



H

GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS B (MEI)

B294B

Paper 4 Section B (Higher Tier)

Friday 10 June 2011
Morning

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

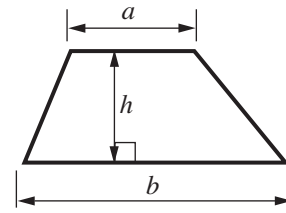
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- 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.

INFORMATION FOR CANDIDATES

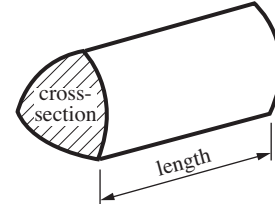
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 11.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **50**.
- This document consists of **16** 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

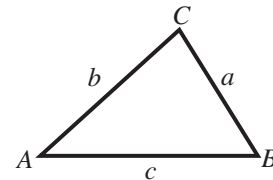


In any triangle ABC

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

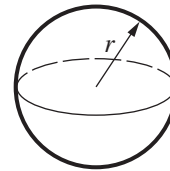
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



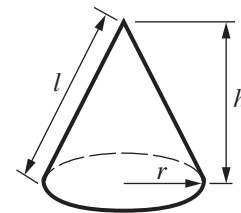
Volume of sphere = $\frac{4}{3}\pi r^3$

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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11 Work these out, giving each answer correct to 3 significant figures.

(a) $\frac{4.32}{6.1 \times 3.92}$

(a) [2]

(b) $\frac{7.2 + \sqrt{7.2^2 - 4 \times 2.3 \times 3.1}}{4.6}$

(b) [2]

12 Fiona and Ali are each doing a traffic survey on the colours of cars in their town.

Fiona records the colours of 20 cars.
Her results are shown in this table.

Colour	Silver	Black	Blue	Red	Green	Other
Frequency	7	4	3	2	1	3

Ali records the colours of 1100 cars.
His results are shown in this table.

Colour	Silver	Black	Blue	Red	Green	Other
Frequency	268	172	234	135	97	194

(a) Explain why Ali’s results are more likely to be representative of all the cars in the town.

.....
 [1]

(b) In one area of the town there are 5600 cars.

Use Ali’s results to estimate how many of these cars you might expect to be blue.

(b) [2]

13 The Retail Price Index (RPI) at the end of each year from 2002 to 2008 is shown in this table.

Year	2002	2003	2004	2005	2006	2007	2008
RPI	169.5	173.2	177.1	181.0	187.6	193.3	201.5

