

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**MATHEMATICS B (MEI)**

Paper 4 Section A (Higher Tier)

**B294A**

**Friday 10 June 2011  
Morning**

**Duration: 1 hour**

Candidates answer on the question paper.

**OCR supplied materials:**  
None

**Other materials required:**

- Geometrical instruments
- Tracing paper (optional)



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.
- 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 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**

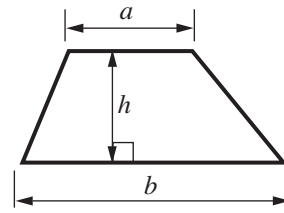
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this Section is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

**WARNING**

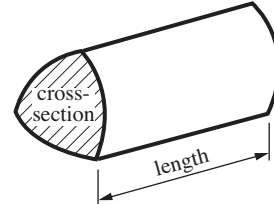
No calculator can be used for Section A of this paper

## Formulae Sheet: Higher Tier

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



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

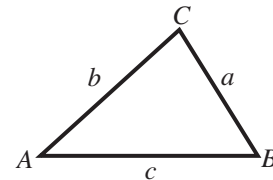


**In any triangle  $ABC$**

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

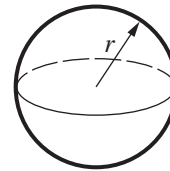
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



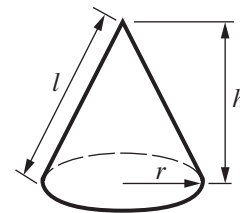
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**PLEASE DO NOT WRITE ON THIS PAGE**

1 (a) Mike is using this recipe for making custard.

<p><u>Serves 5</u></p> <p>1 pint milk 55 ml cream 1 vanilla pod 4 egg yolks 30 g caster sugar 2 level teaspoons cornflour</p>
---

Mike wants to make enough custard for 8 people.

How much cream should he use?

(a) ..... ml [2]

(b) Soraya is using the same recipe as Mike.  
She has plenty of the other ingredients but only 72 g of caster sugar.

For how many people can Soraya make custard?

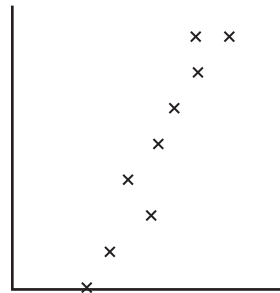
(b) ..... [2]

Turn over

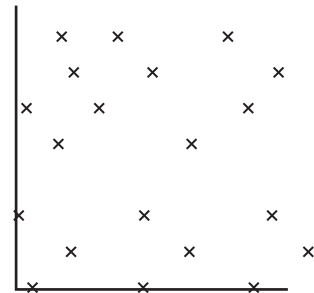
2 Here are some scatter diagrams.



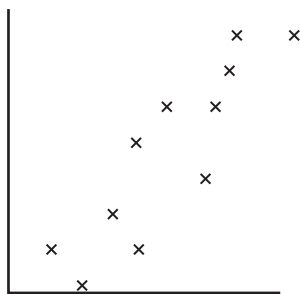
**A**



**B**



**C**



**D**



**E**



**F**



**G**

Complete the following sentences.

- (a) Strong, but not perfect, negative correlation is shown in diagram ..... [1]
- (b) Weak positive correlation is shown in diagram ..... [1]
- (c) No correlation is shown in diagram ..... [1]
- (d) Perfect positive correlation is shown in diagram ..... [1]

3 (a) Show that the interior angle of a regular pentagon is  $108^\circ$ .

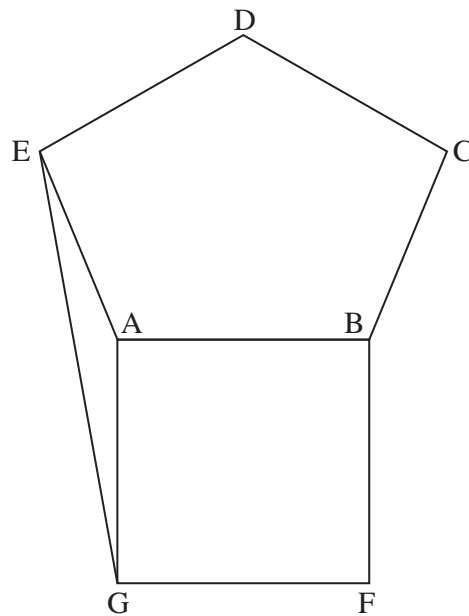
.....

