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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B294B

MATHEMATICS B (MEI)

**Paper 4 Section B
(Higher Tier)**

MONDAY 1 JUNE 2009: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments
Scientific or graphical calculator
Tracing paper (optional)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

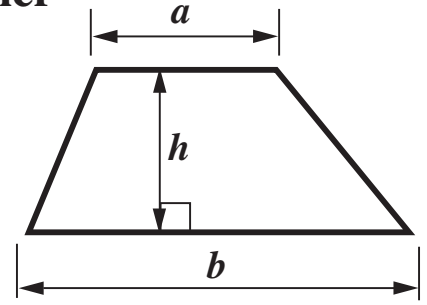
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show all your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer ALL the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

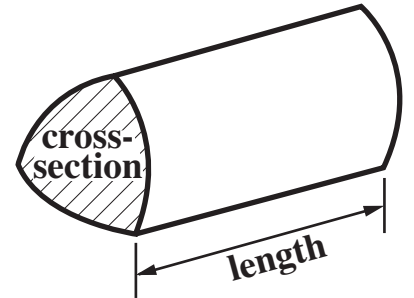
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 10.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total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

Formulae Sheet: Higher Tier

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



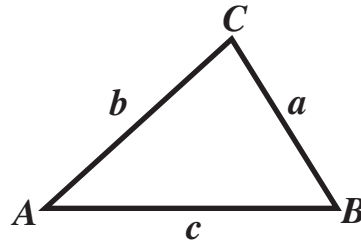
Volume of prism = (area of cross-section) \times length



In any triangle ABC

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

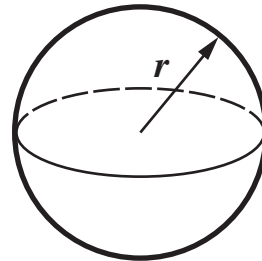
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$



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

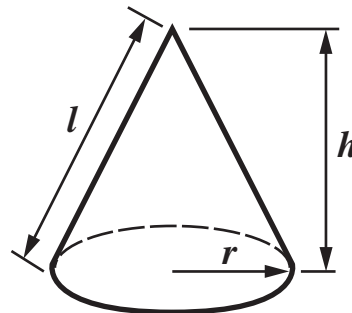
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

10 (a) Factorise $a^2 - 6a$
[1 mark]

(a) _____

(b) Solve

$$5x - 2 = 3x + 7$$

[3 marks]

(b) _____

(c) Simplify the following.

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

[1 mark]

(c)(i) _____

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

[2 marks]

