

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS B (MEI)**

B294B

Paper 4 Section B
(Higher Tier)

**Monday 1 June 2009
Morning**

Duration: 1 hour

Candidates answer on the question paper

OCR Supplied Materials:

None

Other Materials Required:

- Geometrical instruments
- Scientific or graphical calculator
- Tracing paper (optional)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

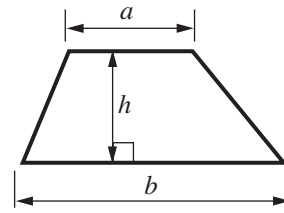
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show all your working. 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, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

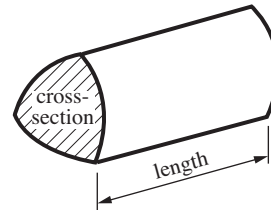
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 10.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total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

Formulae Sheet: Higher Tier

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



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

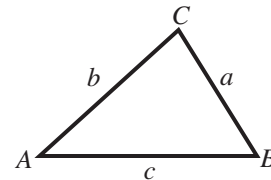


In any triangle ABC

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

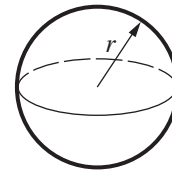
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



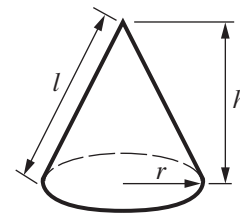
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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) $\frac{12x^4y^3}{3x^2y}$

(ii) [2]

- 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?

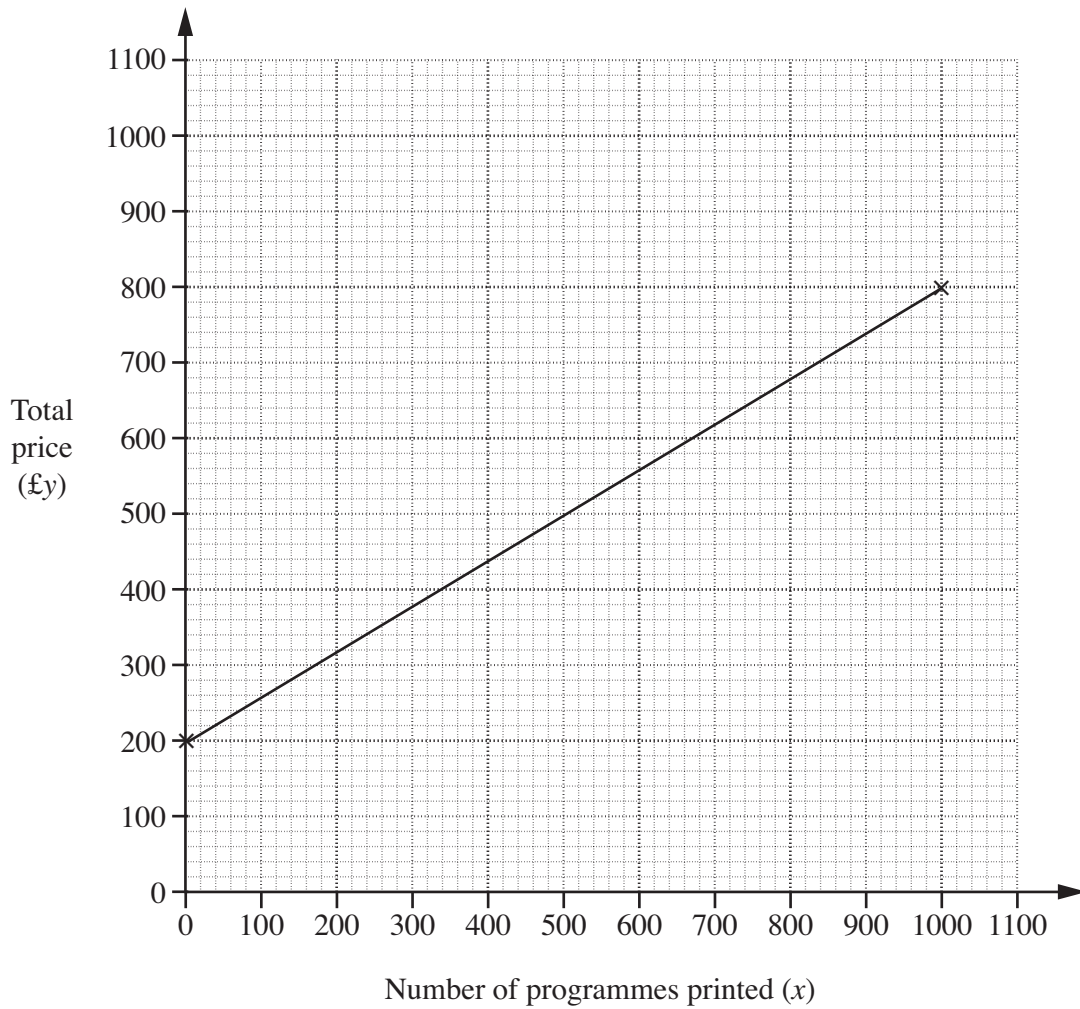
(a) [1]

