



H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS B (MEI)

Paper 3 Section A (Higher Tier)

B293A

Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:

- Geometrical instruments
- Tracing paper (optional)

Tuesday 11 January 2011
Morning

Duration: 45 minutes



| | | | |
|--------------------|--|-------------------|--|
| Candidate forename | | Candidate surname | |
|--------------------|--|-------------------|--|

| | | | | | | | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|
| Centre number | | | | | | Candidate number | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|

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

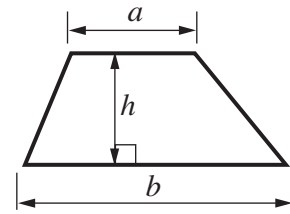
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this Section is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

WARNING

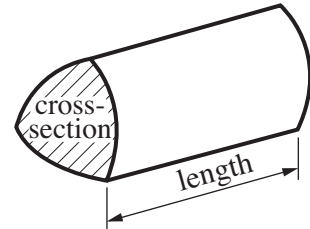
No calculator can be used for Section A of this paper

Formulae Sheet: Higher Tier

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



$$\text{Volume of prism} = (\text{area of cross-section}) \times \text{length}$$

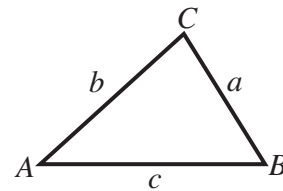


In any triangle ABC

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

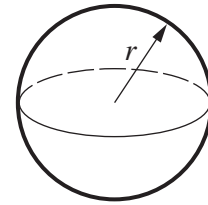
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



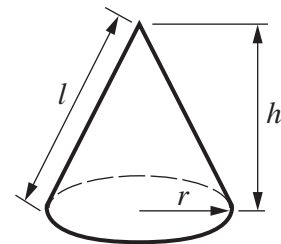
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

$$\text{Curved surface area of cone} = \pi r l$$



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 (a) Express 51 out of 300 as a percentage.

(a)% [2]

- (b) Find the smaller part when £300 is shared in the ratio 5:1.

(b) £ [2]

- 2 For all whole number values of n , the following expressions can be described as

always odd or **always even** or **either odd or even**.

For each expression, determine which one of the descriptions is correct. Give your reasons.

- (a) $5n + 1$

The expression is

Reason:

.....
 [2]

- (b) $2(n + 1)$

The expression is

Reason:

.....
 [2]

- 3 Employees at a factory earn £700 per week.
The manager offers them either an increase of £40 per week or a 5% rise in pay.

Which is the better choice for the employees? Explain your reasoning.

.....

.....

.....

.....

..... [3]

- 4 Peter has correctly worked out this sum on his calculator, correct to 2 decimal places.

$$\frac{95.9}{0.81 \times 0.62} = 190.96$$

Jane does a rough check as follows.

$$\frac{95.9}{0.81 \times 0.62} \approx \frac{96}{1 \times 1} = 96$$

Jane tells Peter that his answer is too big.

However, Jane is wrong.

Carry out a more accurate approximation to demonstrate that the answer is close to 200.

.....

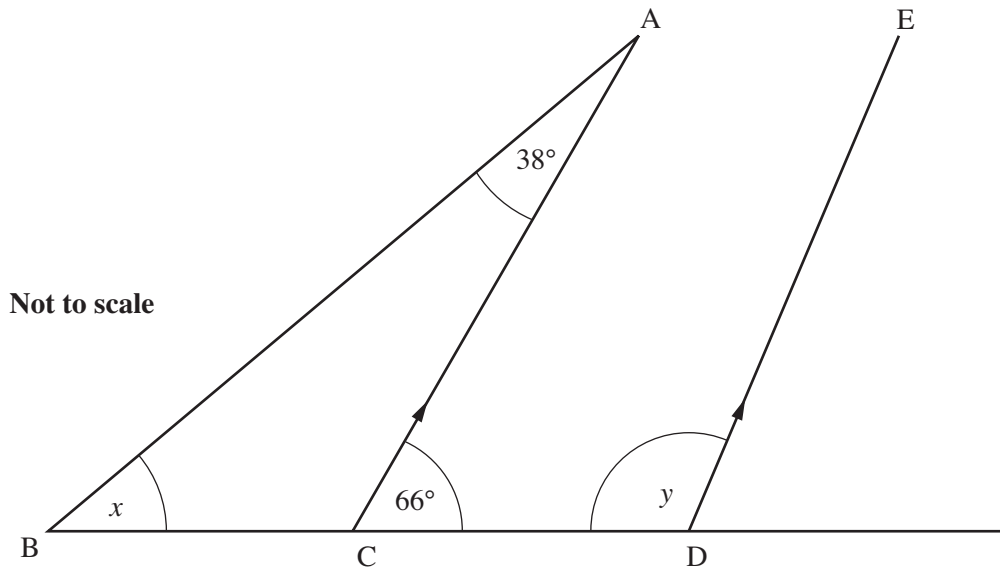
.....

