OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS B (MEI)
Paper 4 Section B
(Higher Tier)

B294B

Monday 1 June 2009
Morning

Duration: 1 hour

Candidate Forename		Candidate Surname	

| Centre Number						Candidate Number				

MODIFIED LANGUAGE

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 all 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. You may ask for more paper, if you need it.

INFORMATION FOR CANDIDATES

* The number of marks is given in brackets **[ ]** at the end of each question or part question.
* Section B starts with question 10.
* You are expected to use a calculator in Section B of this paper.
* Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
* The total number of marks for this Section is **50**.
* This document consists of **12** pages. Any blank pages are indicated.

Turn over

Formulae Sheet: Higher Tier

Area of trapezium $= \frac{1}{2}(a + b)h$
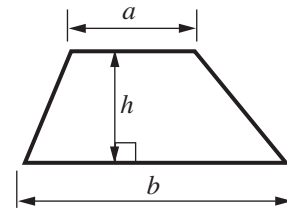
Volume of prism = (area of cross-section) × length
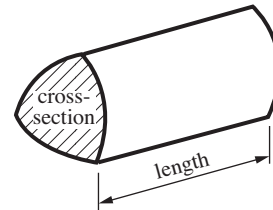
In any triangle *ABC*

Sine rule $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
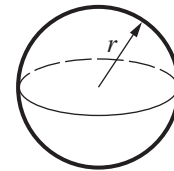
Cosine rule $\quad a^2 = b^2 + c^2 - 2bc \cos A$

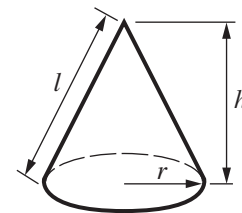**Area of triangle** $= \frac{1}{2}ab \sin C$
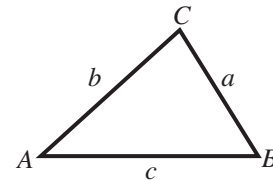
Volume of sphere $= \frac{4}{3}\pi r^3$

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

10 **(a)** Factorise $a^2 - 6a$.

(a) .... **[1]**

(b) Solve $5x - 2 = 3x + 7$.

(b) .... **[3]**

(c) Simplify the following.

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

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

(ii) $\dfrac{12x^4y^3}{3x^2y}$

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

Turn over

4

11 John is arranging a rugby finals day.
He asks two companies for their prices to print the programmes.

The total price is £y and the number of programmes printed is x.

(a) Company A charges a basic fee of £200 plus an amount for each programme printed.
The formula for Company A is $y = 200 + 0.6x$.
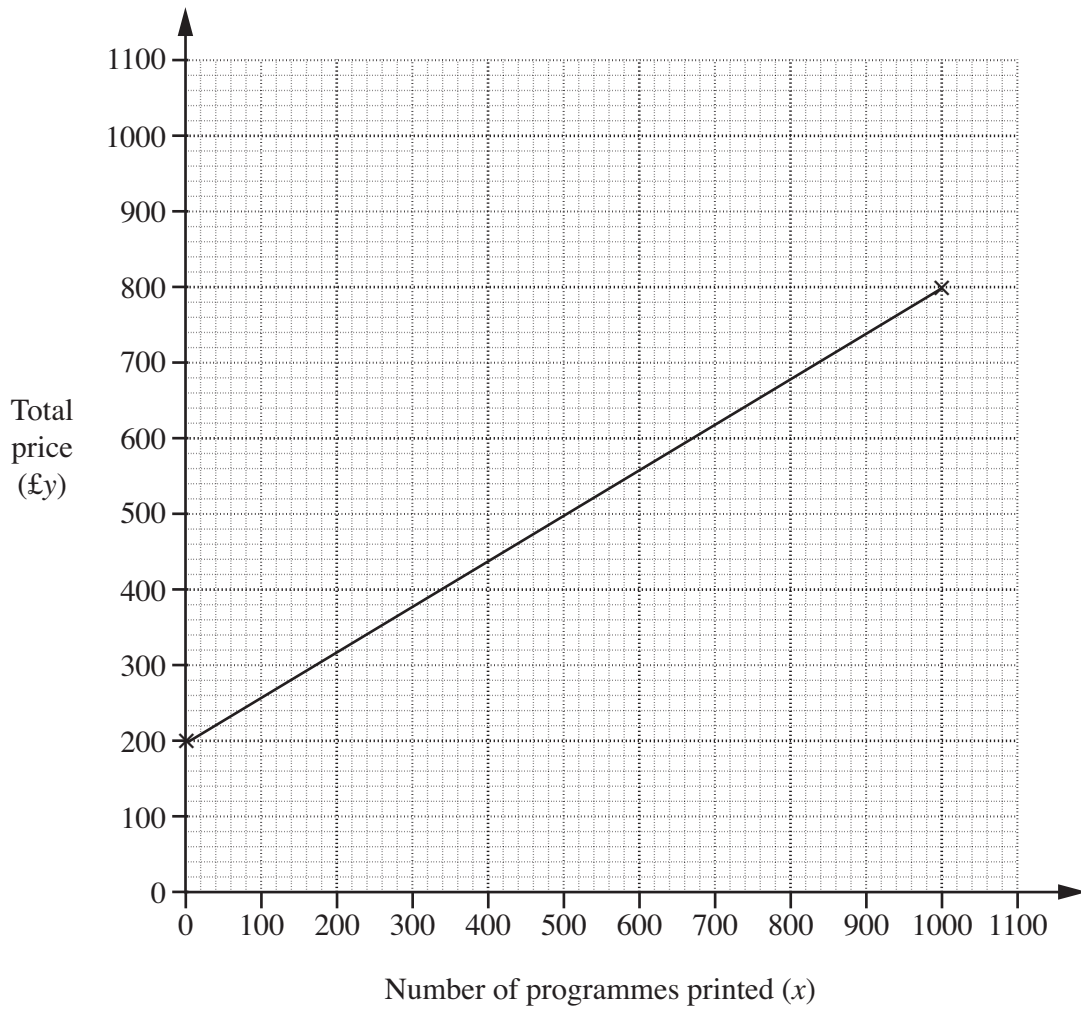
What is the amount charged for each programme printed?

