

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
MATHEMATICS B (MEI)**

**B293B**

Paper 3 Section B  
(Higher Tier)

Candidates answer on the question paper

**OCR Supplied Materials:**  
None

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

**Monday 18 May 2009  
Afternoon**

**Duration: 45 minutes**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**MODIFIED LANGUAGE**

**INSTRUCTIONS TO CANDIDATES**

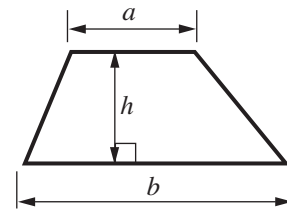
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show **all** your working. 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**

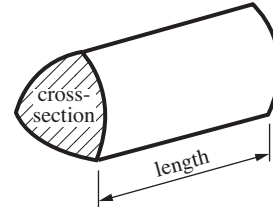
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 10.
- You are expected to use a calculator in Section B of this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **36**.
- This document consists of **8** 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

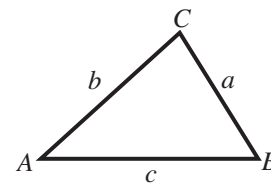


**In any triangle ABC**

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

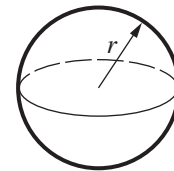
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



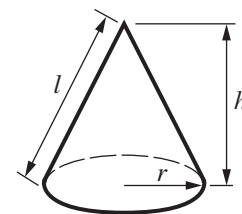
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**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

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

**PLEASE DO NOT WRITE ON THIS PAGE**

10 There are 190 students in a year group at a school.  
They all go on an outing by coach. 12 teachers are with them.

(a) Each coach can take 39 passengers.

How many coaches are needed to take all the students and teachers on the outing?

(a) ..... [3]

(b) Each coach costs £350 to hire for the outing.  
The teachers do not pay anything.

How much should each student pay to just cover the cost of the coaches?

(b) £ ..... [3]

- 11 A traffic speed camera records the speeds of all vehicles passing it at more than 40 mph. It does not record any other speeds. The table shows the data collected by the camera one afternoon.

Speed ( $v$ mph)	Frequency
$40 < v \leq 50$	102
$50 < v \leq 60$	251
$60 < v \leq 70$	82
$70 < v \leq 80$	15
Total	450

- (a) Calculate an estimate of the mean speed of these 450 vehicles.

(a) ..... mph [4]

- (b) Explain why your answer to part (a) is only an estimate.

.....  
 ..... [1]

- (c) If the speed of **all** vehicles passing the camera that afternoon had been recorded, would the mean speed be less than, the same as, or more than your answer to part (a)? Explain your reasoning.

.....  
 ..... [2]

12 (a) Solve the following.

(i)  $4(x - 3) = 14$

(a)(i) ..... [3]

(ii)  $6x - 5 < 7$

(ii) ..... [2]

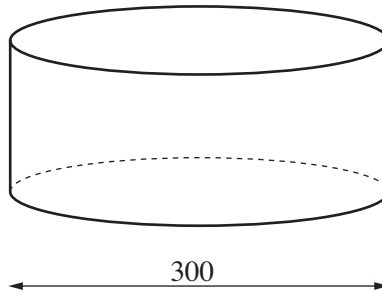
(iii)  $x^2 + 6x - 7 = 0$

(iii) ..... [3]

(b) Factorise  $3x^2 - 9xy$ .

(b) ..... [2]

- 13 A paddling pool is a cylinder with diameter of length 300 centimetres.



- (a) Find the area of the base of the paddling pool.

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

- (b) The pool is filled with water to a depth of 60 cm.

Find the volume of water in the pool.  
Give your answer in litres.

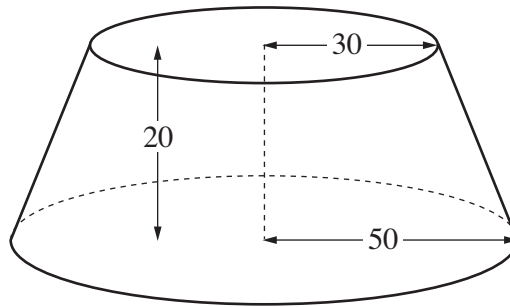
(b) ..... litres [3]

- (c) Paul places a heavy box in the water. The box is a cube with side 30 cm.

By how much will the water level rise?

(c) .....cm [4]

- 14 At a dog show each dog has to climb onto a stand.  
The stand has the shape of a frustum of a cone.  
The horizontal top and base of the frustum are circles of radius 30 cm and 50 cm respectively.  
The height is 20 cm.



Calculate the volume of the frustum.

.....cm<sup>3</sup> [4]

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