

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**MATHEMATICS B (MEI)**

**B264B**

Paper 4 Section B  
(Higher Tier)

**Wednesday 14 January 2009**

**Afternoon**

**Duration: 1 hour**

Candidates answer on the question paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

- Geometrical instruments
- Scientific or graphical calculator
- Tracing paper (optional)



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.

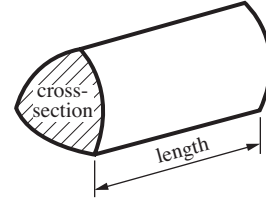
**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 11.
- 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 **50**.
- This document consists of **12** pages. Any blank pages are indicated.

<b>FOR EXAMINER'S USE</b>	
<b>SECTION B</b>	

## Formulae Sheet: Higher Tier

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

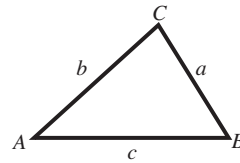


**In any triangle  $ABC$**

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

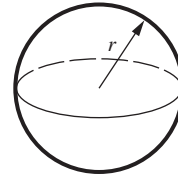
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



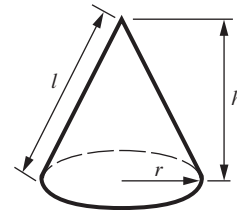
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**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**

11 Here is a list of ingredients for crumble for 6 people.

- 200 g plain flour
- 150 g soft brown sugar
- 75 g butter
- 1 teaspoon baking powder

(a) Katie is making crumble for 15 people.

How much soft brown sugar will she need?

(a) ..... g [2]

(b) Sanjay has plenty of the other ingredients but only 125 g of butter.

What is the largest number of people he can make crumble for?

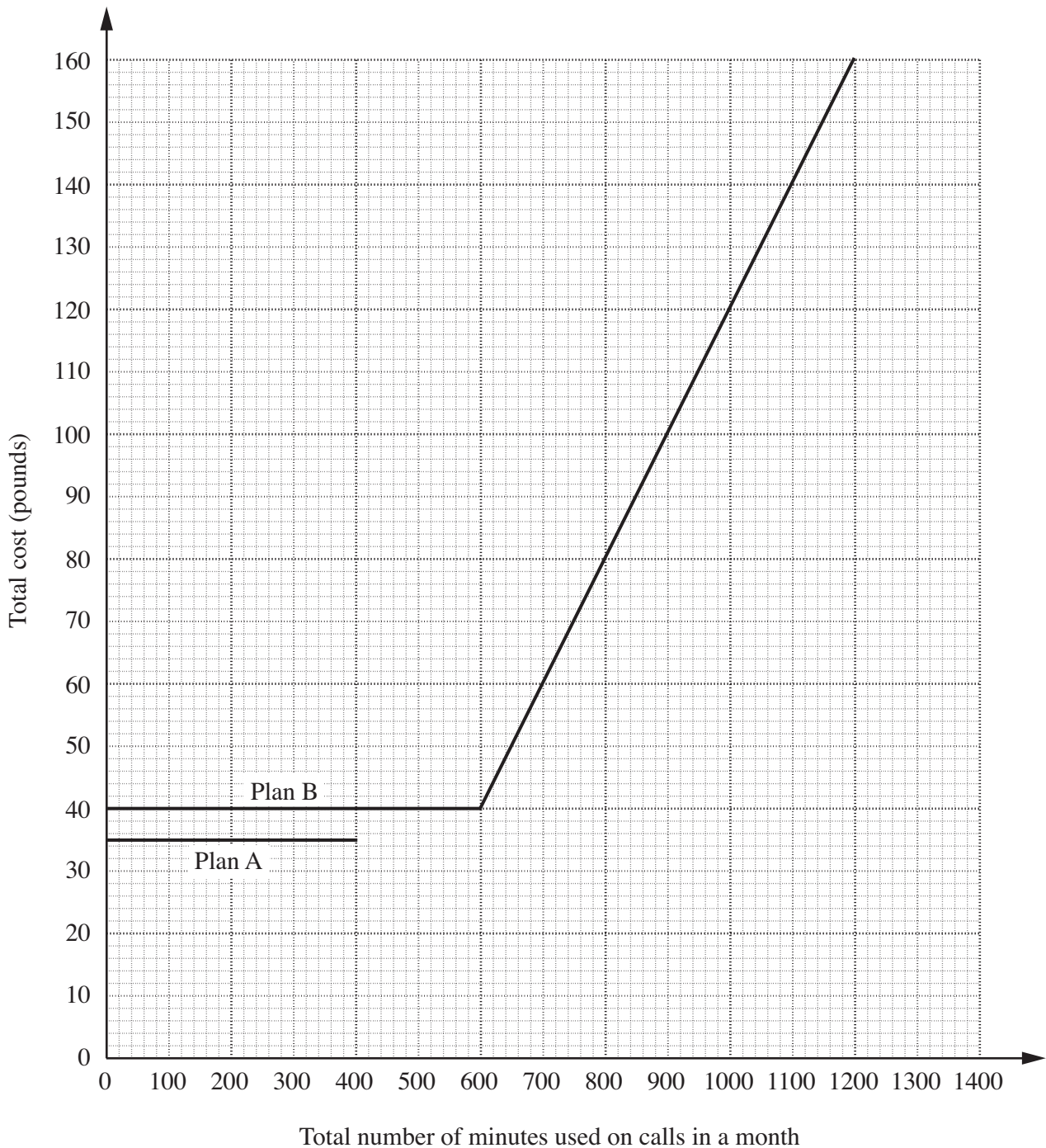
(b) ..... [2]