.....

.....

..... [2]

(b) ABCDE is a regular pentagon.  
ABFG is a square.



Not to scale

Calculate angle AEG.  
Show each step of your calculation.

(b) .....<sup>o</sup> [3]

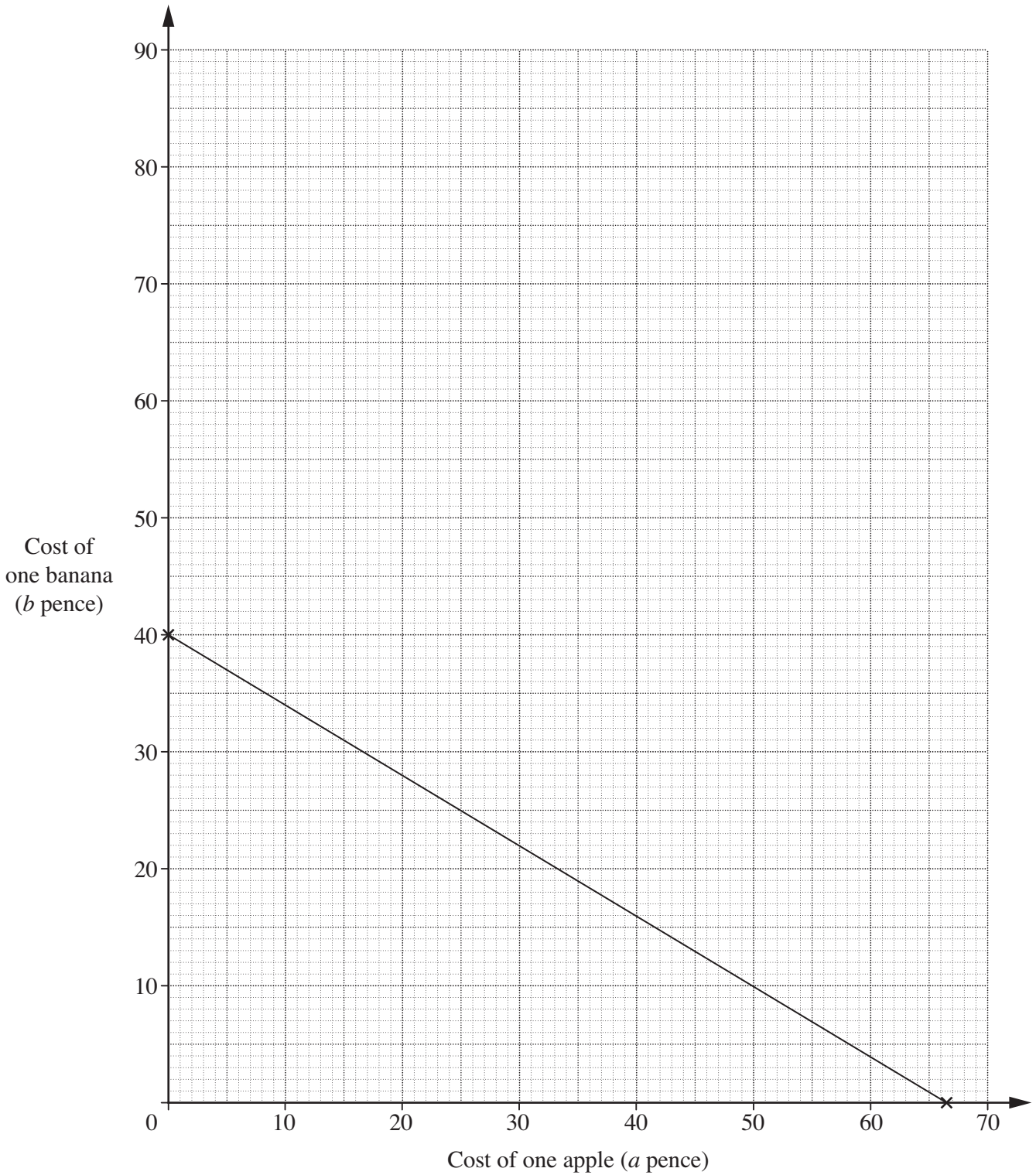
Turn over

- 4 Janine buys 3 apples and 5 bananas. The total cost is £2.00.  
The cost of one apple is  $a$  pence and the cost of one banana is  $b$  pence.

(a) Explain why  $3a + 5b = 200$ .

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

The graph of  $3a + 5b = 200$  is drawn on the grid.



- (b) Winston buys 4 apples and 2 bananas. The total cost is £1.64.

Write down a second equation in  $a$  and  $b$ .

(b) ..... [2]

- (c) (i) On the grid, draw a graph of the equation you found in part (b). [2]

- (ii) Use the graphs to find the cost of one apple and the cost of one banana.

apple ..... pence

banana ..... pence [2]

- 5 (a) The  $n$ th term of a sequence is  $n^2 + 2n$ .