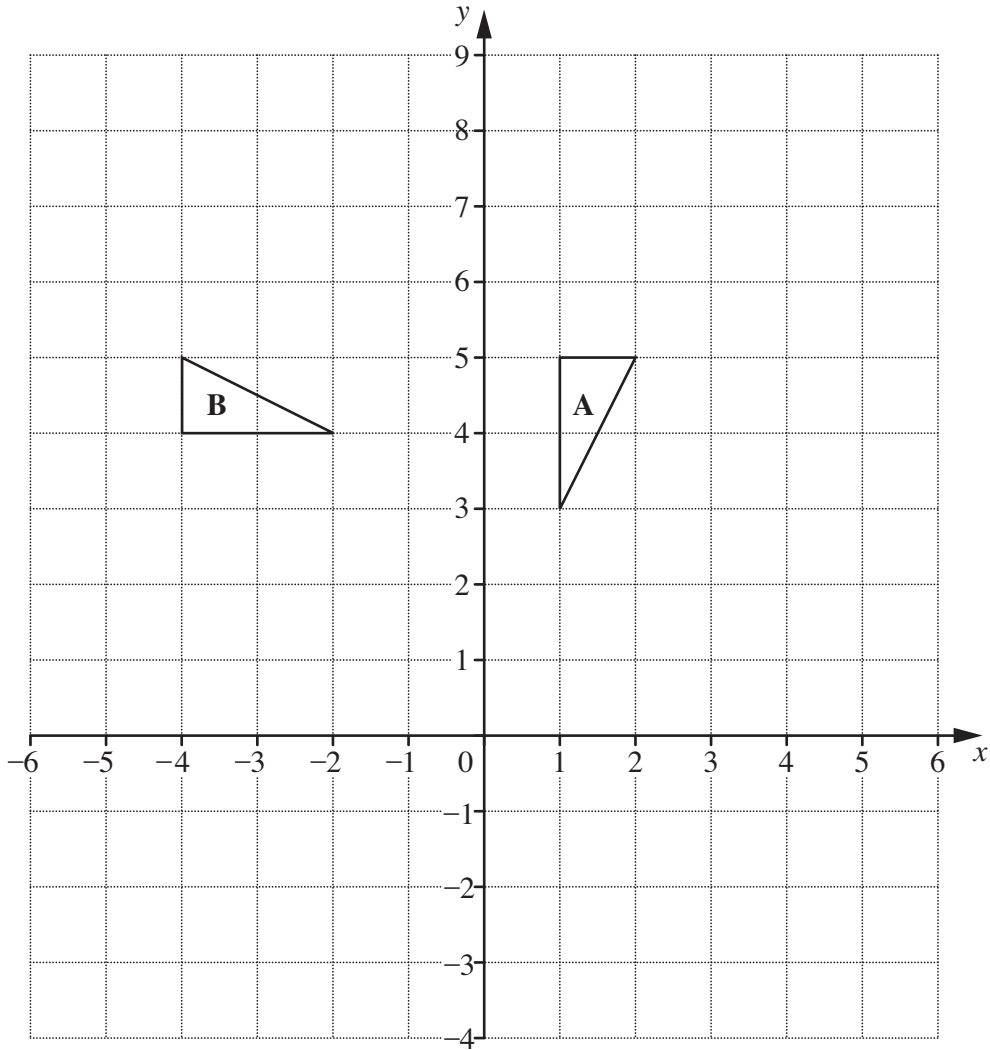
- (a) The monthly expenditure of the Jones family is proportional to the RPI.
At the end of 2003 their monthly expenditure was £1250.

What was the equivalent expenditure at the end of 2006?

(a) £ [2]

- (b) Calculate the increase in the RPI from the end of 2002 to the end of 2008 as a percentage of the 2002 value.

(b) % [3]



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

.....

.....

..... [3]

(b) Enlarge triangle A with centre (2, 3) and scale factor -3 .
Label the image C.

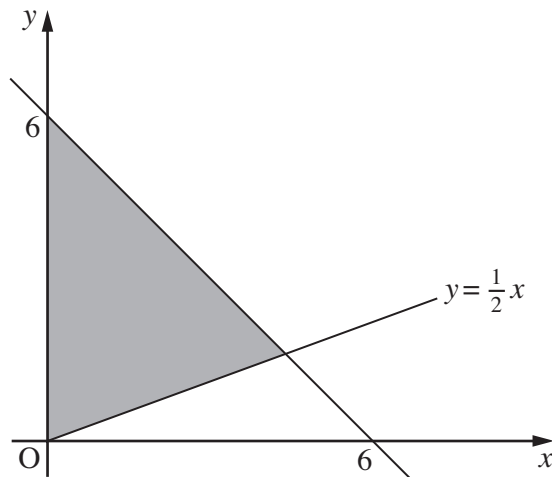
[2]

15 (a) Solve this inequality.

$$2x + 1 \geq 6$$

(a) [2]

