

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**MATHEMATICS B (MEI)**

**B264A**

Paper 4 Section A  
(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
- 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.
- The total number of marks for this Section is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

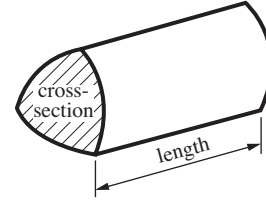
**WARNING**

No calculator can be used for Section A of this paper

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

## Formulae Sheet: Higher Tier

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

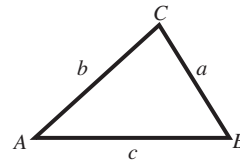


**In any triangle ABC**

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

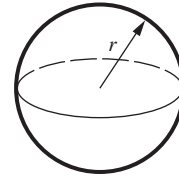
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



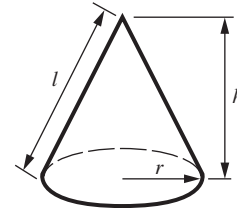
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**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**

1 You are given that  $832 \times 56 = 46\,592$ .

Use this calculation to work these out.

(a)  $8.32 \times 5.6$

(a) ..... [1]

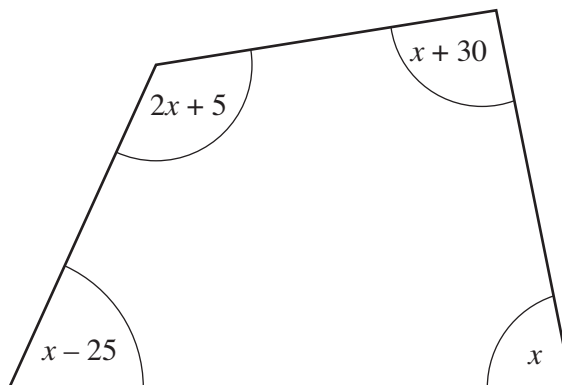
(b)  $0.832 \times 560$

(b) ..... [1]

(c)  $4659.2 \div 83.2$

(c) ..... [1]

2 The angles marked in the diagram are in degrees.



Not to scale

Write down an equation in  $x$  and solve it.

..... [4]

3 Expressed as a product of its prime factors,  $600 = 2 \times 2 \times 2 \times 3 \times 5 \times 5$ .

(a) Express 168 as a product of its prime factors.

(a) ..... [2]

(b) Find the lowest common multiple (LCM) of 600 and 168.

(b) ..... [2]

(c) Find the smallest integer  $k$  such that  $600k$  is a cube number.

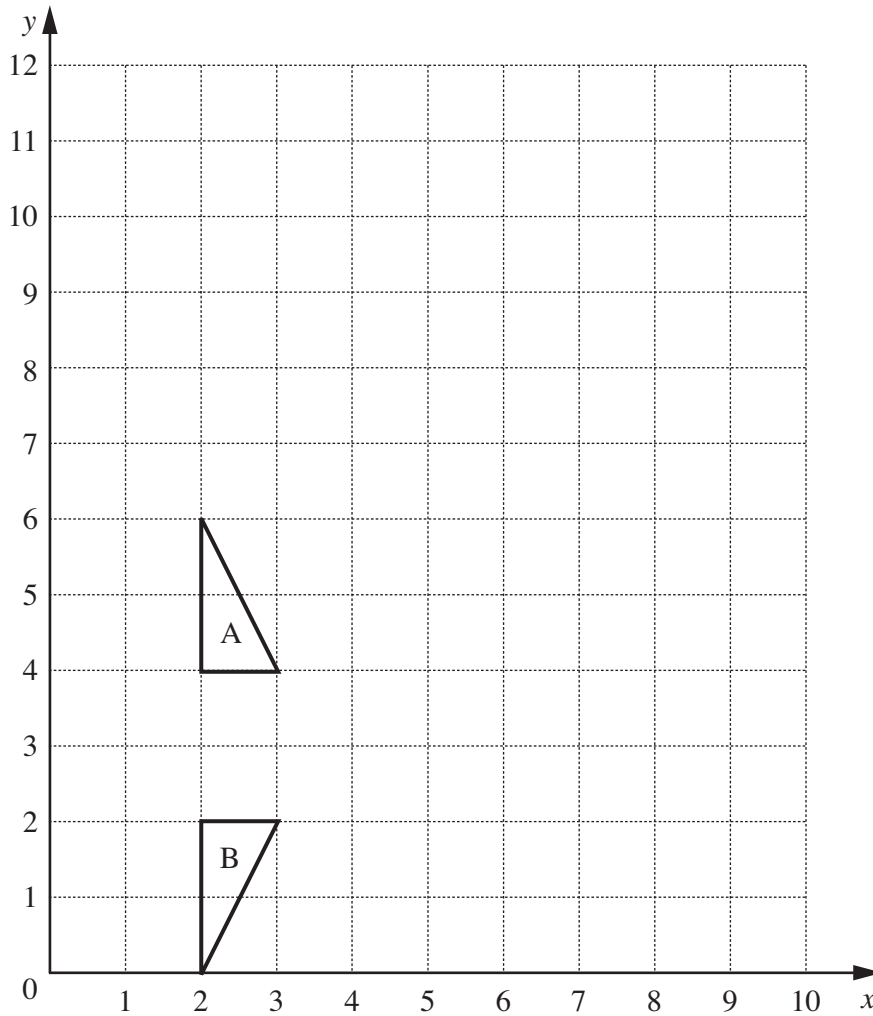
(c) ..... [2]

