OCR
RECOGNISING ACHIEVEMENT

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GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS B (MEI)

B293A

Paper 3 Section A (Higher Tier)

OCE/14183

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:
- Geometrical instruments
- Tracing paper (optional)

Tuesday 12 January 2010
Morning

Duration: 45 minutes

B293A

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 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

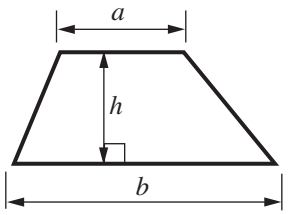
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this Section is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

WARNING

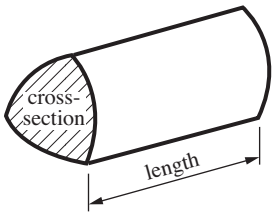
No calculator can be used for Section A of this paper

Formulae Sheet: Higher Tier

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



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

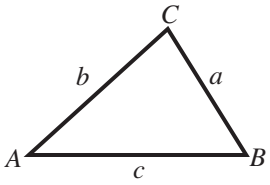


In any triangle *ABC*

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

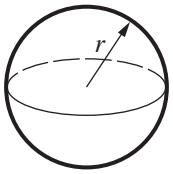
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



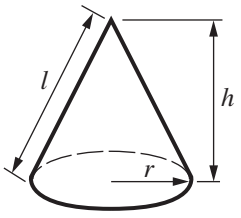
Volume of sphere = $\frac{4}{3}\pi r^3$

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)** Work out the value of the following.
Give your answers as fractions in their lowest terms.

(i) $\frac{2}{3} - \frac{1}{4}$

(a)(i) ..... **[2]**

(ii) $\frac{2}{3} \div 4$

(ii) ..... **[2]**

(b) **Estimate** the value of $\frac{21 \times 29}{307}$.

(b) ..... **[2]**

2 Some residents are campaigning to get a bypass built for their village.

(a) They decide to carry out a traffic survey.

Design a data sheet they could use to show the types and numbers of vehicles passing through the village.

You may not need all the space in the table.

[2]

(b) The residents also decide to survey local opinion using a questionnaire.

Fred says they should ask the question,
"Do you think we should have a bypass to make our village safer?"

What is wrong with Fred's question?

.....

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

(c) Dan suggests that all the questionnaires should be given out at the village primary school at the end of afternoon school.

Give two reasons why this is not a good suggestion.

Reason 1 .....

.....

Reason 2 .....

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

3 The ages, in years, of the players in a football club are as follows.

19	21	34	41	23	31	29	27	26	19
27	27	28	31	33	20	22	37	23	25

(a) Draw an ordered stem and leaf diagram to illustrate these data.

.....

.....

.....

.....

Key: .....…..… represents ..... years **[3]**

(b) Find the median age of these players.

(b) ..... years **[1]**

4 **(a)** Make n the subject of this formula.

$$m = 5n - 3$$

(a) $n =$ ..... **[2]**

(b) Simplify $p^2 \times p^6$.

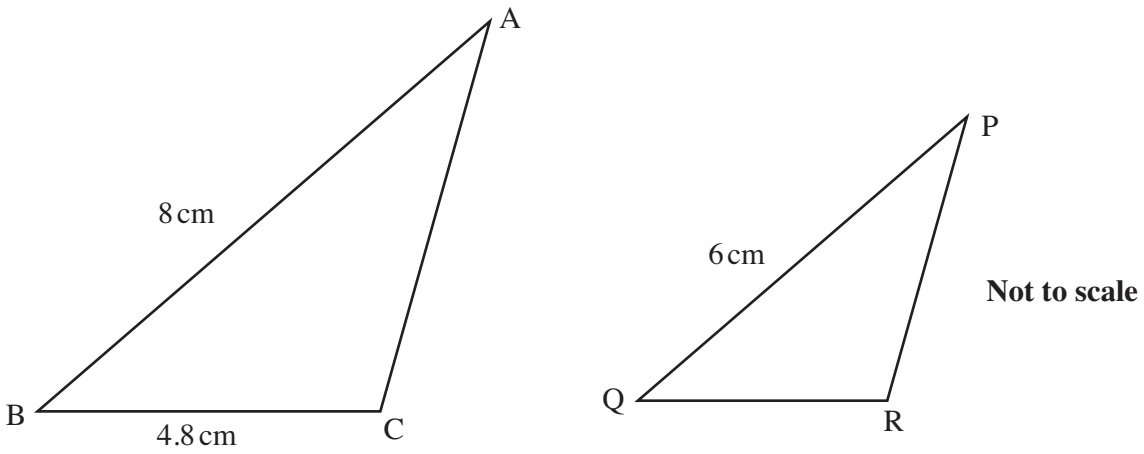
(b) ..... **[1]**

(c) Solve this equation.

$$\frac{2x - 5}{4} = 3$$

(c) ..... **[3]**

5 Triangles ABC and PQR are similar.



Calculate QR.

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

6 Three consecutive integers can be written as $(n-1)$, n and $(n+1)$.

(a) Use this information to show that the sum of any three consecutive integers is divisible by 3.

[2]

(b) **(i)** Show that $(n-1)^2 + n^2 + (n+1)^2$ simplifies to $3n^2 + 2$.

[3]

(ii) Is the sum of the squares of three consecutive integers divisible by 3?

Explain your reasoning.

.....

.....

.....

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

TURN OVER FOR QUESTION 7

7 **(a)** Express $x^2 + 4x - 7$ in the form $(x + c)^2 + d$.

(a) ..... **[2]**

(b) Use your answer to part **(a)** to

(i) find the minimum value of $x^2 + 4x - 7$,

(b) (i) ..... **[1]**

(ii) find the roots of $x^2 + 4x - 7 = 0$ in surd form.

(ii) ..... **[2]**

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