

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS B (MEI)

Paper 4 Section A (Higher Tier)

B294A

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:

- Geometrical instruments
- Tracing paper (optional)

Friday 11 June 2010

Morning

Duration: 1 hour



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. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

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.

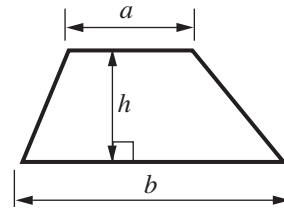
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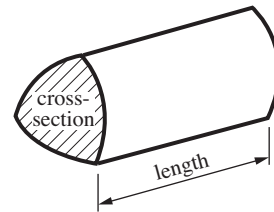
No calculator can be used for Section A of this paper

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a + b)h$



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

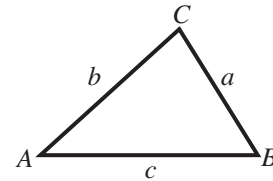


In any triangle ABC

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

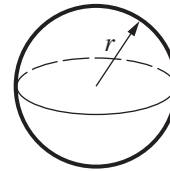
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



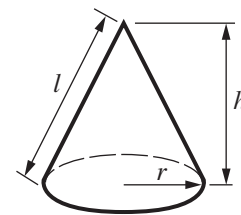
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



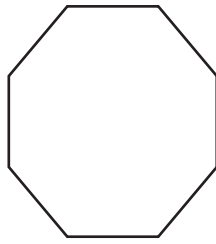
The Quadratic Equation

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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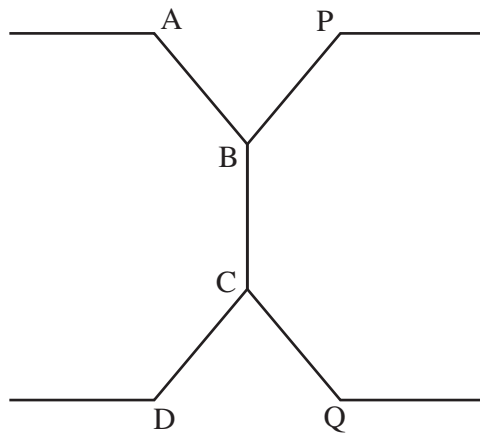
- 1 (a) Calculate the interior angle of a regular octagon.



Not to scale

(a) ° [2]

(b)



Not to scale

ABCD and PBCQ each form part of a regular octagon.

- (i) Using your answer to part (a), explain why regular octagons alone do not tessellate.

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

- (ii) A tessellation is made with regular octagons and another regular shape.

What is the name of this shape?

(b)(ii) [1]

2 Which of these fractions are equivalent to recurring decimals?

$$\frac{2}{3} \quad \frac{2}{5} \quad \frac{1}{6} \quad \frac{1}{2}$$

..... [2]

3 Mr and Mrs Brown have two children, Chas and Amy.

Chas is 3 years older than Amy.

Mr Brown is four times as old as Amy.

Mrs Brown is 5 years younger than Mr Brown.

The total age of the family is 128 years.

Let Amy's age be x years

(a) Write down an equation in x .

You do not need to simplify your equation at this stage.

(a) [2]

(b) Solve your equation to find the age, in years, of each member of the Brown family.

(b) Amy, Chas, Mr Brown,, Mrs Brown [3]

- 4 (a) Ghalib threw a six sided die 20 times.
His results are shown in the table.

Number on die	1	2	3	4	5	6
Frequency	0	3	6	4	2	5

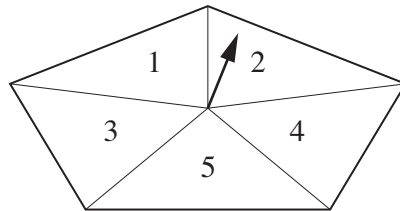
Ghalib says, “This is evidence that the die is biased.”

Is he correct? State your reason.

..... because

..... [1]

- (b)



Class 10B’s Maths teacher made a spinner as shown in the diagram.
She spun it 200 times.
Her results are shown in this table.

Number on spinner	1	2	3	4	5
Frequency	42	44	30	32	52

As a class exercise the members of 10B spun the spinner a total of 3000 times.
Estimate how many of the 3000 spins resulted in a 3.

