



H

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 14 January 2011
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, 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.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

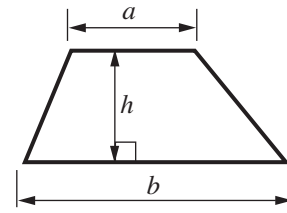
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this Section is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

WARNING

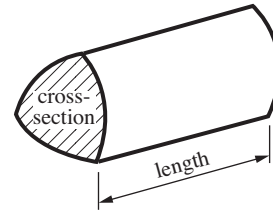
No calculator can be used for Section A of this paper

Formulae Sheet: Higher Tier

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



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

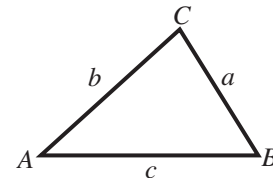


In any triangle ABC

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

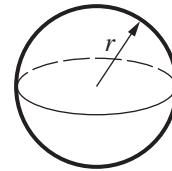
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



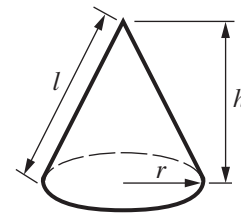
Volume of sphere = $\frac{4}{3}\pi r^3$

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 Anil does this calculation on his calculator.

$$\frac{0.432 \times 689.86}{28.4}$$

He writes down the numbers shown on his calculator display as 10493 645, but forgets to put in the decimal point.

(a) Use estimation to decide where the decimal point should go.
You must show your working.

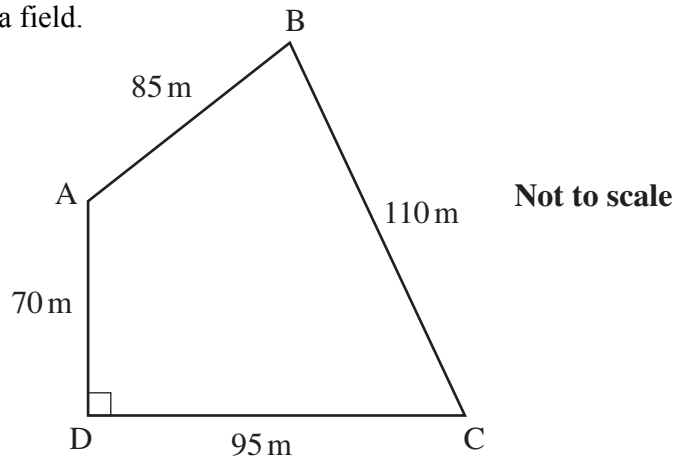
(a) [3]

(b) Write the correct answer, accurate to 3 significant figures.

(b) [1]

2 In this question leave in all the construction arcs you use.

The diagram shows the sketch of a field.



- (a) Make an accurate scale drawing of the field.
Use a scale of 1 cm to represent 10 m.
The line DC has been drawn for you.

D ————— C

[3]

