

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS B (MEI)**  
Paper 3 Section B (Higher Tier)

**B293B**

Candidates answer on the Question Paper

**OCR Supplied Materials:**  
None

- Other Materials Required:**
- Geometrical instruments
  - Scientific or graphical calculator
  - Tracing paper (optional)

**Tuesday 12 January 2010**  
**Morning**

**Duration: 45 minutes**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

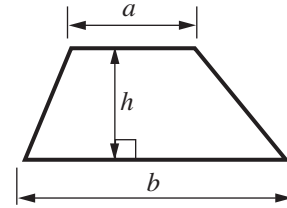
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

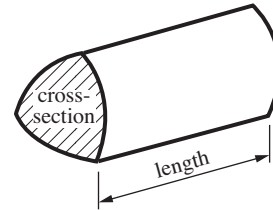
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 8.
- You are expected to use a calculator for this section of the paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

## Formulae Sheet: Higher Tier

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



**Volume of prism** = (area of cross-section)  $\times$  length

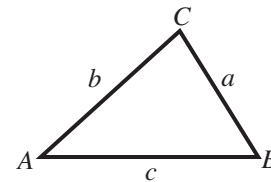


**In any triangle  $ABC$**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

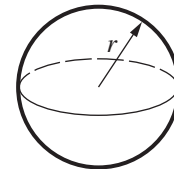
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



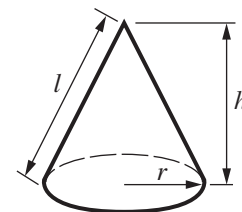
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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



**The Quadratic Equation**

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

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

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8 Mike drove down the motorway at a steady speed of 70 mph for 3 hours.

(a) Work out the distance Mike travelled in 3 hours.

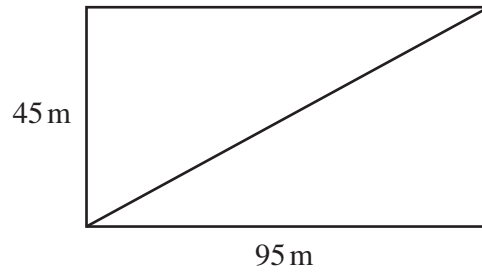
(a) ..... miles [1]

He then took another 2 hours to cover a further 40 miles.

(b) Calculate his average speed for the whole journey.

(b) ..... mph [2]

- 9 A rectangular garden measures 95 m by 45 m.  
A path lies on a diagonal of the rectangle.

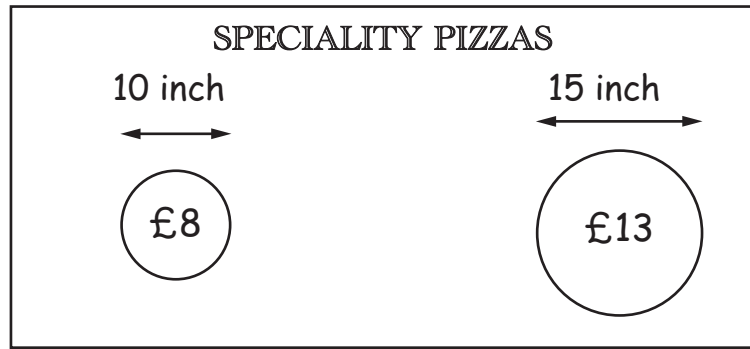


**Not to scale**

Calculate the length of the path.

..... m [3]

10 Tony and Gordon compared pizzas.



Tony said, "The diameter of the big pizza is half as much again; it should only cost £12."

Gordon said, "No, the area of the big pizza is more than twice as much; it is very good value."

Write down calculations to show that Gordon is right.

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..... [4]

- 11 The table summarises the attendances at the home matches of a local football club.

Attendance ( $n$ )	Number of matches	Midpoint
$500 \leq n < 1000$	2	750
$1000 \leq n < 1500$	4	
$1500 \leq n < 2000$	5	
$2000 \leq n < 2500$	4	
$2500 \leq n < 3000$	3	

Calculate an estimate of the mean attendance.

..... [3]

- 12 Last year George received a pension of £150.15 per week.  
This year his pension has increased to £157.05.

Calculate the percentage increase, correct to one decimal place.

.....% [3]

- 13** The number of fish in a lake can be estimated by the ‘capture/recapture’ method. One day 20 fish were caught. They were tagged and returned to the lake. The next day 20 fish were caught, 2 of which were already tagged.

Using the information

- the probability that a fish that is caught is already tagged,
- the number of tagged fish,

estimate the number of fish originally in the lake.

..... [3]

14 Josh and his sister Julia have an Uncle Peter.

Each Christmas he gives them a sum of money to be shared in the ratio of their ages.

(a) In 2008, when Josh was 11 and Julia was 14 years old, he gave them £200 to share.

