Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2020

Mathematics

Unit M8 Paper 2
(With calculator)
Higher Tier

[GMC82]

GMC82

WEDNESDAY 15 JANUARY, 10.45am–12 noon

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.**
Answer **all fourteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** 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 calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

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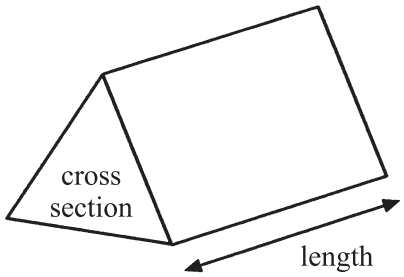
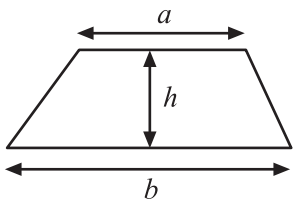
Formula Sheet

Volume of prism = area of cross section × length

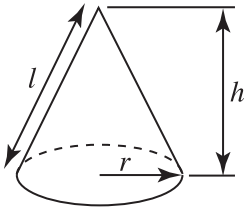


Area of trapezium = $\frac{1}{2}(a+b)h$



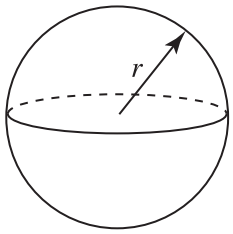
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl

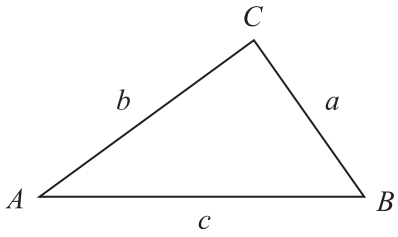


Volume of sphere = $\frac{4}{3}\pi r^3$

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



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 = $\frac{1}{2}ab\sin C$

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1 The equation $x^3 + 3x = 25$ has a solution between 2 and 3

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show **all** your working.

x	$x^3 + 3x$	

Answer _____ [3]

[Turn over

2 The first four terms of a sequence are

2 7 12 17

Write down an expression for the n^{th} term of the sequence.

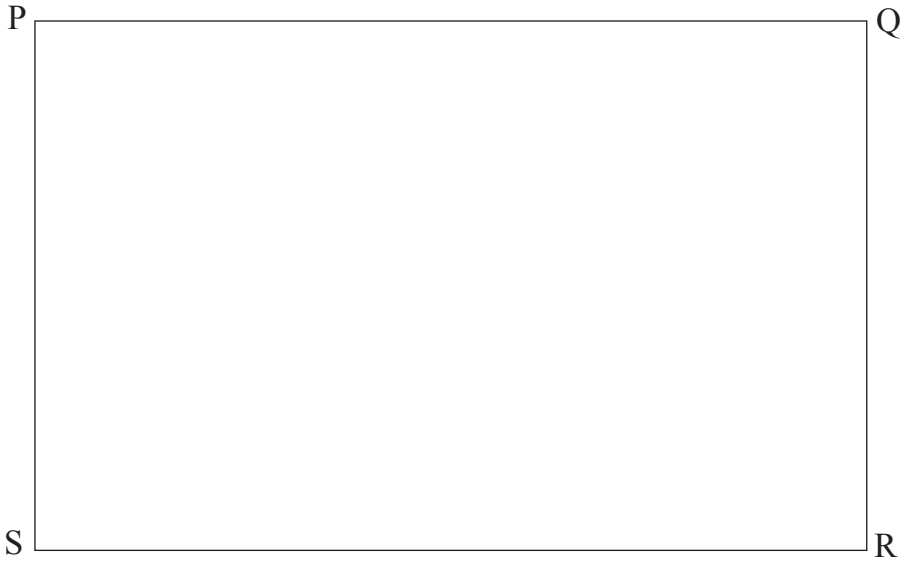
Answer _____ [2]

3 PQRS is a rectangle.

Shade the region inside the rectangle which is

more than 5 cm from P

and more than 3 cm from the line QR.



[3]

4 A survey is carried out to find out the number of electric cars on the road.

One hundred cars are surveyed each day for four days.

The results are recorded in the following table along with the relative frequencies so far.