(b) [3]

5 The probability that Rovers win any match is 0.3.
The probability that Rovers lose any match is 0.6.

(a) What is the probability that Rovers draw any match?

(a) [2]

(b) What is the probability that they win both of their next two matches?

(b) [2]

6 In July 2007 the population of China was 1322 million.

(a) Write 1322 million in standard form.

(a) [1]

(b) In July 2007 the population of Japan was 1.27×10^8 .

Calculate the difference in population between China and Japan.
Give your answer in standard form.

(b) [3]

7 (a) Simplify these expressions.

(i) $t^3 \times t^5$

(a)(i) [1]

(ii) $\frac{3x^2 \times 6x^0}{2x^5}$

(ii) [2]

(b) Evaluate $4^{\frac{3}{2}} \times 3^{-2}$.
Give your answer as a fraction.

(b) [3]

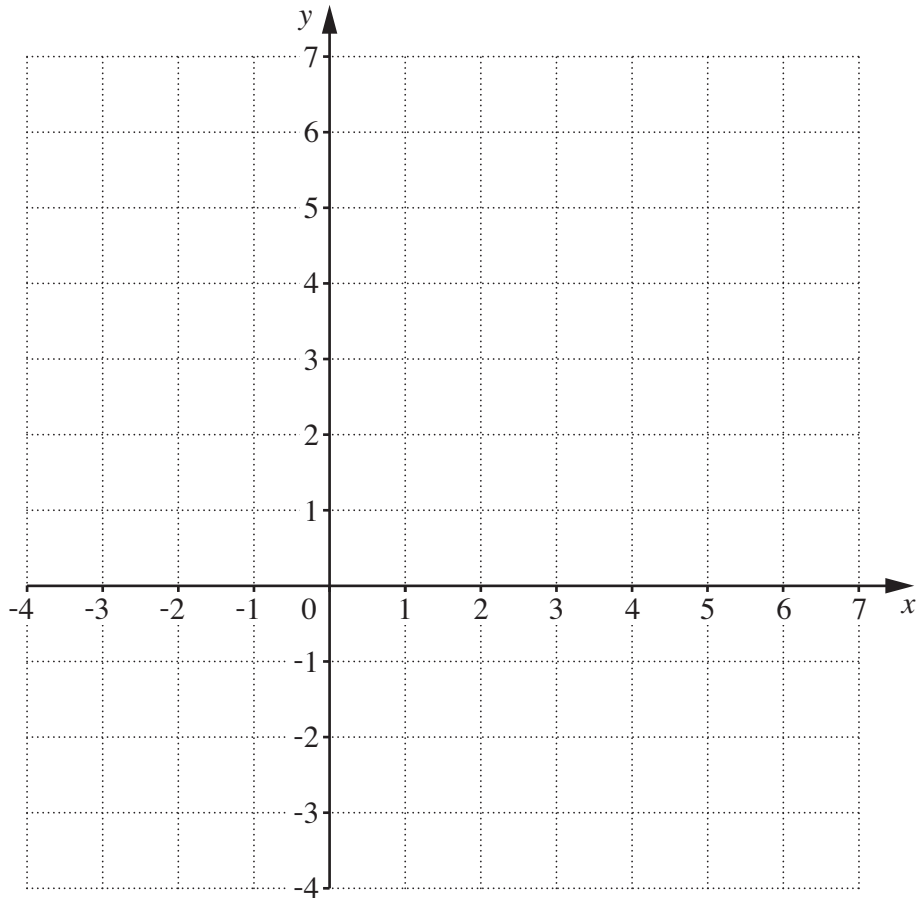
(c) Write $\frac{2 + 5\sqrt{3}}{\sqrt{3}}$ in the form $\frac{a + b\sqrt{3}}{c}$ where a , b and c are integers.