- (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]

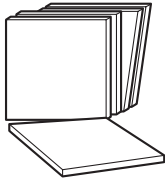
(c) This graph is for $y = 200 + 0.6x$.



- (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.

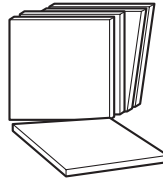
(c)(ii) [2]

Discount Tiles



£24.35 per m²
+ VAT

Total Tiles



£27.73 per m²
including VAT

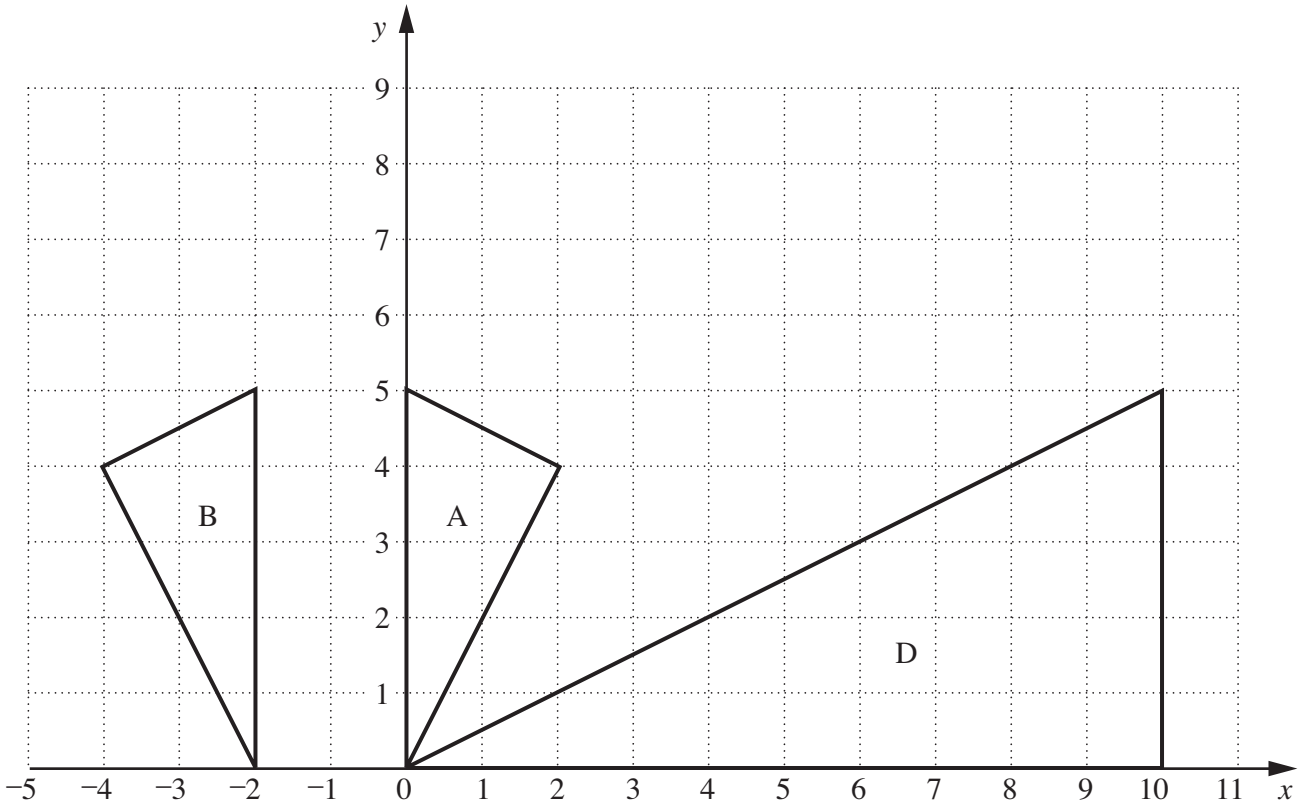
(a) VAT on tiles is charged at 17.5%.