(a) .... **[1]**

(b) Company B does not charge a basic fee, but charges £1.10 for each programme printed.

Write down a formula for y in terms of x for Company B.
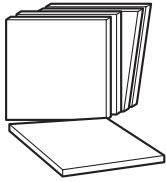
(b) .... **[1]**

(c) This graph is for $y = 200 + 0.6x$.

(i) Draw a line on the grid to represent Company B's total price. **[2]**

(ii) Use your graph to find the number of programmes for which the total price for the two companies is the same.
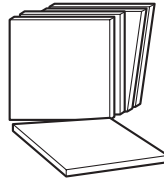
(c)(ii) .... **[2]**

12

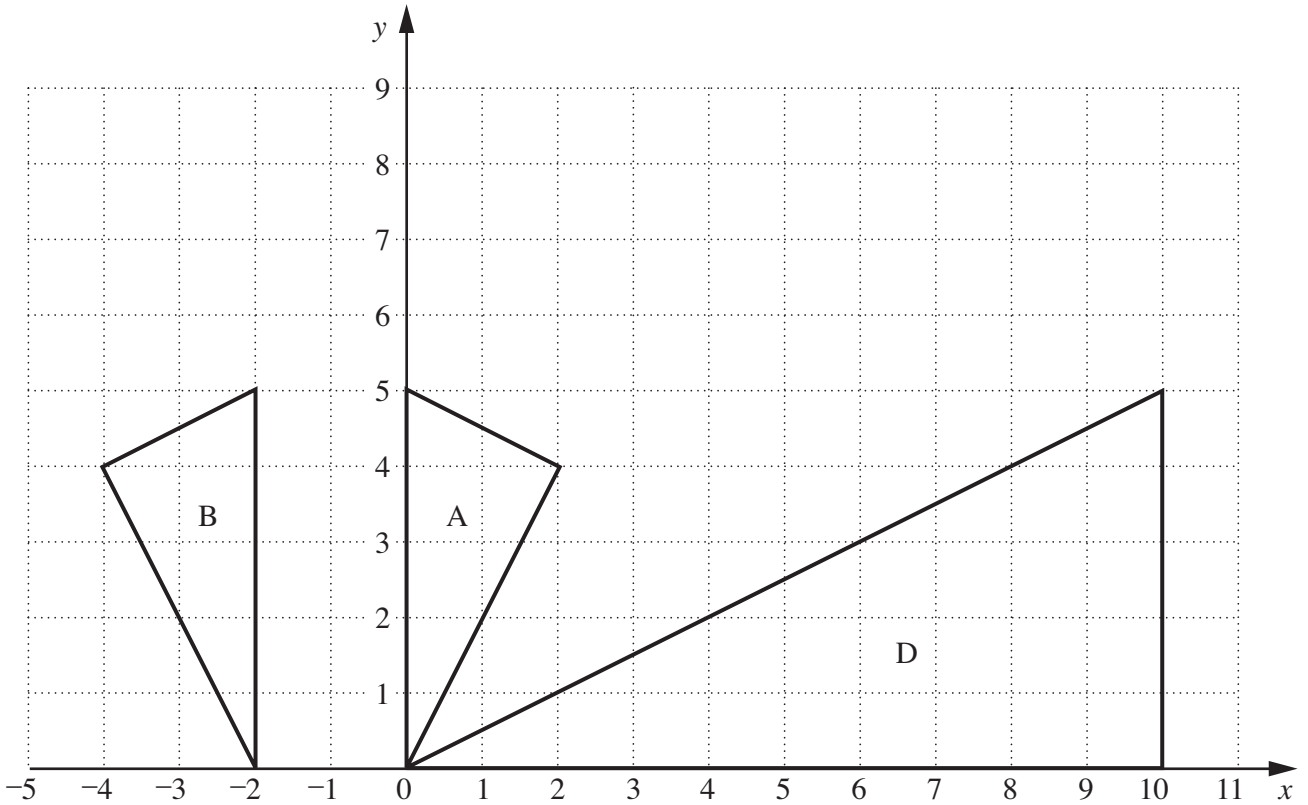| Discount Tiles	Total Tiles
£24.35 per m² + VAT	£27.73 per m² including VAT