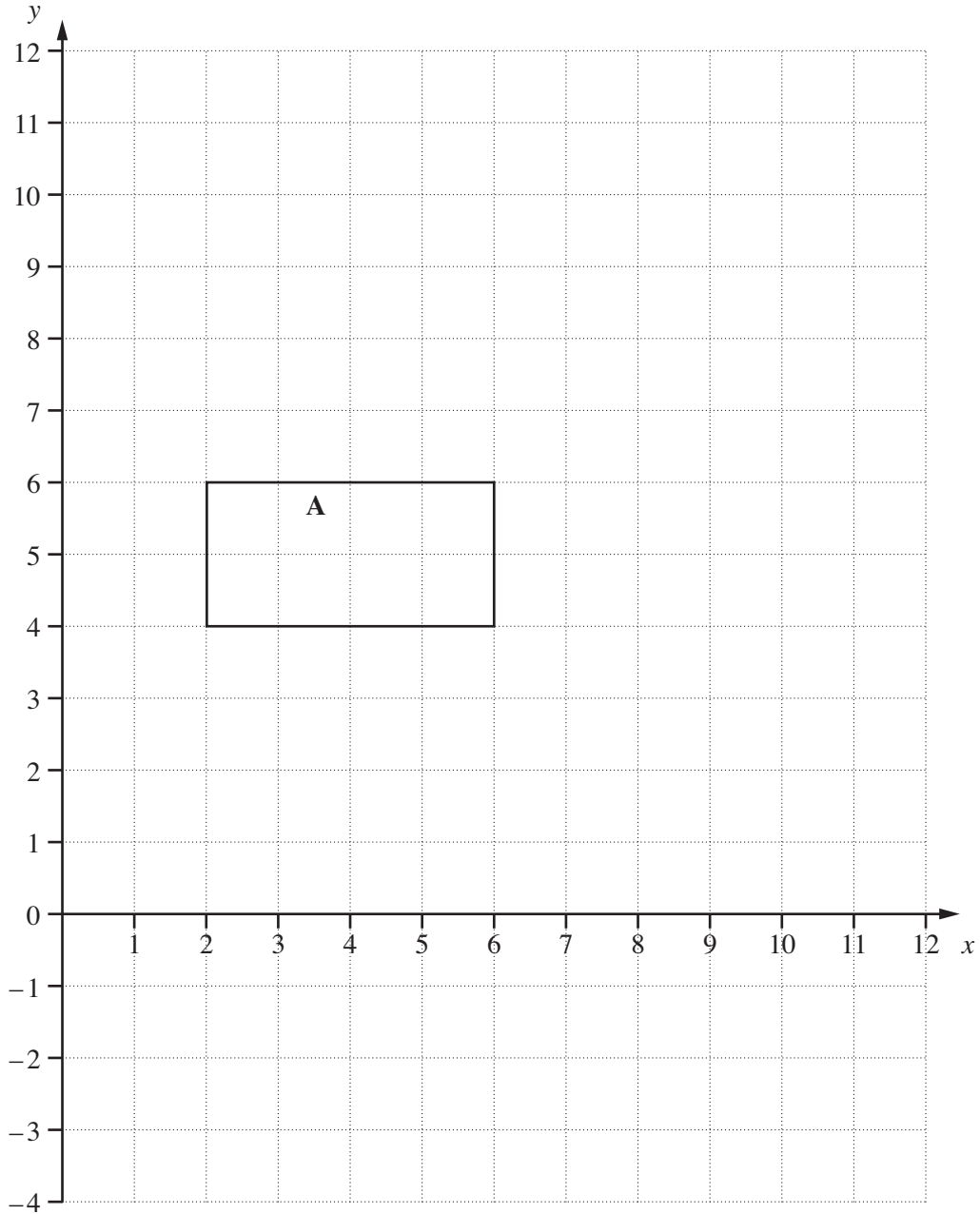
- (b) A mobile phone mast is to be erected in the field.
The mast must be
- the same distance from B as it is from D
 - at least 65 m from A.

On your drawing, use ruler and compasses only to construct all the possible positions for the mast.

Show your answer clearly.

[4]

3



- (a) Enlarge rectangle A by scale factor $\frac{1}{2}$ with centre (0, 0). [2]
- (b) Translate rectangle A by the vector $\begin{pmatrix} 2 \\ -7 \end{pmatrix}$. [2]

4 Write each of the following as a single power of 5.

(a) $\frac{5^4 \times 5^7}{5^3}$

(a) [2]

(b) $\frac{1}{5}$

(b) [1]

(c) the square root of five cubed

(c) [1]

5 At Barney's Diner a three-course meal costs £2 more than a two-course meal.
A group of 8 people go to the Diner.
Three of them have two-course meals and the rest have three-course meals.

The total cost is £126.

Let $\pounds x$ be the cost of a two-course meal.

Write down an equation in x and solve it to find the cost of a two-course meal.