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]



(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]

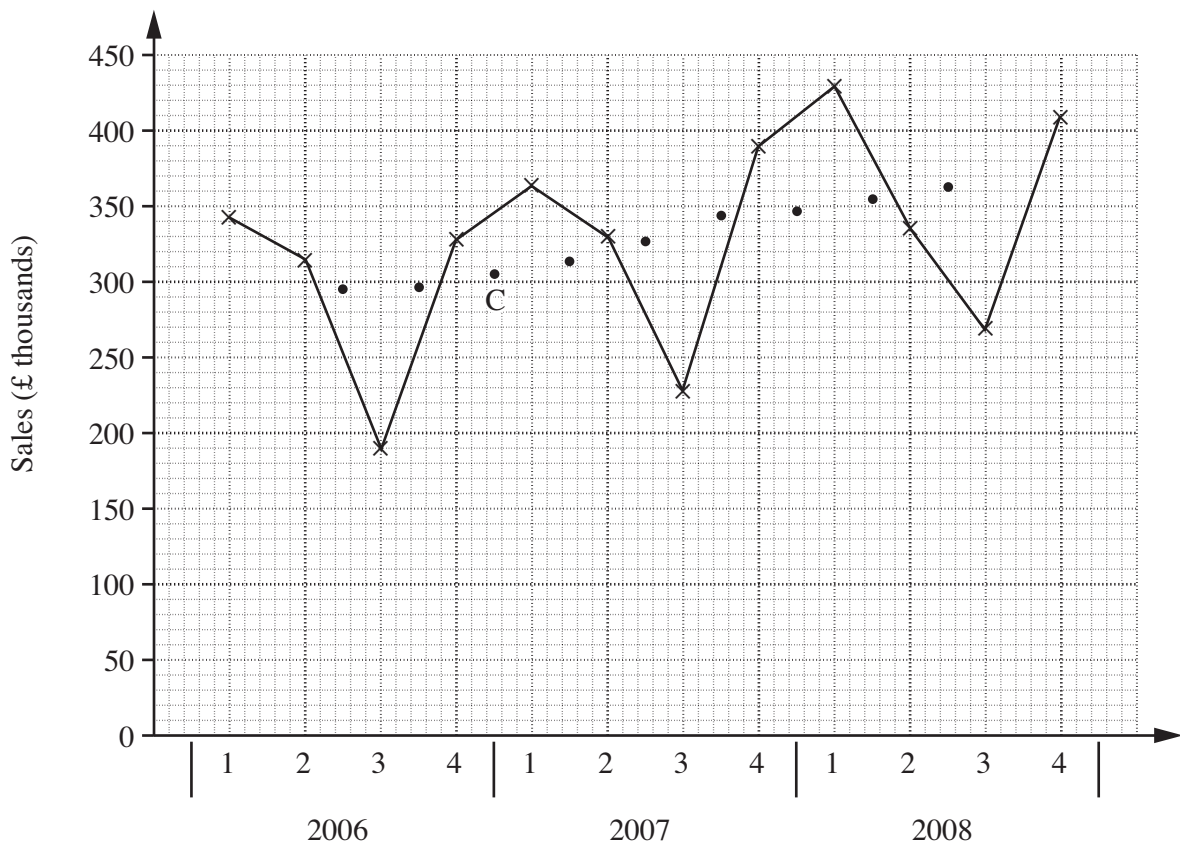
(ii) Calculate the scale factor of the enlargement.
Give your answer in the form \sqrt{a} , where a is an integer.