4 (a) Factorise  $14a - 7$ .

(a) ..... [1]

(b) Multiply out  $x(2x^2 + 5)$ .

(b) ..... [2]



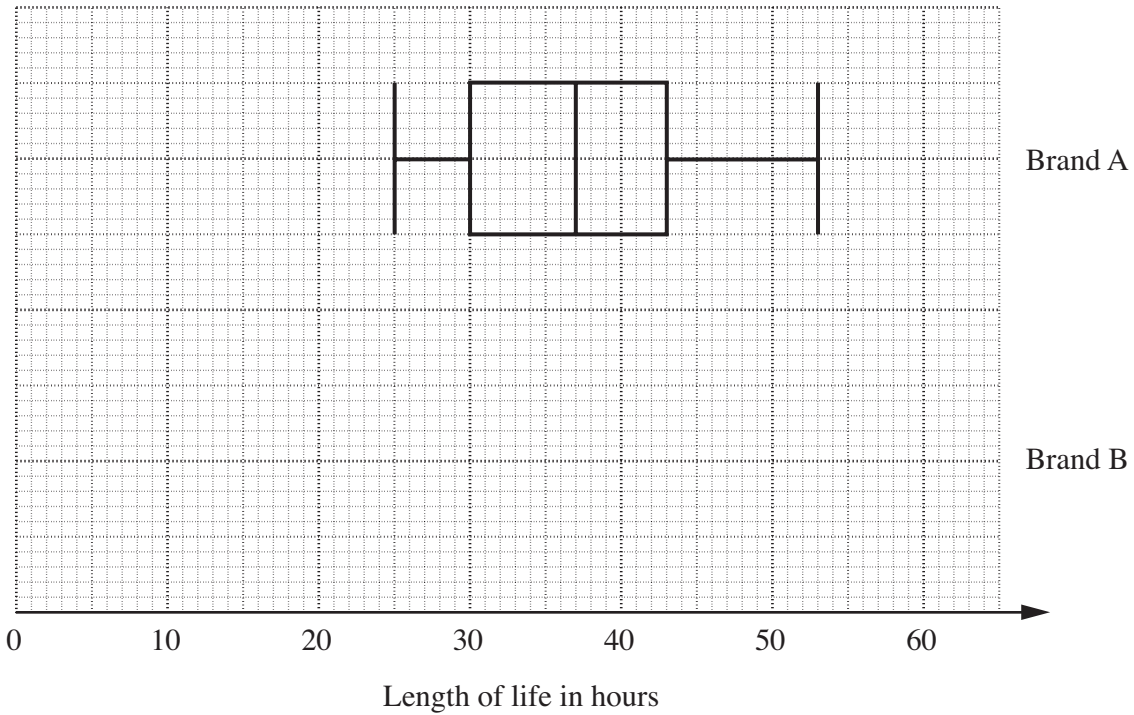
(a) Describe fully the **single** transformation that will map triangle A onto triangle B.