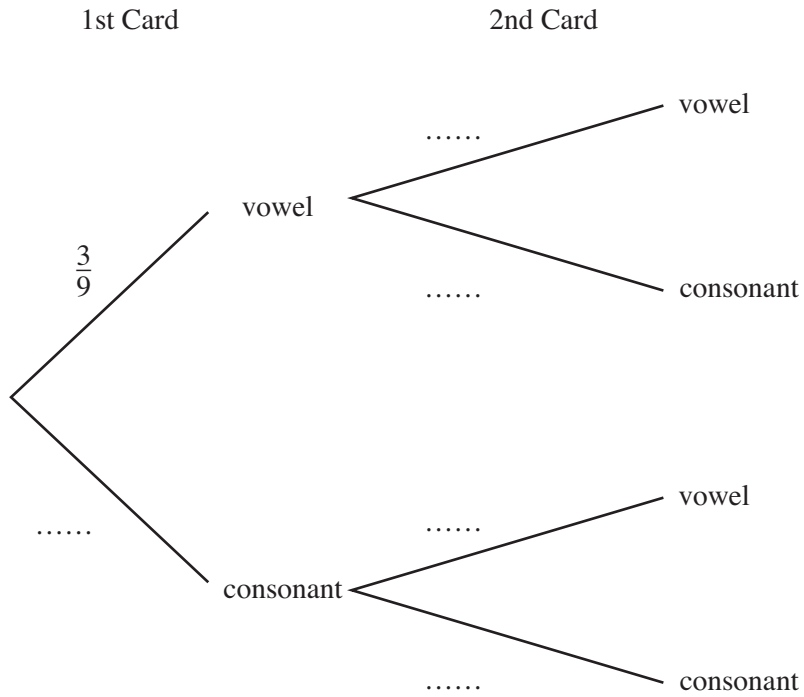
£ [5]

6



Carol chooses two of these cards at random and places them side by side. She notes whether each is a vowel or a consonant.

(a) Complete the probability tree diagram for Carol's choices.



[2]

(b) Calculate the probability that at least one of her cards is a consonant.

(b) [3]

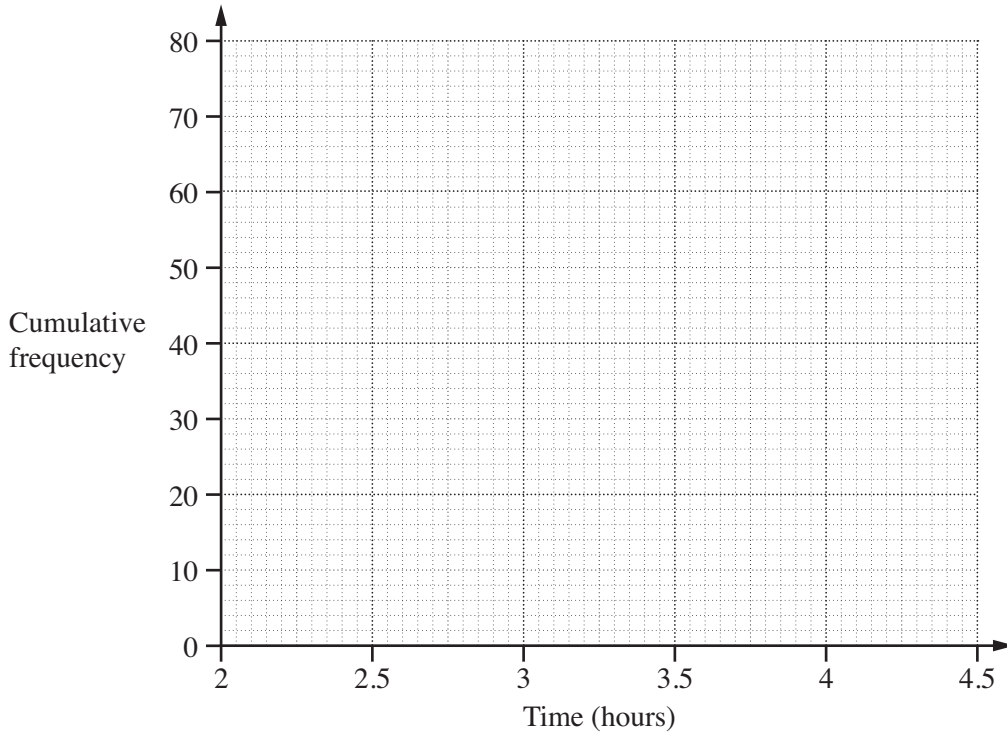
7 Mr Gill drives regularly from Manchester to London. He records the time, t hours, it takes on 80 of these journeys. His results are summarised in the table below.