12 A mobile phone company offers their customers the choice of two payment plans.

	Plan A	Plan B
Monthly fee	£35	£ $F$
Amount of free talk time per month	400 minutes	600 minutes
Charge for each minute more than the free talk time	15p	20p

The total costs are to be shown on a graph.

The graph for Plan B has been completed together with part of the graph for Plan A.



(a) Write down the monthly fee for Plan B (£ $F$ ).

(a) £..... [1]

(b) Alice uses payment Plan A.

How much does it cost her if she uses her phone for a total of 1000 minutes in a month?

(b) £ ..... [1]

(c) Draw a line on the graph to show the total cost for Plan A from 400 to 1200 minutes. [2]

(d) How many minutes in a month cost the same using the two plans?

(d) ..... minutes or ..... minutes [2]

(e) Jeremy used 800 minutes in one month.

Which plan is cheaper for Jeremy, and by how much?

(e) Plan ..... by £ ..... [2]

- 13 Theo throws a die 40 times.  
The table shows his results.

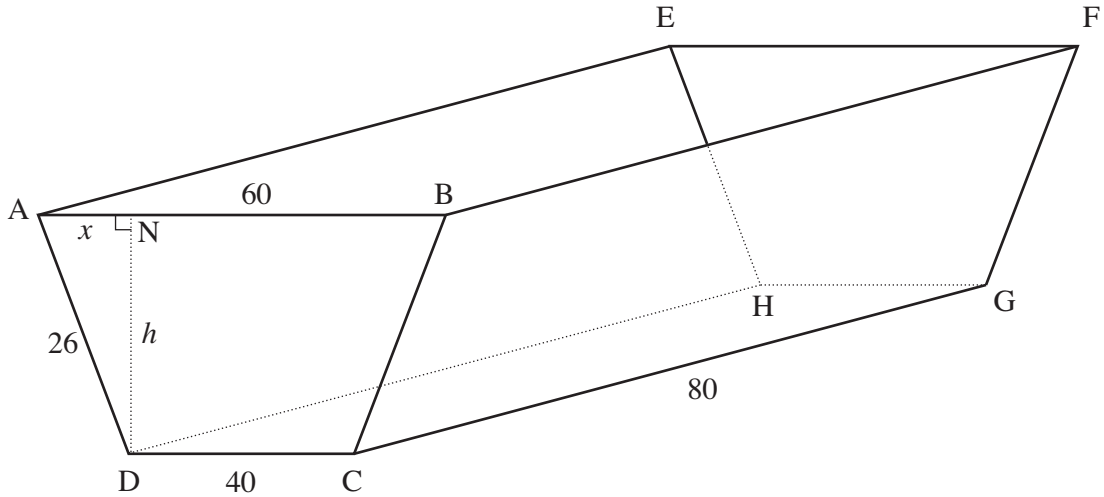
Score on die	Frequency
1	6
2	4
3	6
4	7
5	8
6	9
Total	40

- (a) Calculate the mean value of these scores.

(a) ..... [3]

- (b) From these results, is there evidence that Theo's die is biased?  
Explain your answer.

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



The diagram shows a planter.  
 It is in the shape of a prism with an isosceles trapezium as its cross-section.  
 $AB = 60\text{cm}$ ,  $DC = 40\text{cm}$ ,  $AD = BC = 26\text{cm}$  and  $CG = 80\text{cm}$ .  
 $AN = x\text{cm}$  and  $DN = h\text{cm}$ .  
 $\text{Angle } AND = 90^\circ$ .

(a) Show that  $x = 10$ .