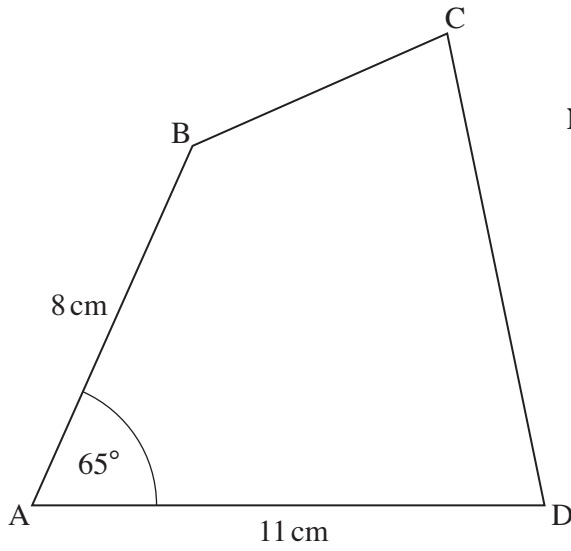
(b)



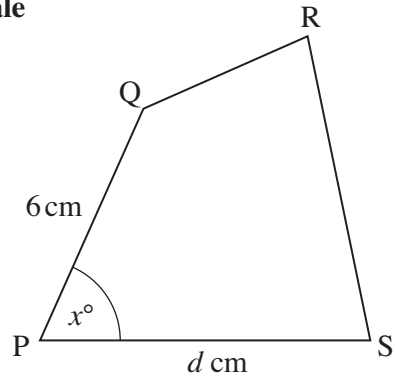
The shaded region is defined by three inequalities.
One of these is $x \geq 0$.

Find the other two inequalities.

(b)
..... [3]



Not to scale



The quadrilaterals ABCD and PQRS are similar.

(a) Write down the value of x .

(a) [1]

(b) Calculate the value of d .

(b) [2]

17 (a) Rearrange this equation to make x the subject.

$$y(1 + 2x) = 4 - 3x$$

(a) [3]

(b) The volume, V , of a cylinder, is given by this formula.

$$V = \pi r^2 h$$

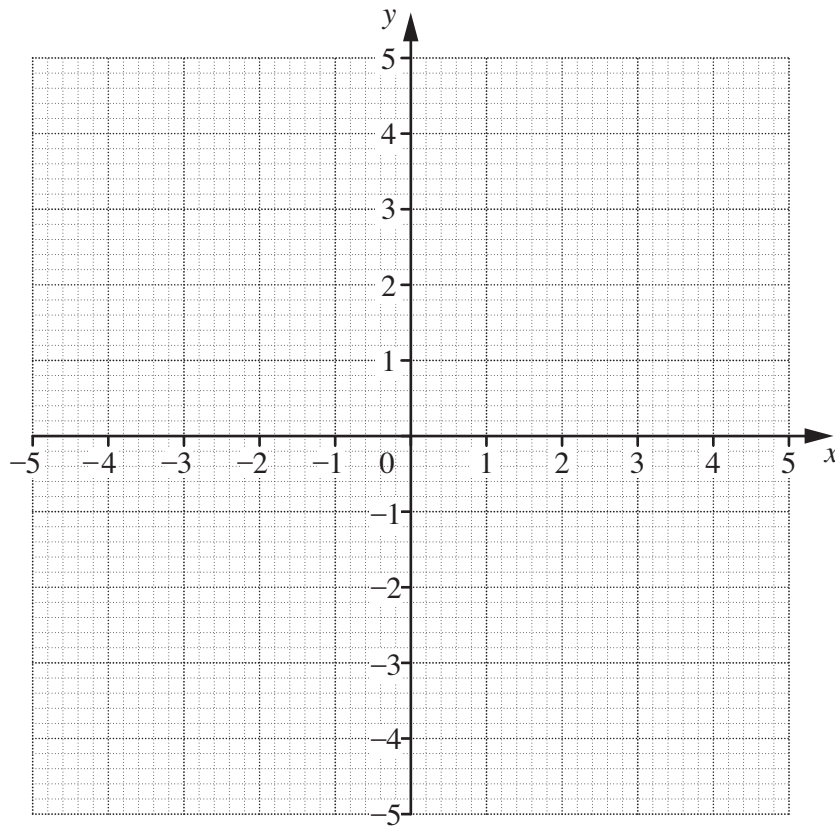
The curved surface area, A , of the cylinder is given by this formula.

$$A = 2\pi r h$$

By substituting for h , find a formula for V in terms of A and r .
Write your formula as simply as possible.