Write down the first three terms in this sequence.

(a) ..... , ..... , ..... [2]

- (b) Here is a different sequence.

20          17          14          11          8

Find an expression for the  $n$ th term of the sequence.

(b) ..... [2]

6  $a = 4.2 \times 10^6$ ,  $b = 3 \times 10^{-4}$  and  $c = 5 \times 10^5$ .

Calculate the following, giving your answers in standard form.

(a)  $a \times b$

(a) ..... [2]

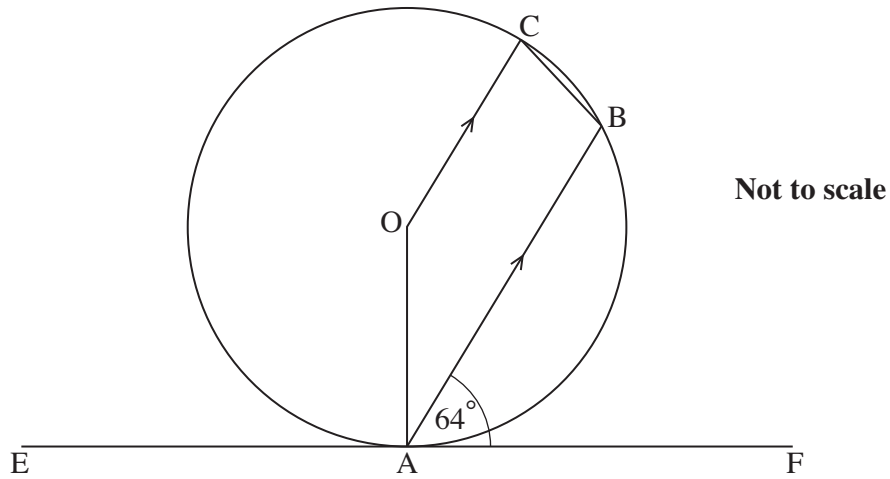
(b)  $a + c$

(b) ..... [2]

(c)  $\frac{a}{b}$

(c) ..... [2]





EAF is a tangent to the circle, centre O.  
 Angle BAF =  $64^\circ$ .  
 OC is parallel to AB.

Calculate these angles, giving a reason for each step in your working.

(a) Angle AOC

.....  
 .....  
 .....  
 .....  
 .....  
 .....

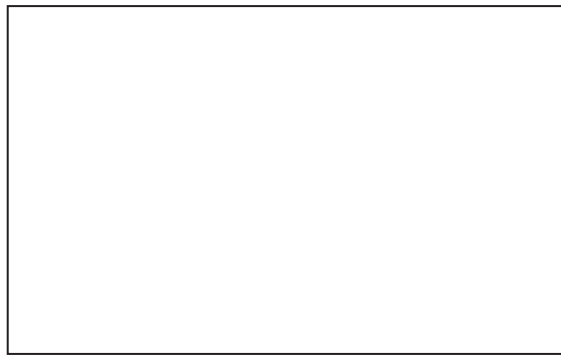
.....<sup>o</sup> [4]

(b) Angle ABC

.....  
 .....  
 .....  
 .....  
 .....