Time (t hours)	Number of journeys
$2.75 < t \leq 3$	8
$3 < t \leq 3.25$	15
$3.25 < t \leq 3.5$	20
$3.5 < t \leq 3.75$	17
$3.75 < t \leq 4$	14
$4 < t \leq 4.25$	6

Time (t hours)	Cumulative frequency
$t \leq 3$	8
$t \leq 3.25$	
$t \leq 3.5$	
$t \leq 3.75$	
$t \leq 4$	
$t \leq 4.25$	80

(a) Complete the table of cumulative frequencies. [1]

(b) On the grid below draw a cumulative frequency diagram to show these data.



[2]

(c) (i) Find the median time.

(c)(i) hours [1]

(ii) Find the interquartile range of the times.

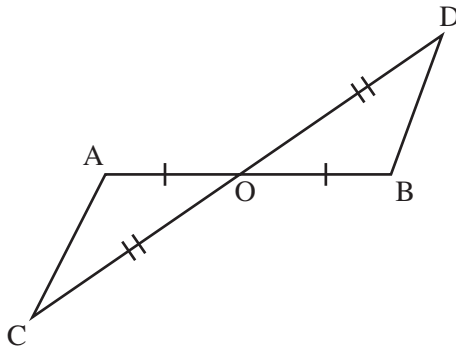
(ii) hours [2]

- (d) Mr Badley also travels from Manchester to London. He travels by train.
The median time for his journeys is 3.7 hours and the interquartile range is 0.4 hours.

Make two comparisons between Mr Gill's journeys and Mr Badley's journeys.

- 1
- 2 [2]

8



The lines AB and CD bisect each other at O.

- (a) Prove that triangles AOC and BOD are congruent.

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..... [3]

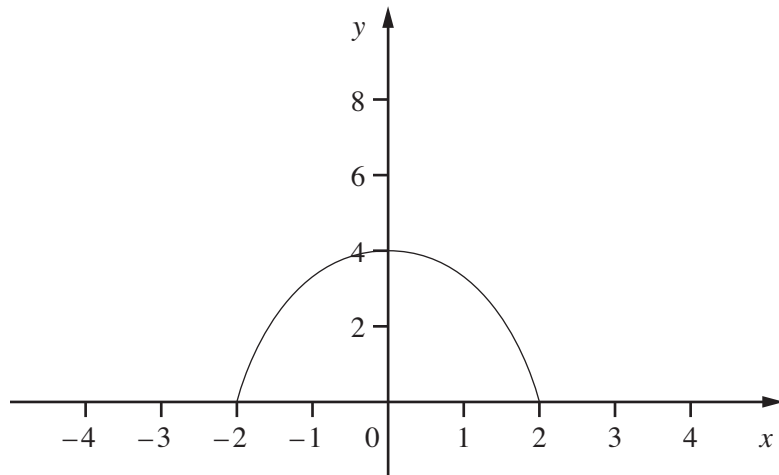
- (b) Prove that CA is parallel to BD.