(ii) [3]

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 $(x - 4)(x - 3)$.

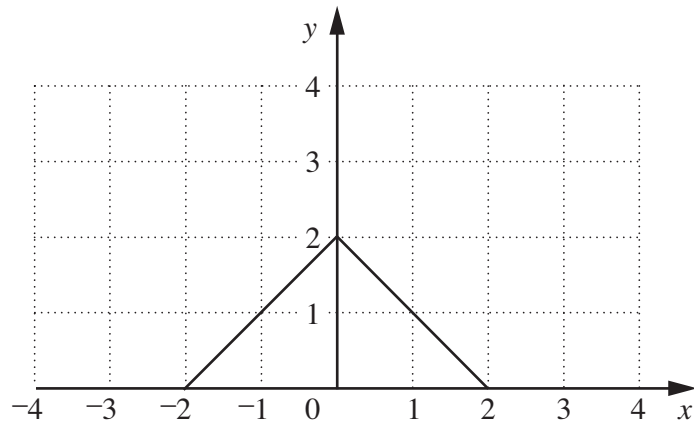
(a) [2]

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

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

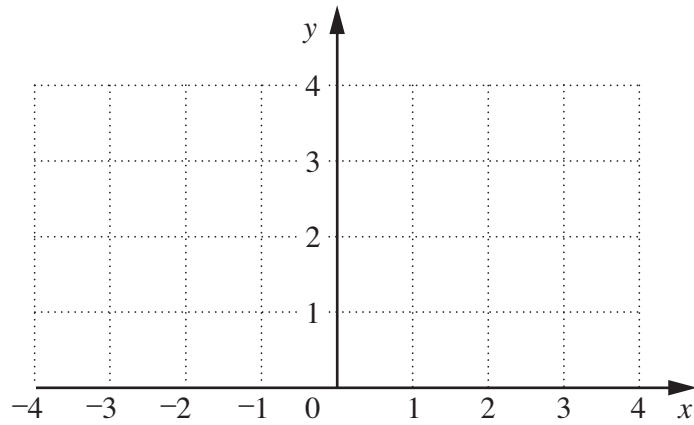
(b) [4]

16 The graph shows $y = f(x)$.



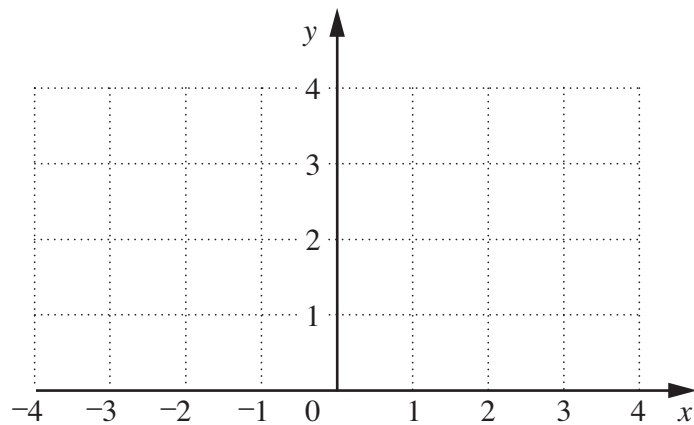
On the grids transform the above graph to show the graph of

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



[1]

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



[1]

TURN OVER FOR QUESTION 17

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

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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