Day	Number of cars surveyed	Number of electric cars	Relative frequency
1	100	11	0.11
2	100	12	0.115
3	100	16	0.13
4	100	9	

(a) Work out the missing relative frequency and record it in the table. [1]

(b) What would be the best estimate for the probability that a car chosen at random is electric?

Answer _____ [1]

(c) There are 15 000 cars on the road.

How many would you expect to be electric?

Answer _____ [1]

5 Write the following in standard form.

(a) 0.00000385

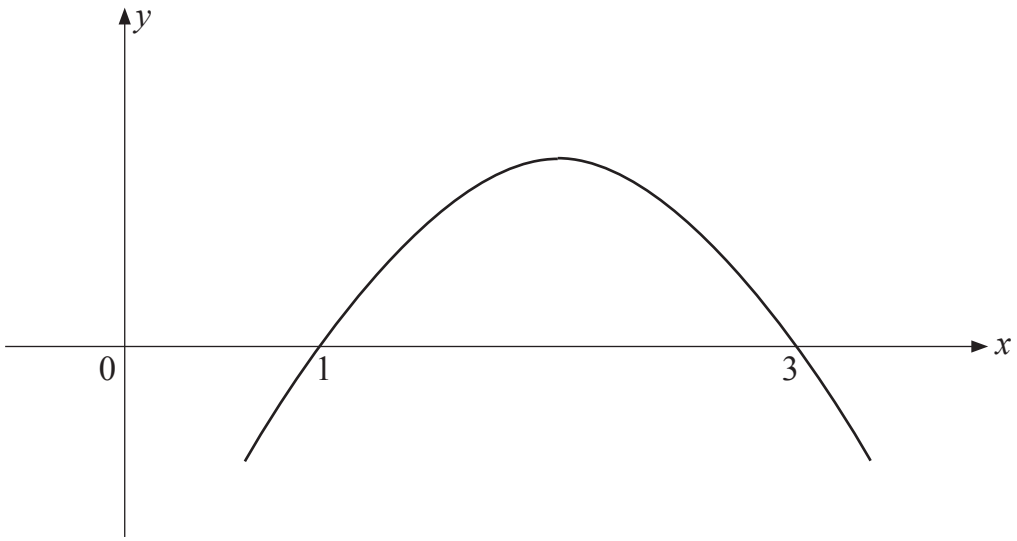
Answer _____ [1]

(b) 167×10^{-9}

Answer _____ [1]

[Turn over

6



The sketch above shows part of the graph of the quadratic function $y = -x^2 + 4x - 3$

(a) Write down the coordinates of the point where the graph will cross the y-axis.

Answer _____ [1]

(b) Work out the coordinates of the highest point on the graph.

Answer _____ [1]

7 A model of a building site is to be made.

The length of the building site is 100 times the length of the model.

How many times larger is the area of the building site than the area of the model?

Answer _____ [1]

8 Simplify the expressions

(a) $(4x^5 y^3)(3x^2 y^2)$

Answer _____ [2]

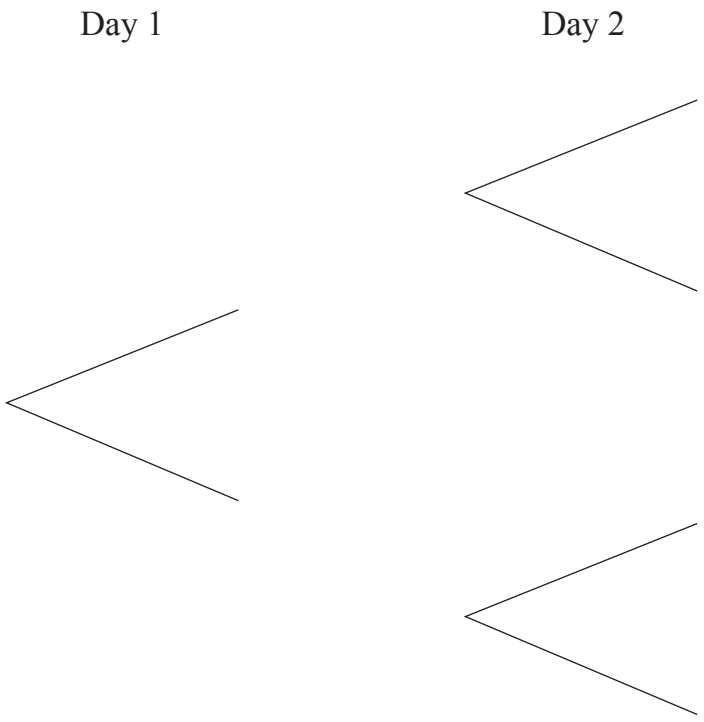
(b) $(2pq^2)^3$

Answer _____ [2]

[Turn over

9 The probability that Jack takes a packed lunch to school on any given day is $\frac{3}{8}$

(a) Complete the tree diagram to show this information for two days.