(ii) _____

**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? [1 mark]

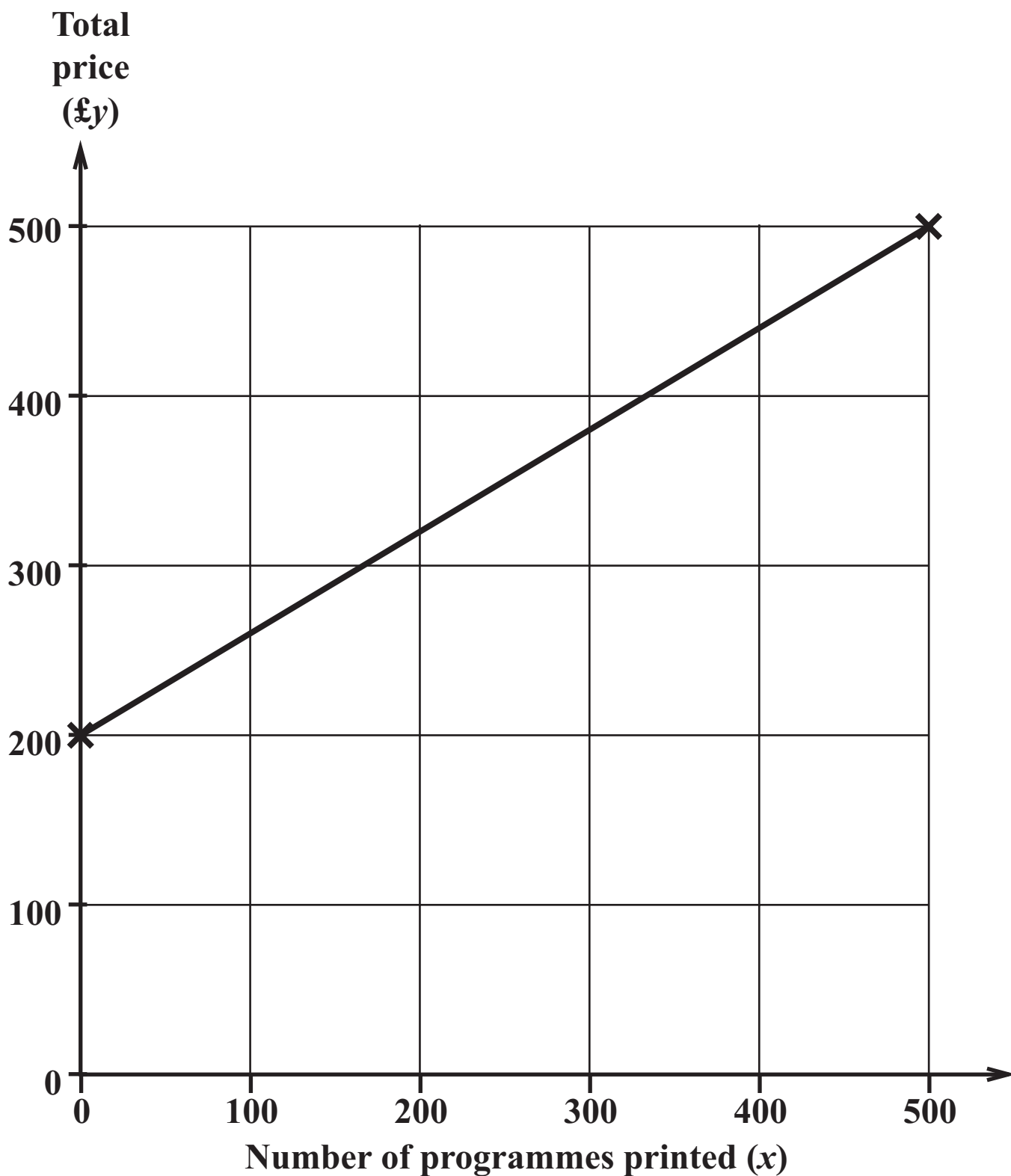
(a) _____

(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. [1 mark]

(b) _____

(c) The graph below is for $y = 200 + 0.6x$



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

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

(c)(ii) _____

12 Two shops sell the same tiles.

At 'Discount Tiles' they cost £24.35 per m² + VAT

At 'Total Tiles' they cost £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?

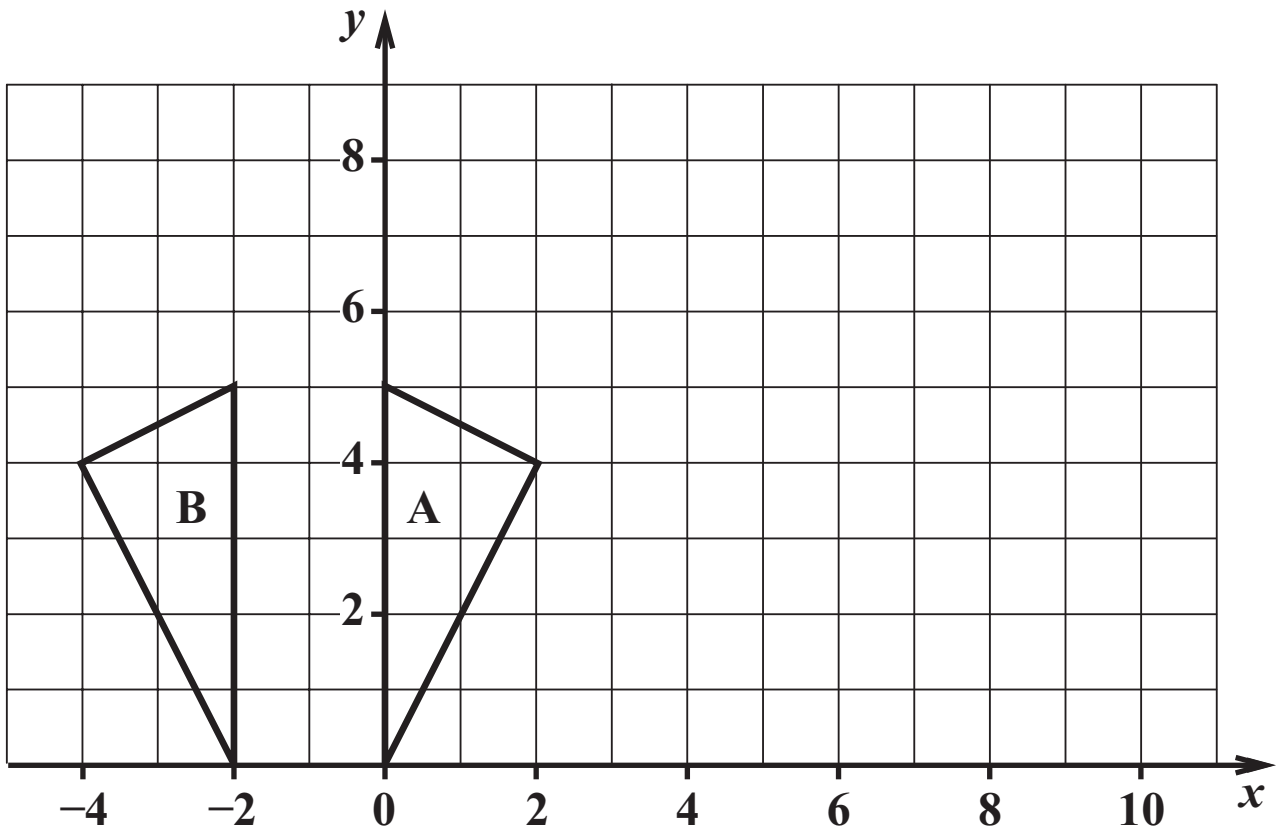
[4 marks]