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

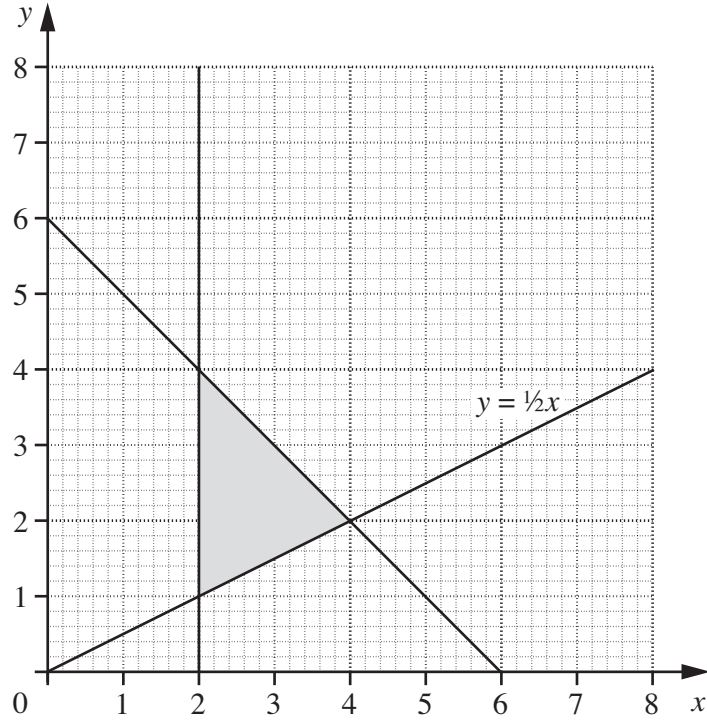
(b) Find the height,  $h\text{cm}$ , of the trapezium.

(b) .....cm [3]

(c) Find the volume of the planter.  
 Give the units of your answer.

(c) ..... [4]

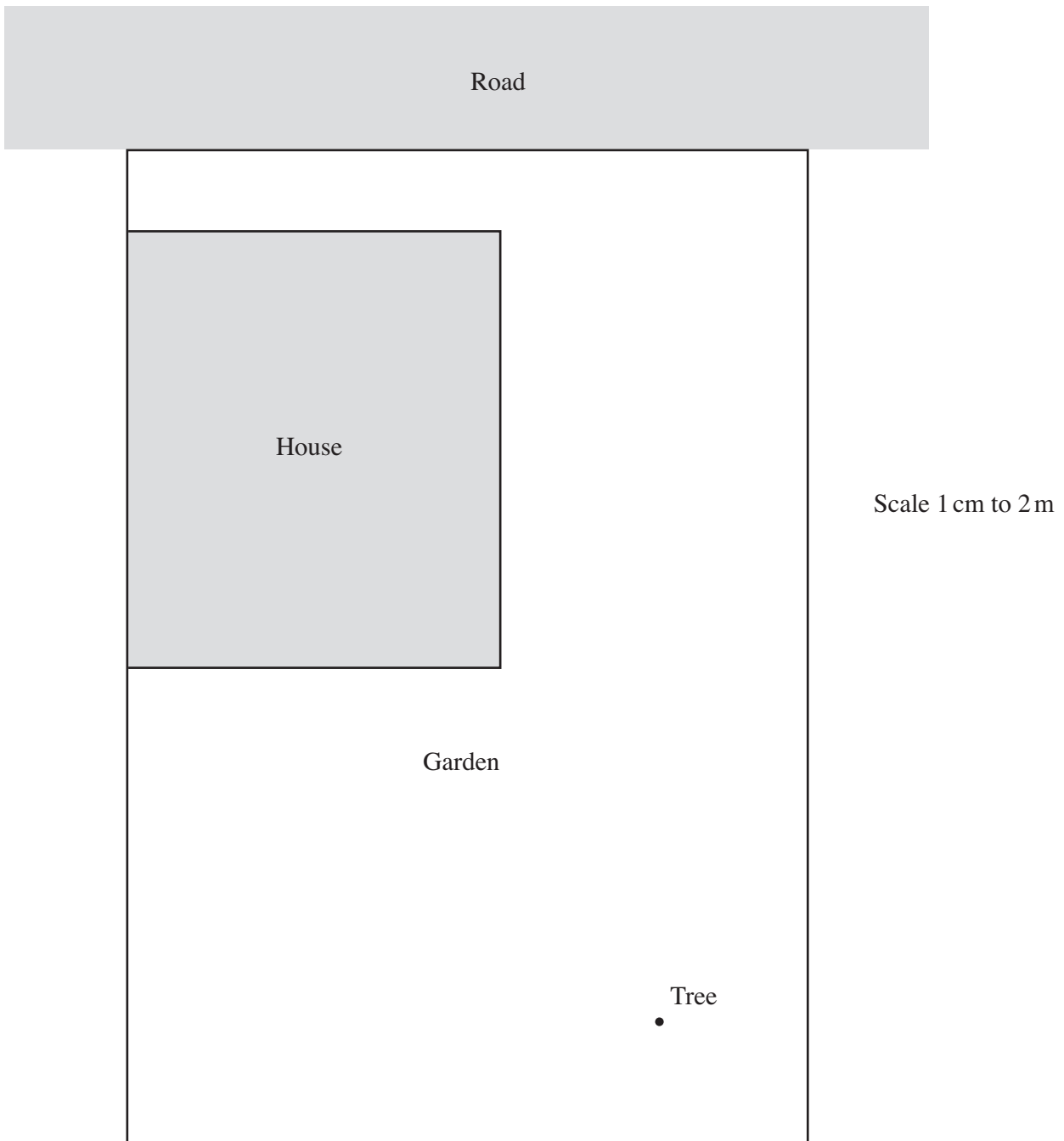
15



Write down the three inequalities that define the shaded region.