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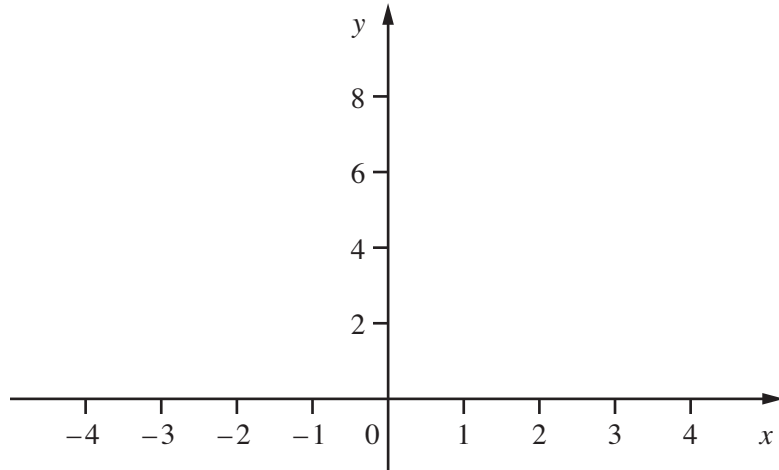
..... [2]

9 The sketch shows the graph of $y = f(x)$.



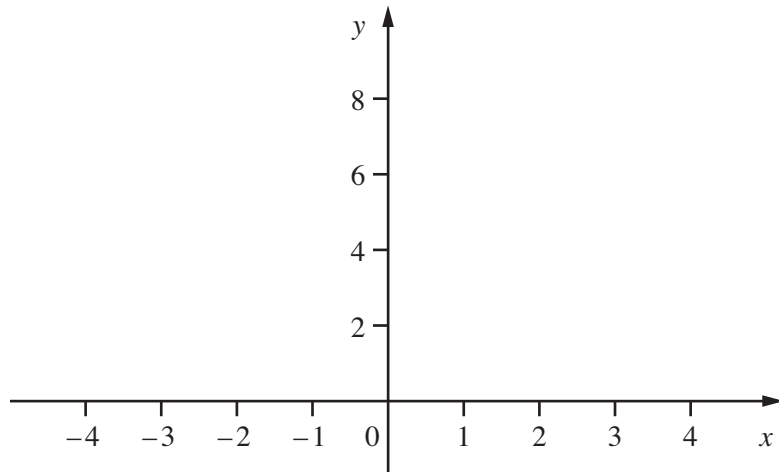
On the given axes, sketch the graphs of these functions.

(a) $y = 2f(x)$



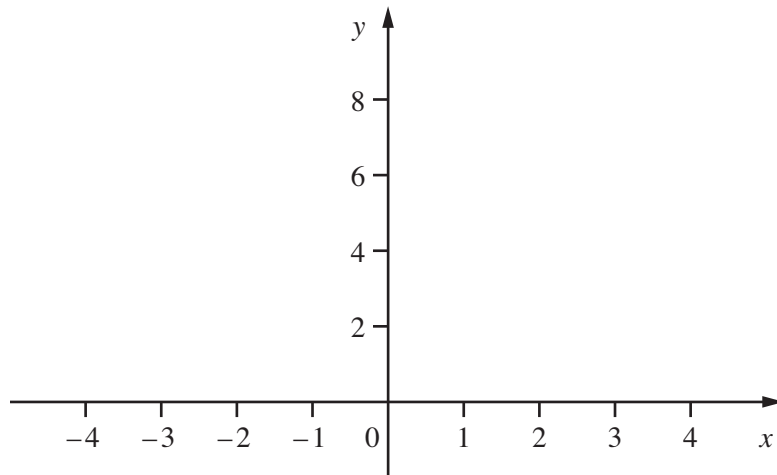
[1]

(b) $y = f(2x)$



[1]

(c) $y = f(x + 2)$



[1]

10 (a) Simplify $(5 + \sqrt{2})(5 - \sqrt{2})$.

(a) [2]

(b) Expand $(3 + 4\sqrt{3})(2 + \sqrt{3})$.

Write your answer in the form $a + b\sqrt{3}$ where a and b are integers.

(b) [3]

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