(a) _____ by £ _____

(b) Find the cost per m^2 of the tiles at 'Total Tiles' before VAT is included.

(b) £ _____

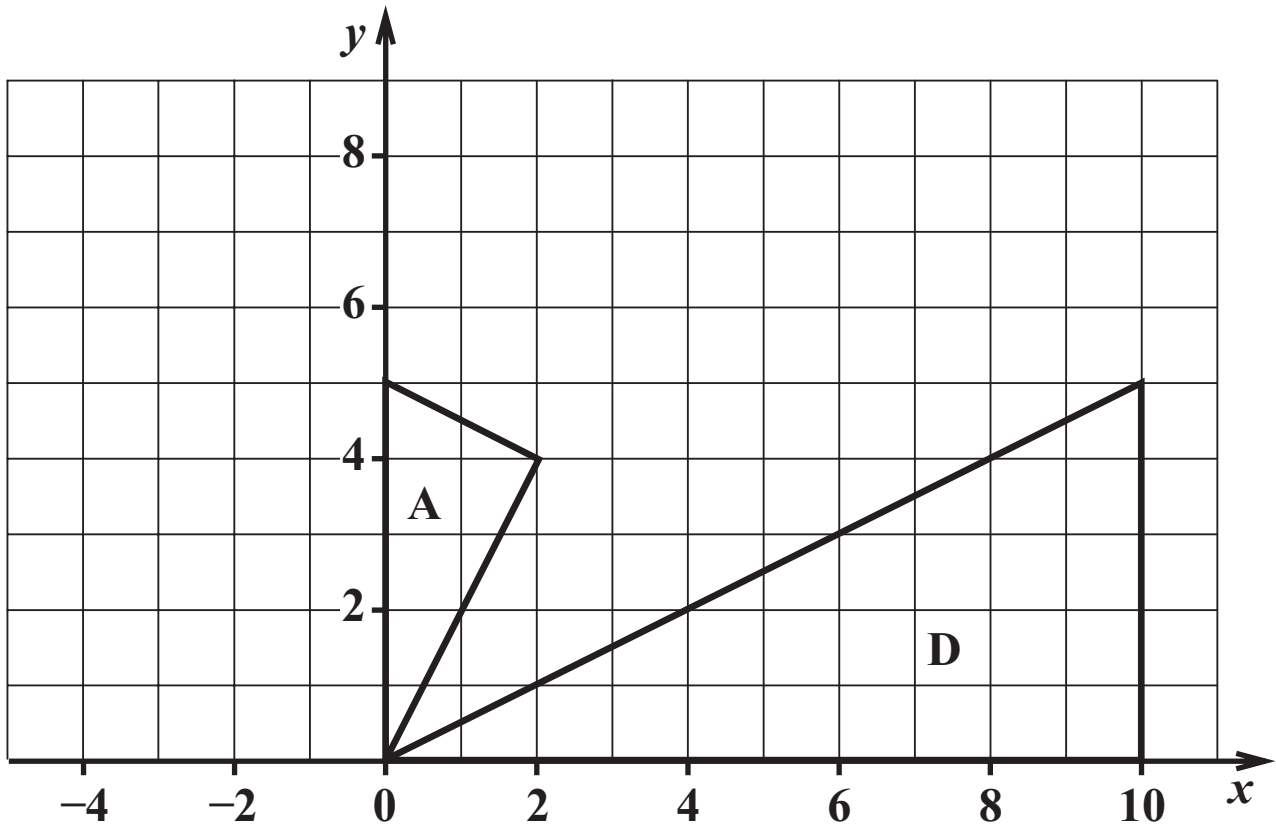
- 13 Look at the diagram below.
It shows two triangles A and B drawn on a square grid.