.....  
.....  
..... [4]





The diagram shows a plan view of Abby's house and garden drawn to a scale of 1 cm to 2 m. There is a tree in the garden.

Abby wants to plant a second tree in the garden.  
 It must be at least 3 metres from the road.  
 It must be at least 4 metres from the house.  
 It must be at least 6 metres from the existing tree.

Indicate clearly the region in which Abby can plant the tree.

[6]

- 17 The resistance,  $R$  ohms, of a one-metre length of wire varies inversely as the square of its diameter,  $d$  mm.  
The resistance of a one-metre length of a certain type of wire of diameter 0.25 mm is 8 ohms.

(a) Find a formula for  $R$  in terms of  $d$ .

(a)  $R = \dots\dots\dots$  [3]

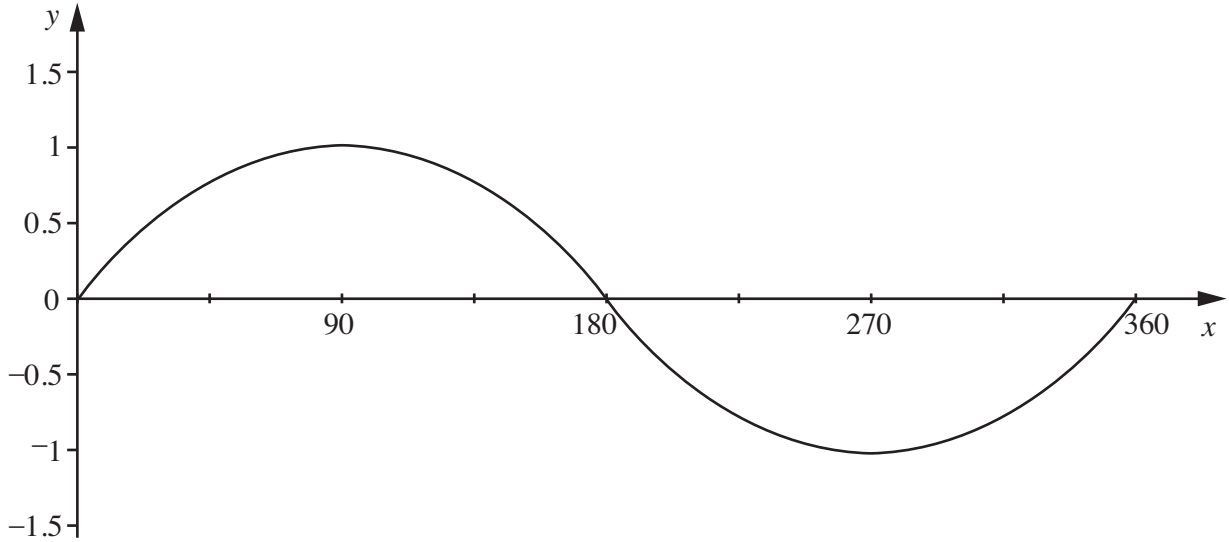
- (b) Find the diameter of a one-metre length of the same type of wire if the resistance is 4 ohms.  
Give your answer to a suitable degree of accuracy.

(b)  $\dots\dots\dots$  mm [3]

18 (a) Use your calculator to solve  $\sin x = 0.3$  for  $0^\circ \leq x \leq 90^\circ$ .

(a) .....° [1]

(b) The graph shows  $y = \sin x$  for  $0^\circ \leq x \leq 360^\circ$ .



Use the graph and your answer to part (a) to solve the following.

(i)  $\sin x = 0.3$  for  $90^\circ < x \leq 360^\circ$

(b)(i) .....° [1]

(ii)  $\sin x = -0.3$  for  $90^\circ < x \leq 360^\circ$

(ii) .....° [2]

TURN OVER FOR QUESTION 19

19 (a) Factorise this expression.

$$x(x - 3y) + 2x - 6y$$

(a) ..... [2]

(b) Prove this identity.

$$\frac{x}{x+1} - \frac{3x}{3x+4} \equiv \frac{x}{(x+1)(3x+4)} \quad [4]$$