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**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

# MATHEMATICS B (MEI)

**B293B**

Paper 3 Section B
(Higher Tier)

*CUP/T61574*

Candidates answer on the question paper

**OCR Supplied Materials:**
None

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

**Friday 9 January 2009**
**Morning**

**Duration:** 45 minutes

*B293B*

| Candidate Forename | | Candidate Surname | |
|---|---|---|---|

| Centre Number | | | | | | Candidate Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

**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.

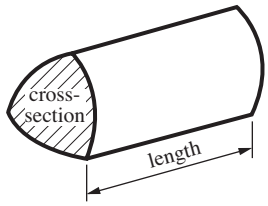
**INFORMATION FOR CANDIDATES**

- 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 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 **8** pages. Any blank pages are indicated.

| FOR EXAMINER'S USE | |
|---|---|
| SECTION B | |

# Formulae Sheet: Higher Tier

**Volume of prism** = (area of cross-section) × length

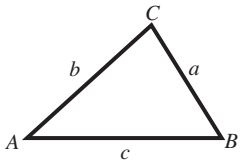



**In any triangle *ABC***

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

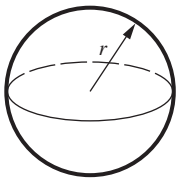
**Cosine rule** $a^2 = b^2 + c^2 - 2bc\cos A$

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



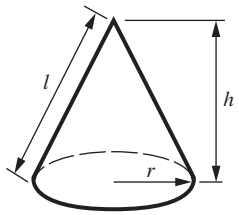

**Volume of sphere** = $\frac{4}{3}\pi r^3$

**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** **(a)** A circular table top has radius 60 cm.

Calculate its area.

**(a)** ..... $cm^2$ **[2]**

**(b)** The thickness of the table top is 3.7 cm.

Calculate its volume.

**(b)** ..... $cm^3$ **[1]**

**(c)** The density of the table top is $0.54\,g/cm^3$.

Calculate its mass.

**(c)** ..... g **[2]**

**11** Solve the equation $8x + 7 = 3x + 22$.

..... **[3]**

**12** The lengths, in metres, of 90 golf holes are summarized in the table.

| Length ($m$ metres) | Number of holes | Midpoint |
|---|---|---|
| $150 \leqslant m < 200$ | 12 | 175 |
| $200 \leqslant m < 250$ | 8 | 225 |
| $250 \leqslant m < 300$ | 0 | 275 |
| $300 \leqslant m < 350$ | 7 | 325 |
| $350 \leqslant m < 400$ | 14 | 375 |
| $400 \leqslant m < 450$ | 28 | 425 |
| $450 \leqslant m < 500$ | 21 | 475 |

Calculate an estimate of the mean of these lengths.

..... **[3]**

**13** **(a)** During 2003 the number of visits made by customers to a post office was 12 360.
In 2004 this number of visits increased by 2.5%.

How many visits were made in 2004?

**(a)** ..... **[3]**

**(b)** During 2005 the number of visits made by customers to a different post office was 26 450.
The number of visits in 2006 was 2% **less** than the number in 2005.
The number of visits in 2007 was 1.4% **more** than the number in 2006.

How many visits were made in 2007?