..... [2]

(b) On the grid, draw an enlargement of triangle A with centre  $(0, 4)$  and scale factor 3. [3]

- 6 A consumers' association tested batteries to see how long they lasted. 200 Brand A batteries and 200 Brand B batteries were tested.

The box plot for the length of life, in hours, of Brand A batteries is shown.



The table shows some information about the length of life, in hours, of Brand B batteries.

Minimum	Lower quartile	Median	Interquartile range	Maximum
10	25	39	23	60

- (a) On the grid above, draw the box plot for Brand B batteries. [3]
- (b) Use the information given in this question to explain why a consumer might prefer to buy
- (i) Brand A batteries, .....  
 ..... [1]
- (ii) Brand B batteries. ....  
 ..... [1]

- 7 (a) (i) Some of these fractions are equivalent to recurring decimals.

Put an R under the ones which recur.

$$\frac{4}{15}$$

$$\frac{5}{14}$$

$$\frac{15}{16}$$

$$\frac{3}{20}$$

.....

.....

.....

.....

[2]

- (ii) Explain how you decided which are equivalent to recurring decimals.

.....

.....

..... [2]

- (b) Change  $0.\dot{5}\dot{2}$  to a fraction.

(b) ..... [2]

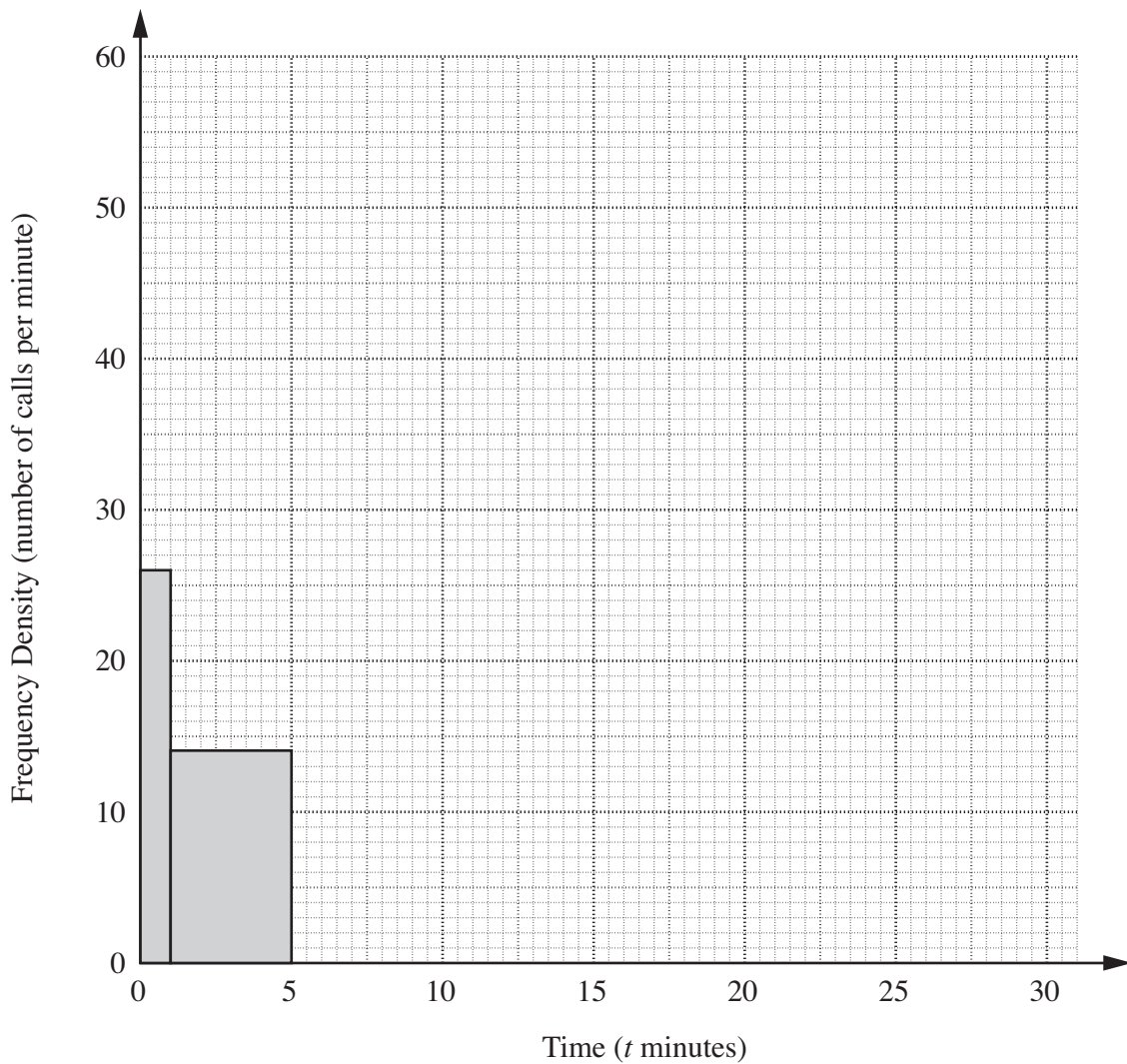
- (c) Rationalise the denominator to simplify  $\frac{10}{\sqrt{2}}$ .