.....<sup>o</sup> [3]

8

**Not to scale**

The area of this rectangle is  $30 \text{ cm}^2$ .

Calculate, giving your answers in the form  $a\sqrt{3}$ ,

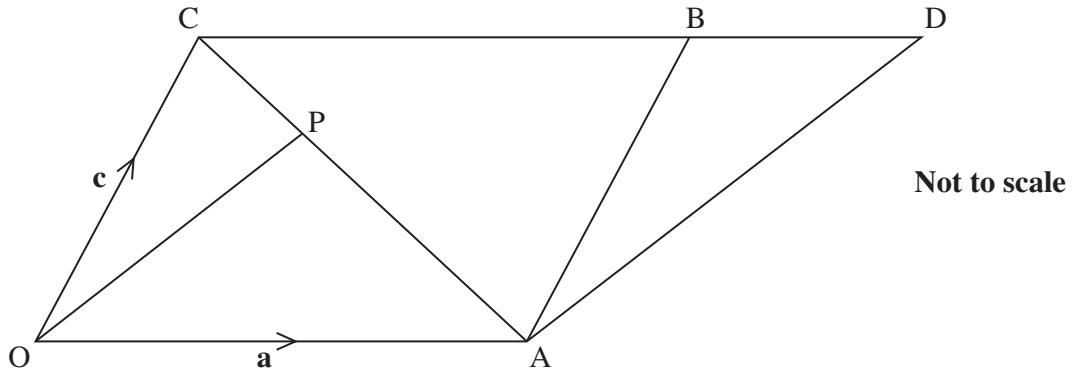
(a) the length of the rectangle,

(a) ..... cm [2]

(b) the perimeter of the rectangle.

(b) ..... cm [1]

9



OABC is a parallelogram.

$\vec{OA} = \mathbf{a}$  and  $\vec{OC} = \mathbf{c}$ .

CPA and CBD are straight lines.

$CP = \frac{1}{3}CA$ .

- (a) Find  $\vec{OP}$  in terms of  $\mathbf{a}$  and  $\mathbf{c}$ .  
Give your answer in its simplest form.

(a) ..... [3]

- (b)  $BD = \frac{1}{2}CB$ .

Prove, using vectors, that OP is parallel to AD.

.....

.....

.....

.....

.....

.....

.....

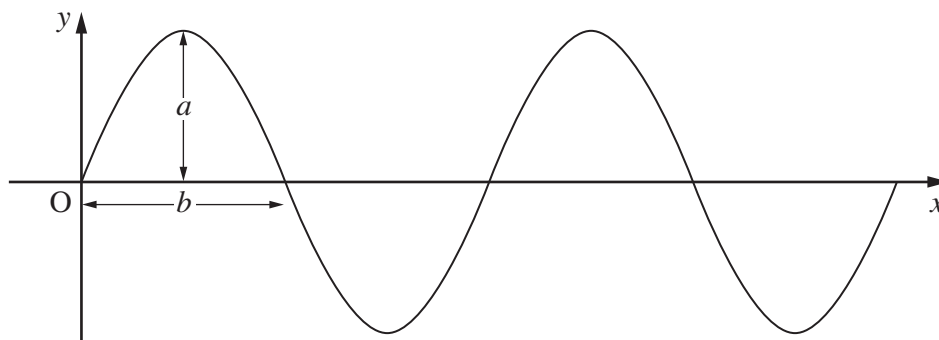
.....

.....

..... [3]

TURN OVER FOR QUESTION 10

10 The sketch shows part of the graph of  $y = 4 \sin(3x^\circ)$ .



Find the value of

(a)  $a$ ,

(a) ..... [1]

(b)  $b$ .

(b) ..... [2]

**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](http://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.