How much did each receive?

(a) Josh: £ .....

Julia: £ ..... [3]

(b) The following year Uncle Peter gave them £243 to share.

How much did they each receive in 2009?

(b) Josh: £ .....

Julia: £ ..... [3]

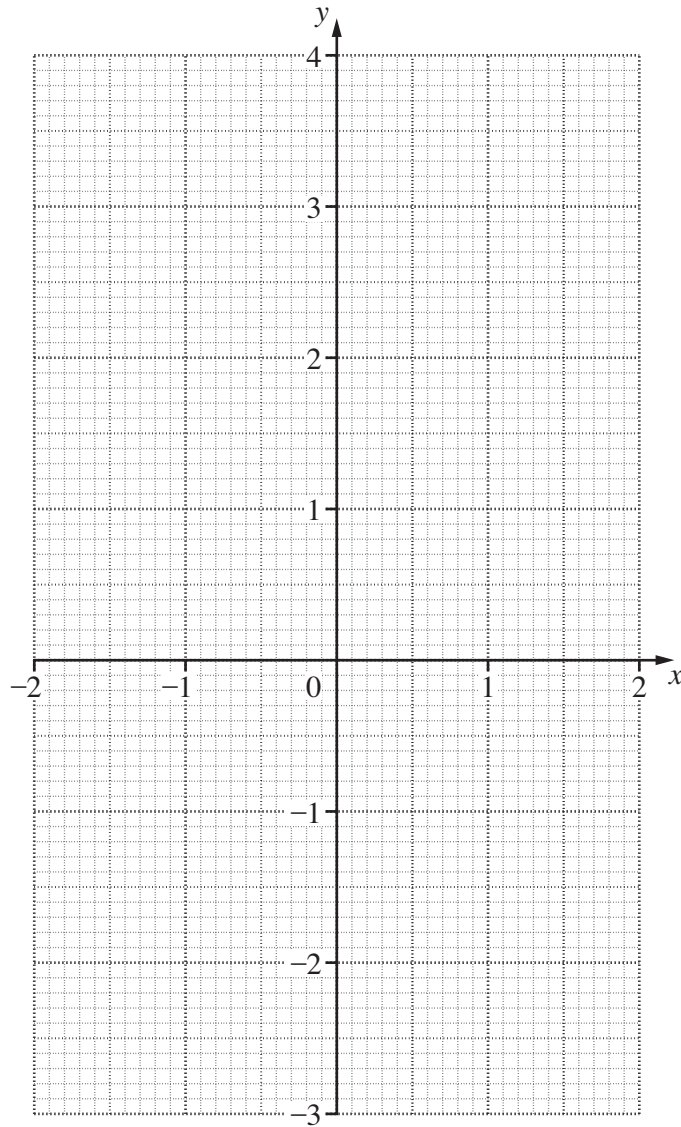


15 (a) Complete the table for  $y = x^3 - 3x + 1$ .

$x$	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
$y$	-1	2.13		2.38	1	-0.38		-0.13	

[2]

(b) Draw the graph of  $y = x^3 - 3x + 1$  for  $-2 \leq x \leq 2$ .



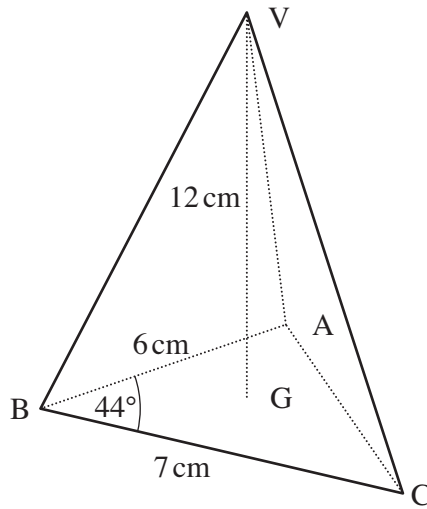
[2]

(c) Write down the roots of the equation  $x^3 - 3x + 1 = 0$ , correct to one decimal place.

(c) ..... [2]

**TURN OVER FOR QUESTION 16**

- 16 A solid ornament has the shape of a pyramid with triangular base ABC and vertex V. The perpendicular height, VG, of the ornament is 12 cm. AB = 6 cm, BC = 7 cm and angle ABC = 44°.



- (a) Find the area of the base, ABC, of the ornament.

(a) ..... cm<sup>2</sup> [2]

- (b) (i) Hence find the volume of the ornament.  
[The volume of a pyramid =  $\frac{1}{3}$  base area  $\times$  height.]

(b)(i) ..... cm<sup>3</sup> [1]

- (ii) The ornament is made of glass which has a density of 2.6 g/cm<sup>3</sup>.  
Find the mass of the ornament.

(ii) ..... g [2]

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