(c) ..... [2]

- 8 (a) A school secretary recorded the lengths of 200 phone calls he received. The results are shown in the table.

Length of call ( $t$ minutes)	Frequency
$0 < t \leq 1$	26
$1 < t \leq 5$	56
$5 < t \leq 10$	65
$10 < t \leq 20$	33
$20 < t \leq 30$	20

Draw a histogram to show these results.  
The first two bars have been drawn for you.



[2]



(b) The school secretary also recorded the number of days of sick leave taken by the 40 staff during one year.

The results are shown below.

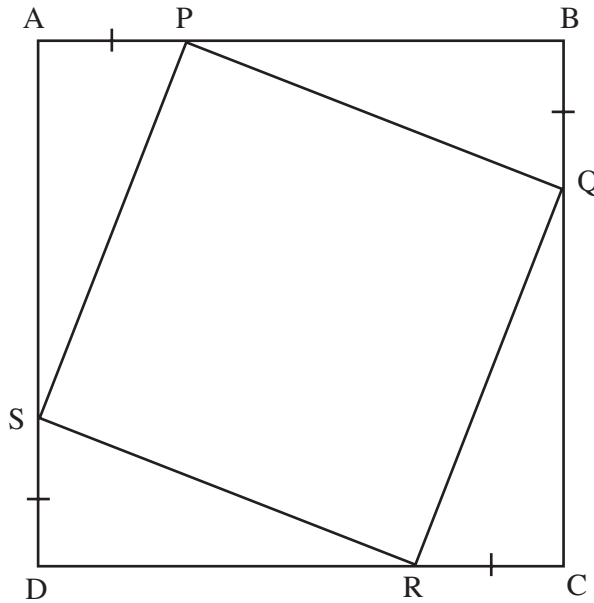
0	0	0	0	0	0	0	0	1	1
1	1	1	1	2	2	2	2	3	3
3	3	3	3	3	5	5	5	5	6
6	8	8	8	10	10	11	12	13	120

Choose the measurement of average, mean, median or mode, which best represents these data.

Choose .....

Reject ..... because .....  
.....

Reject ..... because .....  
..... [2]



In the diagram ABCD is a square.  
 $AP = BQ = CR = DS$ .

(a) Complete this proof that triangle PBQ is congruent to triangle QCR.

In the triangles PBQ and QCR:

Angle PBQ = Angle QCR      Reason      Angles of a square are all  $90^\circ$ .  
 ..... = .....      Reason      .....  
 ..... = .....      Reason      .....

Therefore Triangle PBQ  $\cong$  Triangle QCR Reason ..... [3]

(b) Use what you have proved in part (a) to explain why PQRS is a square.

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

10 Solve, algebraically, these simultaneous equations.

$$y = 3x - 2$$

$$x^2 + y^2 = 20$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

or  $x = \dots\dots\dots y = \dots\dots\dots$  [7]

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