[2]

(b) What is the probability that Jack takes a packed lunch to school on only one of the two days?

Answer _____ [2]

10 There are two types of ticket available for a concert, seated and standing.

Julie buys three seated tickets and one standing ticket for £82

Gemma buys five seated tickets and four standing tickets for £174

Work out the cost of each type of ticket.

A solution by trial and improvement will not be accepted.

Answer Seated tickets cost £ _____ each

Standing tickets cost £ _____ each [4]

[Turn over

11

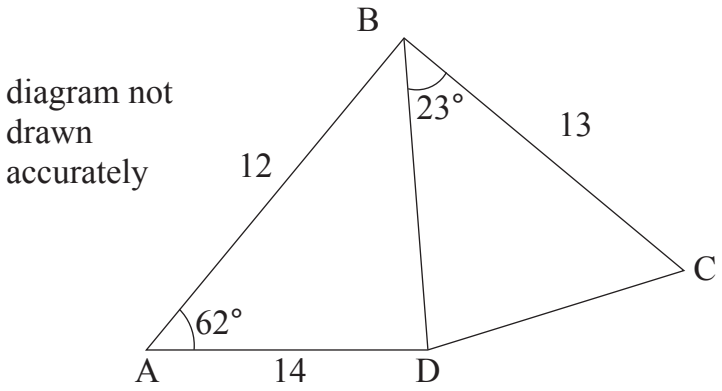


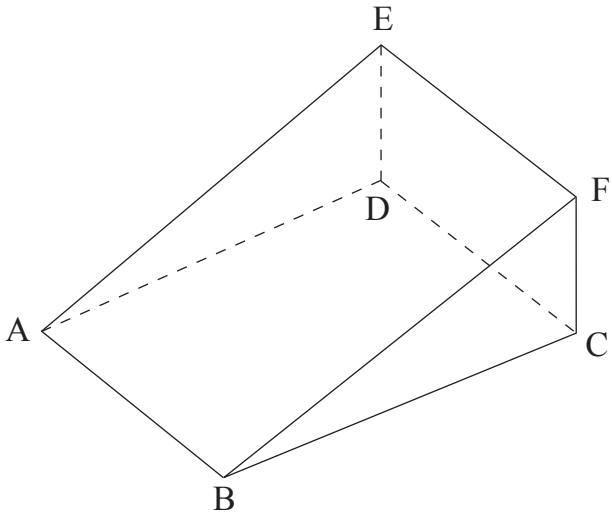
diagram not drawn accurately

AB = 12 cm, AD = 14 cm and BC = 13 cm.

Calculate the area of the triangle BCD.

Answer _____ cm^2 [5]

12



ABCDEF is a triangular prism with ABCD a horizontal rectangle and CDEF a vertical rectangle.

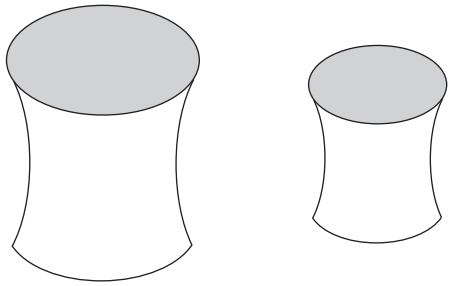
AB = 20 cm, BC = 28 cm and CF = 14 cm.

Calculate the difference in size of the angles of elevation EAD and EBD.

Answer _____° [6]

[Turn over

13



Two vases are of similar shape.

The surface area of the small one is $\frac{16}{25}$ of the surface area of the large one.

The small vase has volume 320 ml.

Calculate the volume of the large vase.

Answer _____ ml [4]

14 y varies inversely as x.

When $x = 12$, $y = 10$

Find the values of x when $y = x + 7$

Answer _____ [7]

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	
4	
5	
6	
7	
8	
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10	
11	
12	
13	
14	
Total Marks	

Examiner Number