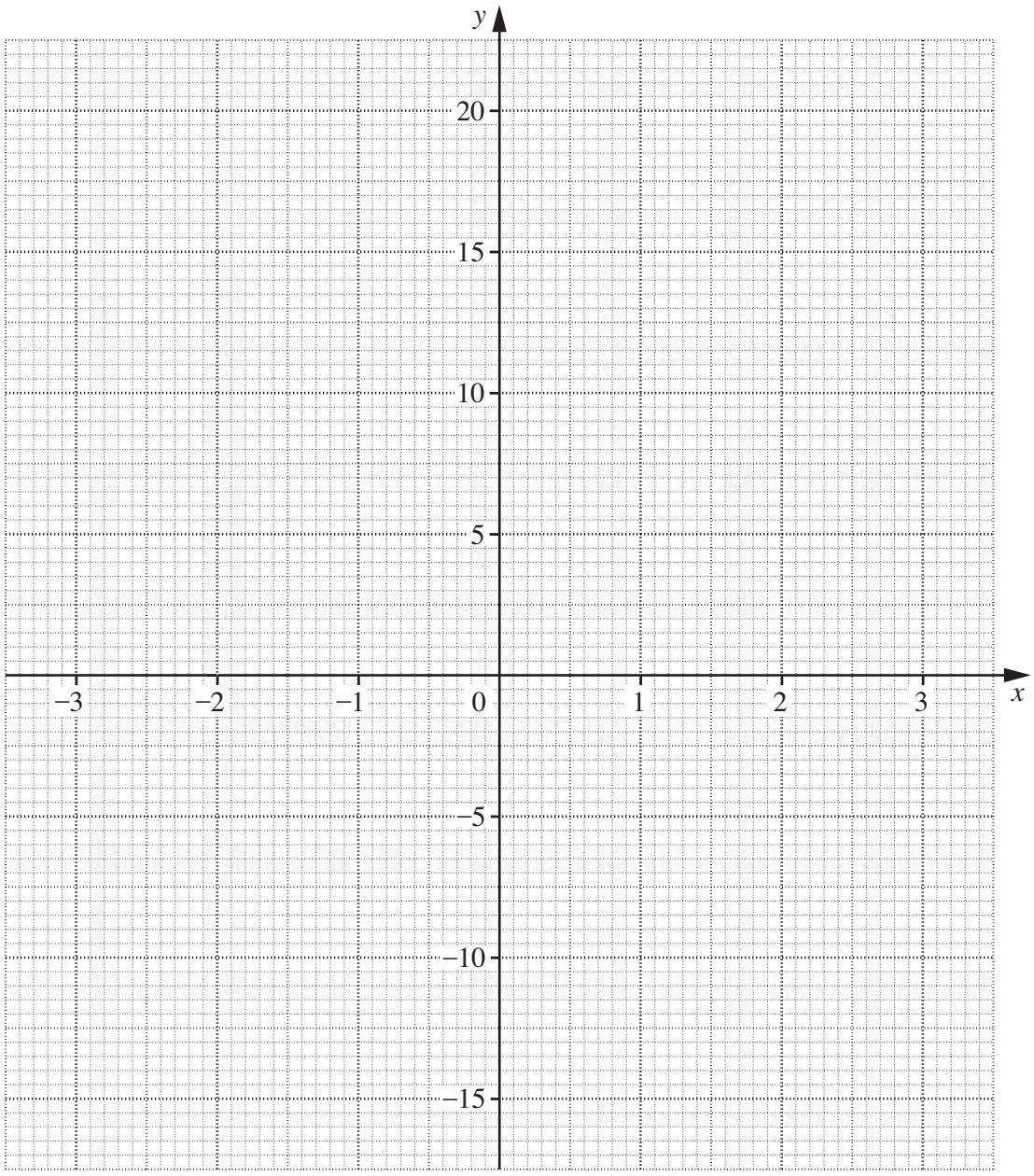
**(b)** ..... **[3]**

**14** **(a)** Complete the table of values for $y = x^3 - 4x + 2$.

| $x$ | –3 | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $y$ | –13 | 2 | | 2 | –1 | 2 | |

**[2]**

**(b)** On the grid below draw the graph of $y = x^3 - 4x + 2$. **[2]**



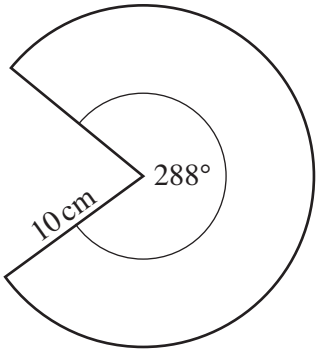

**(c)** Use your graph to solve the equation $x^3 - 4x + 2 = 0$.

**(c)** ..... **[2]**

**15** Solve the equation $x^2 + 7x + 5 = 0$.
Give your answers correct to 2 decimal places.

..... **[3]**

**16** The diagram shows a sector of a circle of radius 10 centimetres.



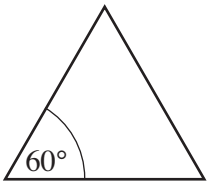

The straight edges are joined so that a hollow cone is formed.

Work out the volume of the cone.

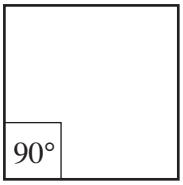
..... $cm^3$ **[6]**

**TURN OVER FOR QUESTION 17**

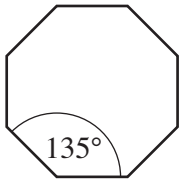
**17** Josh is investigating the interior angles of regular polygons.




3 sides




4 sides




8 sides

He says "The interior angle of a regular polygon is a whole number of degrees."

Find a rule that tells you when Josh is correct.
You must explain your reasons. **[4]**