answer _____ [1]

(b) (i) Solve the inequality.

Answer _____ [1]

(ii) Show your answer on the number line below.

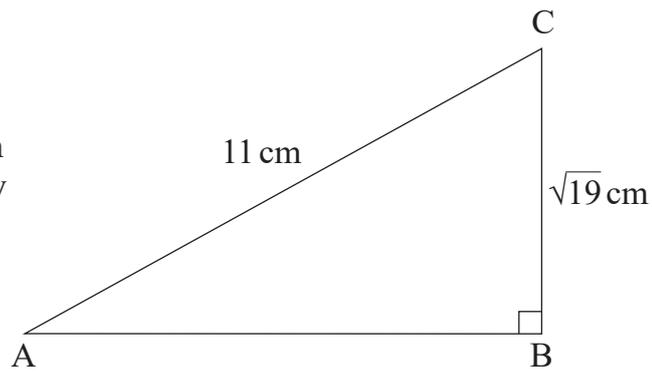


[1]



6

diagram
not drawn
accurately



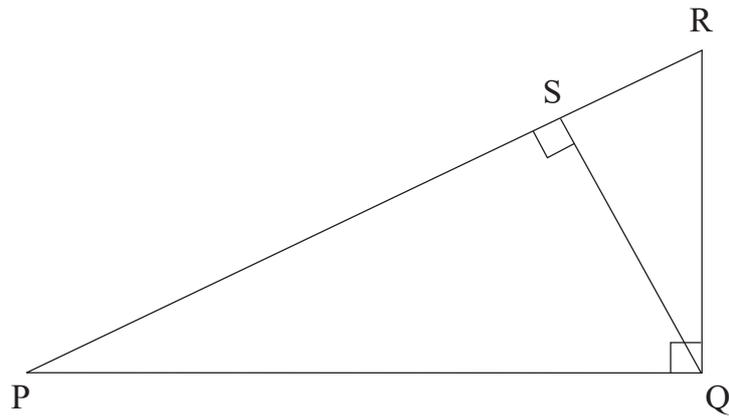
ABC is a right-angled triangle.

Work out the length of AB, giving your answer as a surd.

Answer _____ cm [3]



7



PQR is a right-angled triangle and QS is the perpendicular line from Q to PR.

Prove that the triangles PQR and QSR are similar.

[3]

[Turn over



Special Menu

Two Courses (starter and main
or main and dessert) £15.95

Starters

Soup of the Day
Caesar Salad
Baked Brie
Bruschetta

Mains

Fish of the Day
Chicken Kiev
Pork Medallions
Ribeye Steak (£3 supplement)
Spaghetti Bolognese

Desserts

Cheesecake
Apple Pie
Ice Cream

A restaurant has the above Special Menu available.

How many different ways are there of choosing two courses (starter and main or main and dessert)?

Answer _____ [3]



9 Re-arrange the formula to make r the subject.

$$V = \frac{4}{3}\pi r^3$$

Answer _____ [2]

10 The height of a balloon, h , varies directly as the square root of its surface area, A .

When the balloon's surface area is 81 its height is 12

What is its height when its surface area is 144?

Answer _____ [3]

[Turn over



11 Change $0.0171717\dots$ into a fraction.

Answer _____ [2]

12 P is a point on the circle $x^2 + y^2 = 169$

P also lies on the line $y = 12$

(a) Show that the radius to P has gradient $\pm \frac{12}{5}$

[3]



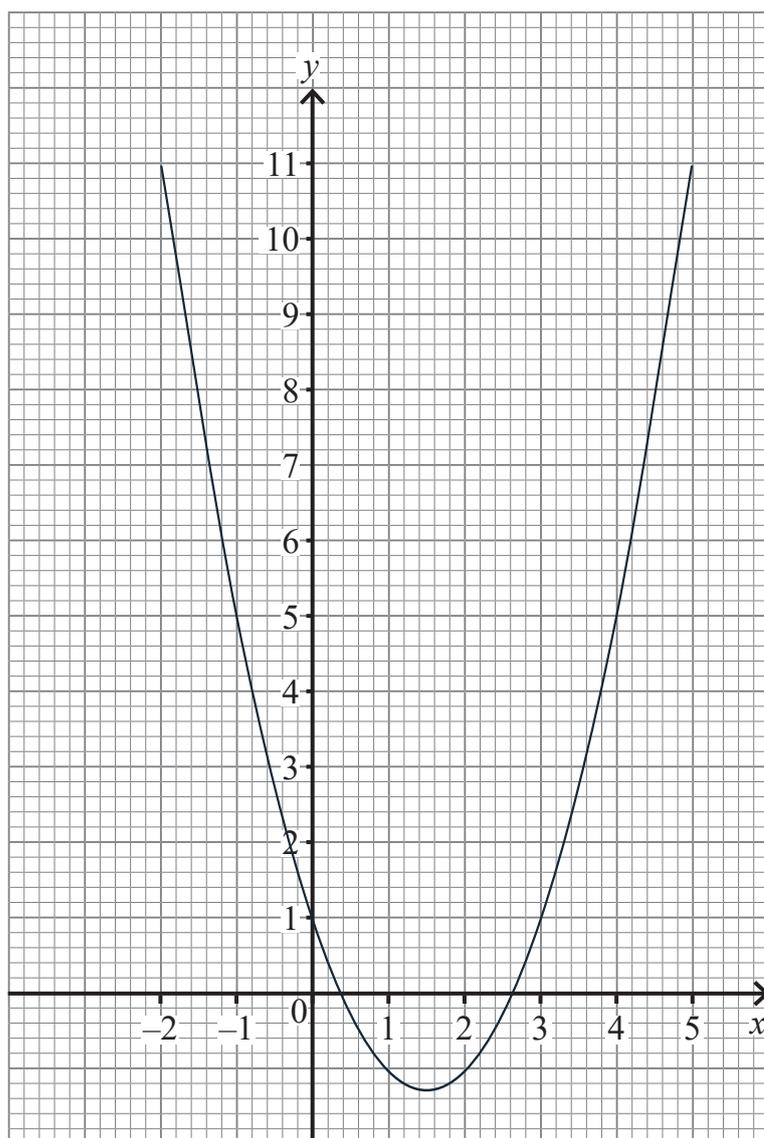
(b) Hence find the two possible equations for the tangent at P.

Answer _____, _____ [3]

[Turn over



13 On the grid is drawn the graph of $y = x^2 - 3x + 1$



By drawing appropriate lines, use this graph to

(a) find the gradient of the curve at the point $(2, -1)$

Answer _____ [2]

(b) solve $x^2 - 3x - 3 = 0$

Answer $x =$ _____ [2]

(c) solve $x^2 - 4x - 1 = 0$

Answer $x =$ _____ [3]

[Turn over



14 Work out

$$\frac{4}{\sqrt{3}} + \frac{\sqrt{3}(\sqrt{27} - 8)}{6}$$

Answer _____ [4]

15 Simplify

$$\frac{(25)^{-\frac{1}{2}}}{32^{0.2} + 6^0}$$

Answer _____ [3]

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16 In each case decide if x , y or z is rational or irrational, giving a reason for your answer.

(a) x is the radius of a circle of circumference 12π

Answer x is _____ because _____ [1]

(b) y is the radius of a circle of area $9\pi^2$

Answer y is _____ because _____ [1]

(c) z is the radius of a circle of area 8π

Answer z is _____ because _____ [1]



THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	Marks
1	
2	
3	
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11	
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13	
14	
15	
16	

Total Marks	
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Examiner Number

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