(a) VAT on tiles is charged at 17.5%.

Which shop is cheaper for the tiles after VAT is included?
How much cheaper per m² are the tiles from this shop?

(a) .... by £ .... **[4]**

(b) Find the cost per m² of the tiles at 'Total Tiles' before VAT is included.

(b) £ .... **[3]**

13

(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.... **[2]**

(b) Translate the triangle A by the vector $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$. Label the image C.   **[2]**

(c) Triangle A can be mapped onto triangle D by a rotation followed by an enlargement.

    (i) Use trigonometry to calculate the angle of rotation.
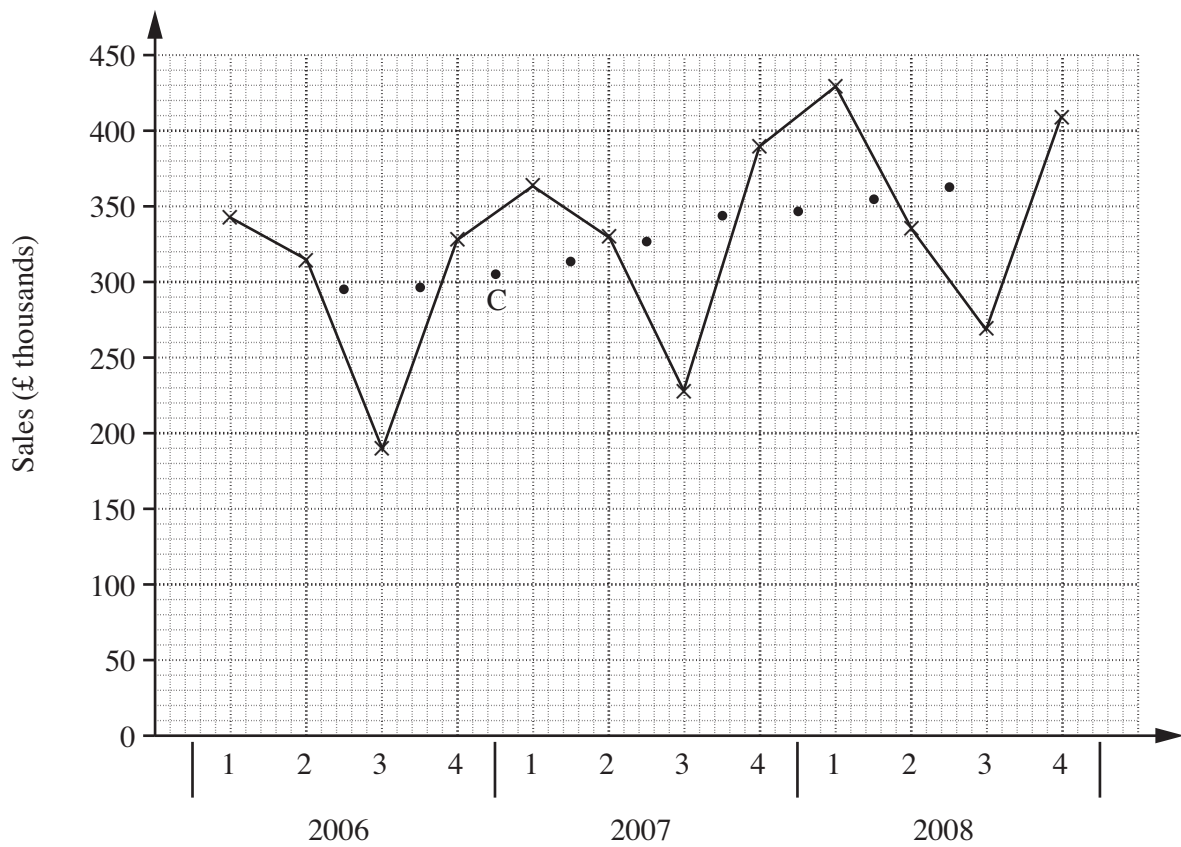
                                           (c)(i) ....° **[3]**

    (ii) Calculate the scale factor of the enlargement.
           Give your answer in the form $\sqrt{a}$, where a is an integer.