- (a) Describe fully the SINGLE transformation that maps triangle A onto triangle B. [2 marks]
-

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

(c) Look at the diagram below.



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

- (i) Use trigonometry to calculate the angle of rotation. [3 marks]

(c)(i) _____°

- (ii) Calculate the scale factor of the enlargement. Give your answer in the form \sqrt{a} , where a is an integer. [3 marks]

(ii) _____

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

	<u>QUARTER</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
<u>2006</u>	343	315	190	328
<u>2007</u>	365	330	228	390
<u>2008</u>	428	338	270	410

Graph 1 on a separate page shows the quarterly sales.

- (a) The 4-quarter moving averages are calculated.
Show that the third moving average is 303.25.
[1 mark]

The moving averages are shown in graph 2 on a separate sheet.

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

Quarterly Pattern [1 mark] _____

Yearly Trend [1 mark] _____

- (c) (i) Draw a trend line on graph 2 and use it to predict the next moving average. [2 marks]**

(c)(i) _____

- (ii) Use the moving average you found in part (c)(i) to predict the sales for the first quarter of 2009. [3 marks]**

(ii) _____

15 (a) Expand and simplify

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

[2 marks]

(a) _____

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

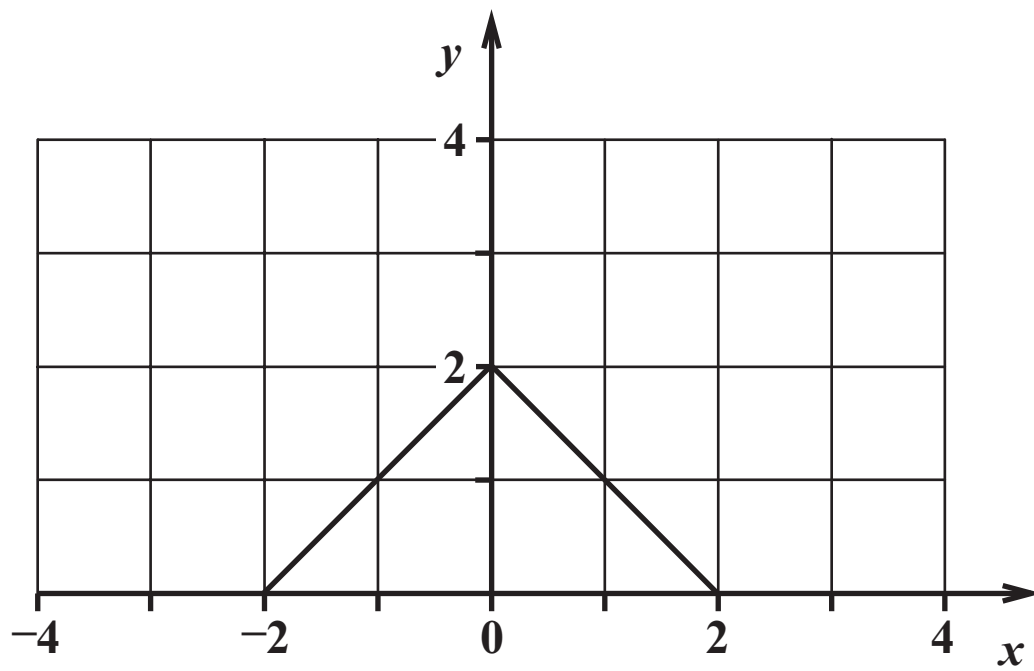
$$y = \frac{5x + 2}{3x - 1}$$

[4 marks]