(c) [3]

- 8 (a) On the grid, show clearly the single region which satisfies all these inequalities.

$$x \geq -1 \quad y \geq 2x + 1 \quad 2x + 3y < 12$$

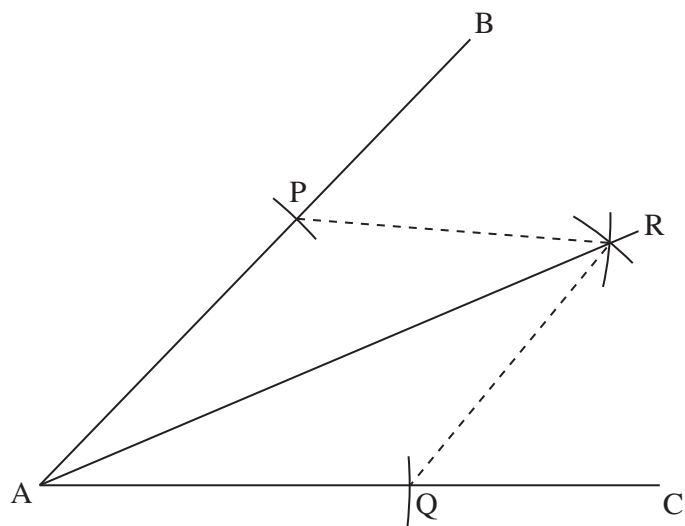
Indicate which boundaries are included in the region.



[6]

- (b) What is the smallest value of $x + y$ in the region?

(b) [1]



Ewa constructed the bisector of angle BAC.

First she drew arcs of the same radius, centre A, to cut AB at P and AC at Q. Then she drew an arc with centre P and another arc with centre Q. The last two arcs had the same radius as each other and intersected at R.

Use congruent triangles to prove that AR is the bisector of angle BAC.

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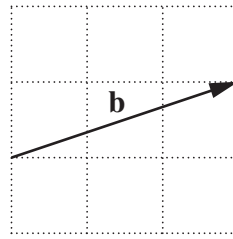
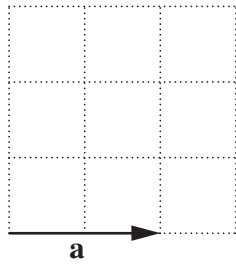
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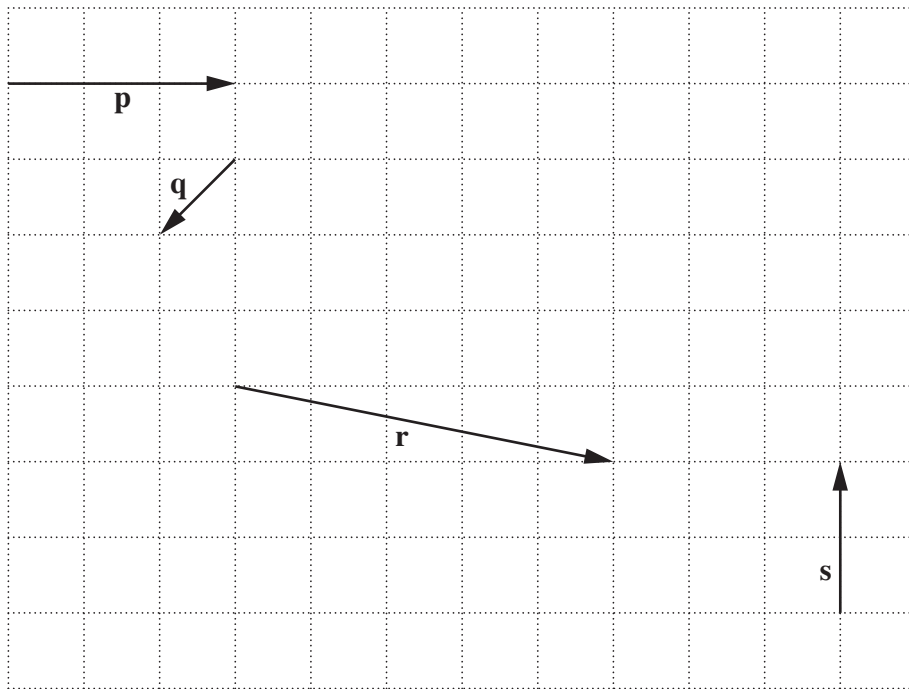
..... [4]

TURN OVER FOR QUESTION 10

10 Two vectors **a** and **b** are defined by these diagrams.



Write each of the vectors **p**, **q**, **r**, **s** in terms of **a** and/or **b**.



p = [1]

q = [1]

r = [2]

s = [2]

11
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