                                           (ii) .... **[3]**

Turn over

14 The table shows the quarterly sales of a heating appliance manufacturer for the years 2006 to 2008.

	Quarter			
	1	**2**	**3**	**4**
2006	343	315	190	328
2007	365	330	228	390
2008	428	338	270	410

The graph shows the quarterly sales (×) and the 4-quarter moving averages (•).

(a) Show that the moving average plotted at point C is 303.25. **[1]**

(b) Make one comment about the quarterly pattern of sales and one comment about the yearly trend.

Quarterly Pattern ....

....**[1]**

Yearly Trend ....**[1]**

(c) (i) Draw a trend line and use it to predict the next moving average.

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

(ii) Use the moving average you found in part **(c)(i)** to predict the sales for the first quarter of 2009.

(ii) ....**[3]**

15 (a) Expand and simplify $(x-4)(x-3)$.

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

(b) Rearrange this formula to make x the subject.

$$y = \frac{5x + 2}{3x - 1}$$

(b) .... **[4]**
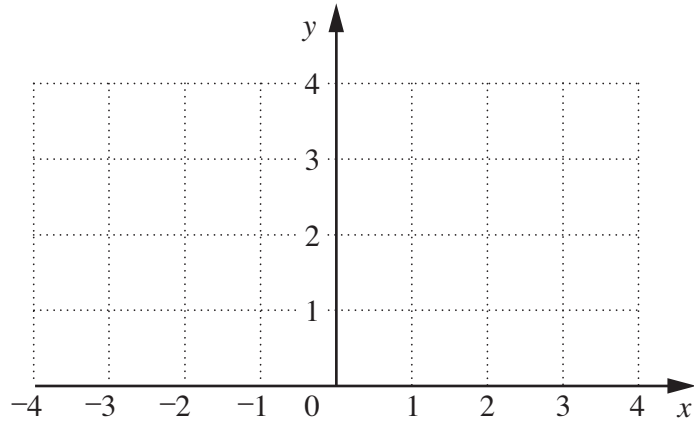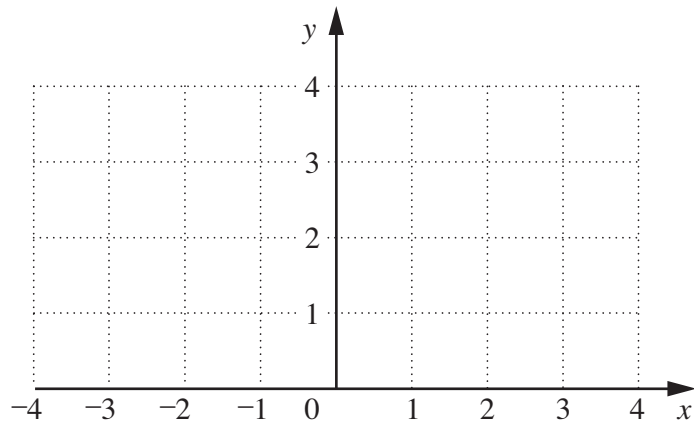
16 The graph shows $y = f(x)$.
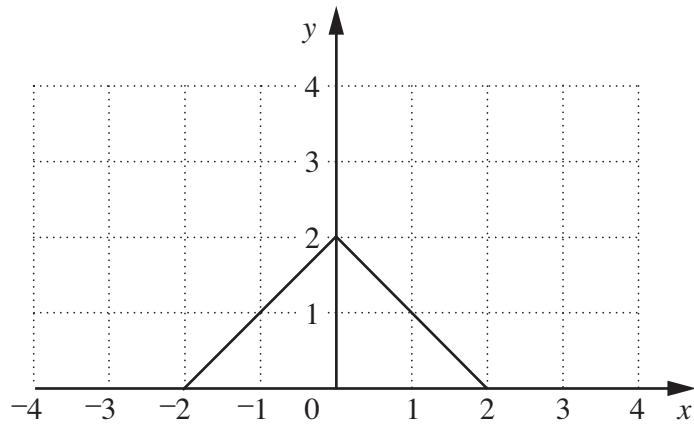
On the grids transform the above graph to show the graph of

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

[1]

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

[1]

TURN OVER FOR QUESTION 17

17 $y = z^2 + 1$ $\qquad$ $3x + z = 2$

By eliminating z, express y in terms of x.
Give your answer in the form $y = ax^2 + bx + c$.

....**[4]**

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