(b) $V =$ [3]

18 (a) Draw the graph of $x^2 + y^2 = 9$.



[2]

(b) The line $y = 2x + 1$ intersects the curve $x^2 + y^2 = 9$ twice.

(i) Show that the x -coordinates of the points of intersection are satisfied by this equation.

$$5x^2 + 4x - 8 = 0$$

.....

.....

.....

.....

..... [3]

- (ii) Solve the equation $5x^2 + 4x - 8 = 0$ and hence find the coordinates of the points of intersection. Give your answers correct to 2 decimal places.

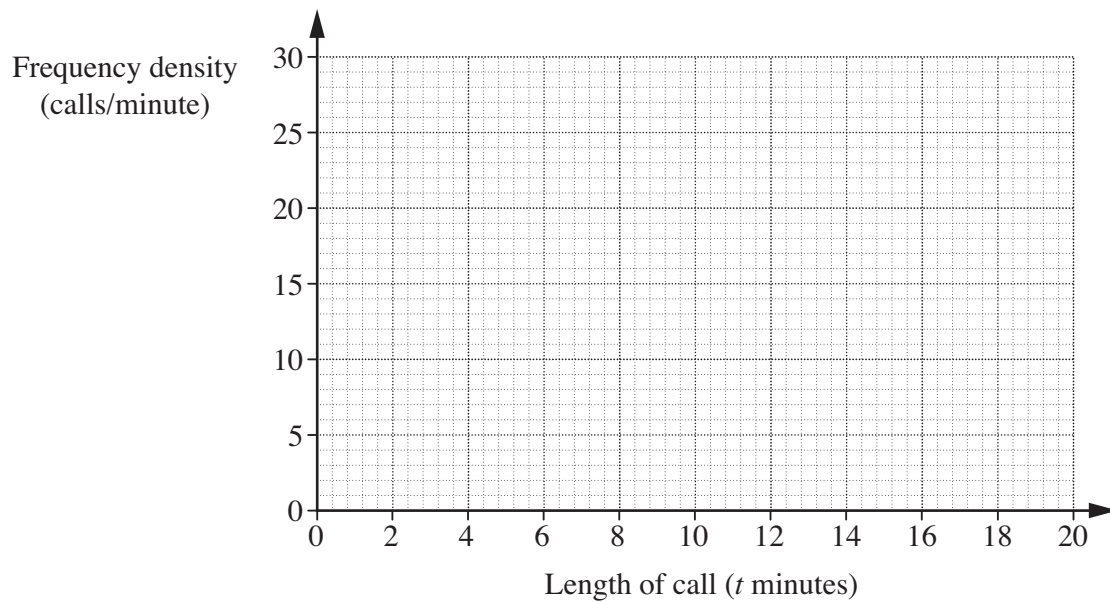
(b)(ii) (..... ,)

(..... ,) [4]

- 19 Beatrice monitors the length of the first 100 phone calls to the school switchboard one morning. She summarises the results in the table.

Length of call (t minutes)	Frequency
$0 < t \leq 1$	25
$1 < t \leq 3$	32
$3 < t \leq 5$	18
$5 < t \leq 10$	15
$10 < t \leq 20$	10

Draw a histogram to show this information.



[3]

- 20 The table shows the number of boys and girls in a class of 30 students and whether they are right-handed or left-handed.

	Boys	Girls	Total
Right-handed	14	11	25
Left-handed	3	2	5
Total	17	13	30

- (a) Two of the 30 students are chosen at random.

Calculate the probability that they are both left-handed.

(a) [3]

- (b) Two of the 13 girls are chosen at random.

Calculate the probability that one is right-handed and one is left-handed.

(b) [4]

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