.....

.....

..... [3]

- 5 In the diagram, CA is parallel to DE.
 Angle ACD = 66° and angle BAC = 38° .



Find the values of x and y , giving your reasons.

$x = \dots\dots\dots^\circ$

Reason:

.....

..... [2]

$y = \dots\dots\dots^\circ$

Reason:

.....

..... [2]

6 (a) Solve this equation.

$$3(2x + 5) = 27$$

(a) [3]

(b) Solve algebraically the following simultaneous equations.

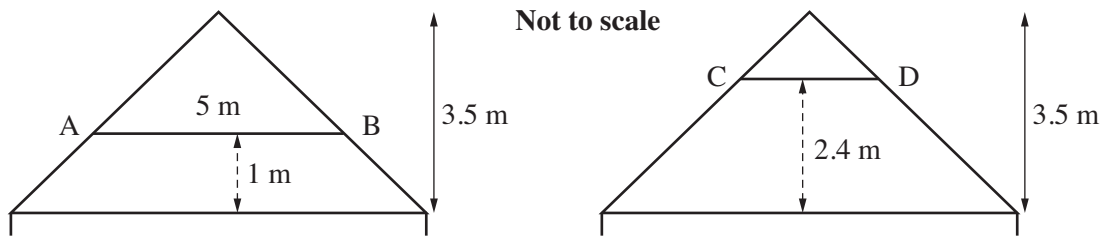
$$\begin{aligned} 4x + 3y &= 6 \\ 5x - 2y &= 19 \end{aligned}$$

(b) $x =$

$y =$ [4]

- 7 Asif wants to convert his attic into a living area. However, there is a beam AB which is too low, as shown in the first diagram. $AB = 5$ m.

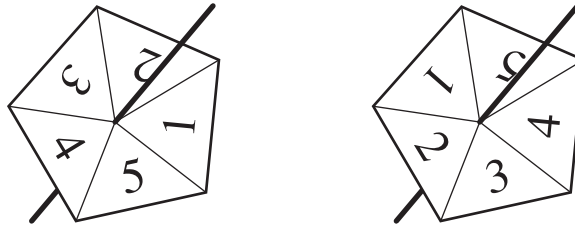
He needs to replace AB with the beam CD as shown in the second diagram.



Use similarity to calculate the length of the beam CD.

.....m [4]

8 Jake and Abdul are playing a game with spinners. Each has a spinner numbered from 1 to 5.



They each record the results of 200 spins.

| | 1 | 2 | 3 | 4 | 5 |
|-------|----|----|----|----|----|
| Abdul | 38 | 46 | 42 | 35 | 39 |
| Jake | 45 | 40 | 41 | 51 | 23 |

(a) Based on these results, what is the probability that Jake obtains a 5 on the next spin?

(a) [1]

(b) On this evidence, which spinner is more likely to be biased? Explain your reasoning

The spinner used by is more likely to be biased.

Reason:

..... [2]

9 (a) Factorise $x^2 - 2x$.

(a) [1]

(b) Hence simplify $\frac{x^2 - 5x + 6}{x^2 - 2x}$.

(b) [3]

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.