(b) _____

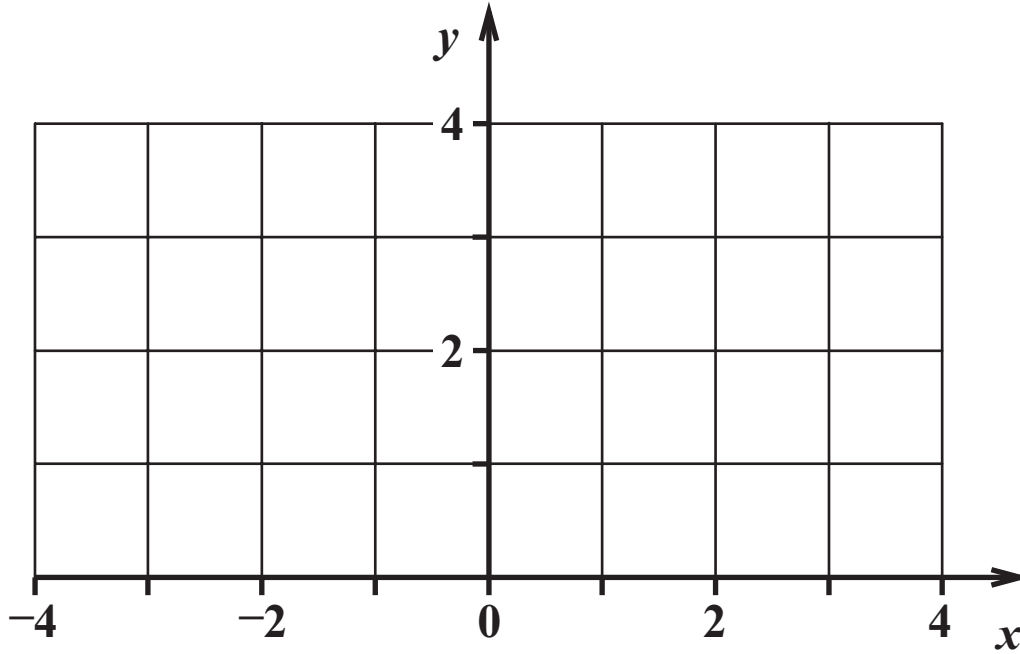
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16 The graph below shows $y = f(x)$.

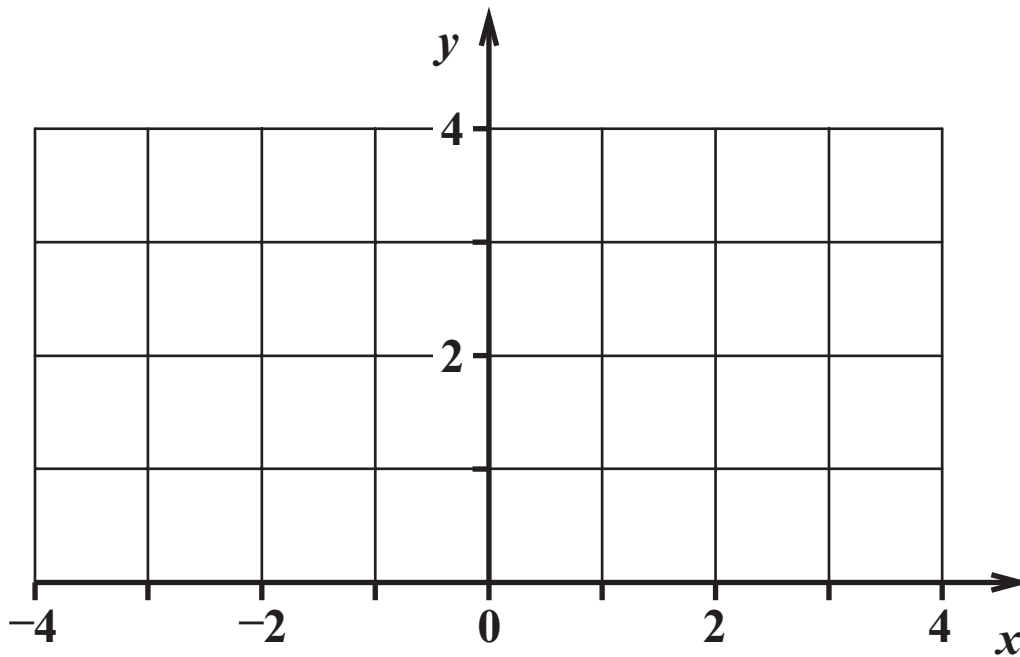


On the grids below transform the graph opposite to show the graph of

- (a) $y = 2f(x)$
[1 mark]



- (b) $y = f(x + 2)$
[1 mark]



$$17 \quad y = z^2 + 1$$

$$3x + z = 2$$

By eliminating z , express y in terms of x

Give your answer in the form $y = ax^2 + bx + c$

[4 marks]



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