Pearson Edexcel International GCSE

Wednesday 11 June 2025

Morning (Time: 2 hours 30 minutes) | **Paper reference** **4MB1/02R**

Mathematics B
PAPER 2R

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ▶

Answer ALL TWELVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Solve the simultaneous equations

$$3x - 4y = 3$$
$$4x - 7y = 2$$

Show clear algebraic working.

(4)

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(Total for Question 1 is 4 marks)

2

A _____ B

D _____ C

The diagram shows quadrilateral *ABCD*

(a) Construct the locus of all points that are 4 cm from *C*

(1)

(b) Using ruler and compasses only and **showing all your construction lines**, construct the perpendicular bisector of *AD*

(2)

The region **R** consists of all the points inside the quadrilateral that are less than 4 cm from *C* and nearer to *A* than to *D*

(c) Show, by shading, the region **R**
Label the region **R**

(1)

(Total for Question 2 is 4 marks)

3

Diagram **NOT**
accurately drawn

Figure 1

Figure 1 shows part of a regular 20-sided polygon in which *AB*, *BC*, *CD*, *DE*, *EF* and *FG* are six of the sides.

(a) Find the size, in degrees, of angle *ABC*

(2)

(b) Find the size, in degrees, of angle *EGA*

(4)

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$$\left[\begin{array}{l}\textbf{Sum of interior angles of a polygon} \\ (2n-4) \text{ right angles} \end{array}\right]$$

(Total for Question 3 is 6 marks)

P 7 9 5 5 7 A 0 5 4 0

4 The nth term of a sequence is given by $2n^2 - 5$

(a) Find the difference between the 3rd term and the 7th term of the sequence.

(2)

A different sequence is generated.

After the first term the sequence is generated by using the rule

"multiply the previous term by d and then add 2"

The first term of the sequence is $(2x - 1)$

The second term of the sequence is $(4x + 9)$

The third term of the sequence is $(20x - 11)$

Given that $2x - 1 > 0$

(b) find the value of d
Show all your working.

(5)

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$$\left[\text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right]$$

(Total for Question 4 is 7 marks)

5 A large rental company has cars, vans and minibuses available to rent.

The cost to rent a minibus from the company is found by adding

$1000 rental fee
$400 for each day the minibus is rented
$0.8 per kilometre the minibus travels during the time it is rented

This cost is reduced by n% if the minibus is a hybrid vehicle.

The total cost of hiring 3 minibuses that are hybrid vehicles for 7 days is $10 584

Given that each minibus travels a total distance of 500 kilometres during these 7 days

(a) find the value of n
   Show all your working.

   (5)

The number of cars the company owns is the Highest Common Factor (HCF) of

$$2^2 \times 3^5 \times 5^3 \text{ and } 2^5 \times 3^2 \times 5^5 \times 7$$

(b) Find the number of cars the company owns.

   (1)

The number of cars that are hybrid vehicles is the least value of N such that

   when N is divided by 120 the remainder is 7 and
   when N is divided by 504 the remainder is 7

(c) Find the number of cars that are hybrid vehicles.

   (3)

The company owns 200 vans and minibuses in total.

Each van and each minibus is either an electric vehicle or a hybrid vehicle.

The ratio of the number of vans to the number of minibuses is 5 : 3

40% of the vans are hybrid vehicles.

$\dfrac{9}{25}$ of the minibuses are hybrid vehicles.

(d) Express the total number of vans and minibuses which are hybrid vehicles as a
   percentage of the total number of vans and minibuses.
   Show your working clearly.

   (4)

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P 7 9 5 5 7 A 0 1 1 4 0

Question 5 continued

Question 5 continued

6 A group of 90 students were asked if they own any of a dog (D), a cat (C) or a horse (H)

Of these 90 students

4 own all three

14 own a dog and a cat

7 own a cat and a horse

26 own a dog only

2 own a horse only

6 own none of these animals

Let x be the number of these students who own a cat only.

(a) Show all this information on the Venn diagram, giving the number of students in each appropriate subset, in terms of x where necessary.
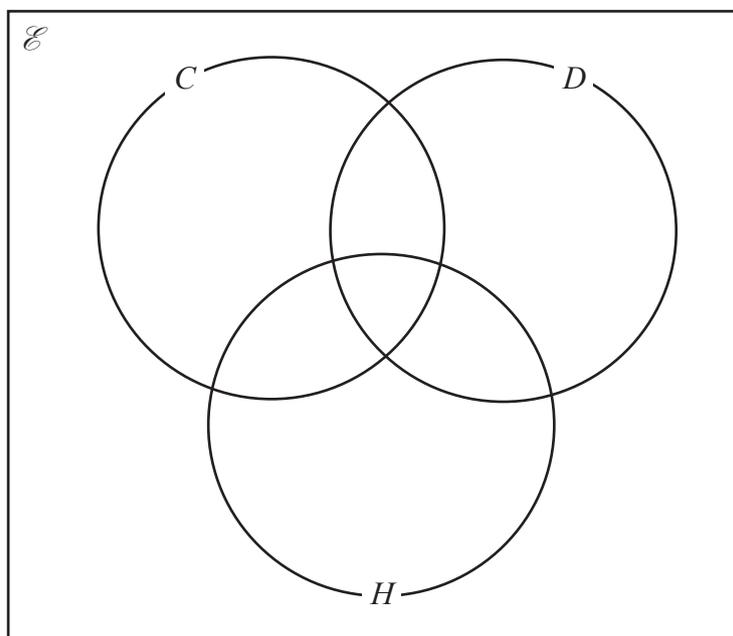
(3)

The number of these students who own a cat is 37 more than the number of these students who own a horse.

(b) Find the value of x

(2)

(c) Find $n(D \cap H')$

(1)

(d) Find $n\left(\left[C \cup D\right]'\right)$

(1)

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Question 6 continued

(Total for Question 6 is 7 marks)

7 Triangle A and triangle B are drawn on the grid opposite.

Triangle A is transformed to triangle C under the translation $\begin{pmatrix} -4 \\ 7 \end{pmatrix}$

(a) On the grid, draw and label triangle C

(2)

Triangle A is transformed to triangle D under a reflection in the line with equation $x = 4$

(b) On the grid, draw and label triangle D

(2)

Triangle B is the image of triangle A under an enlargement with centre the origin and scale factor $\sqrt{5}$ followed by a clockwise rotation of $\theta°$ about the origin.

(c) Calculate the value, to 4 significant figures, of θ
Show your working.

(3)

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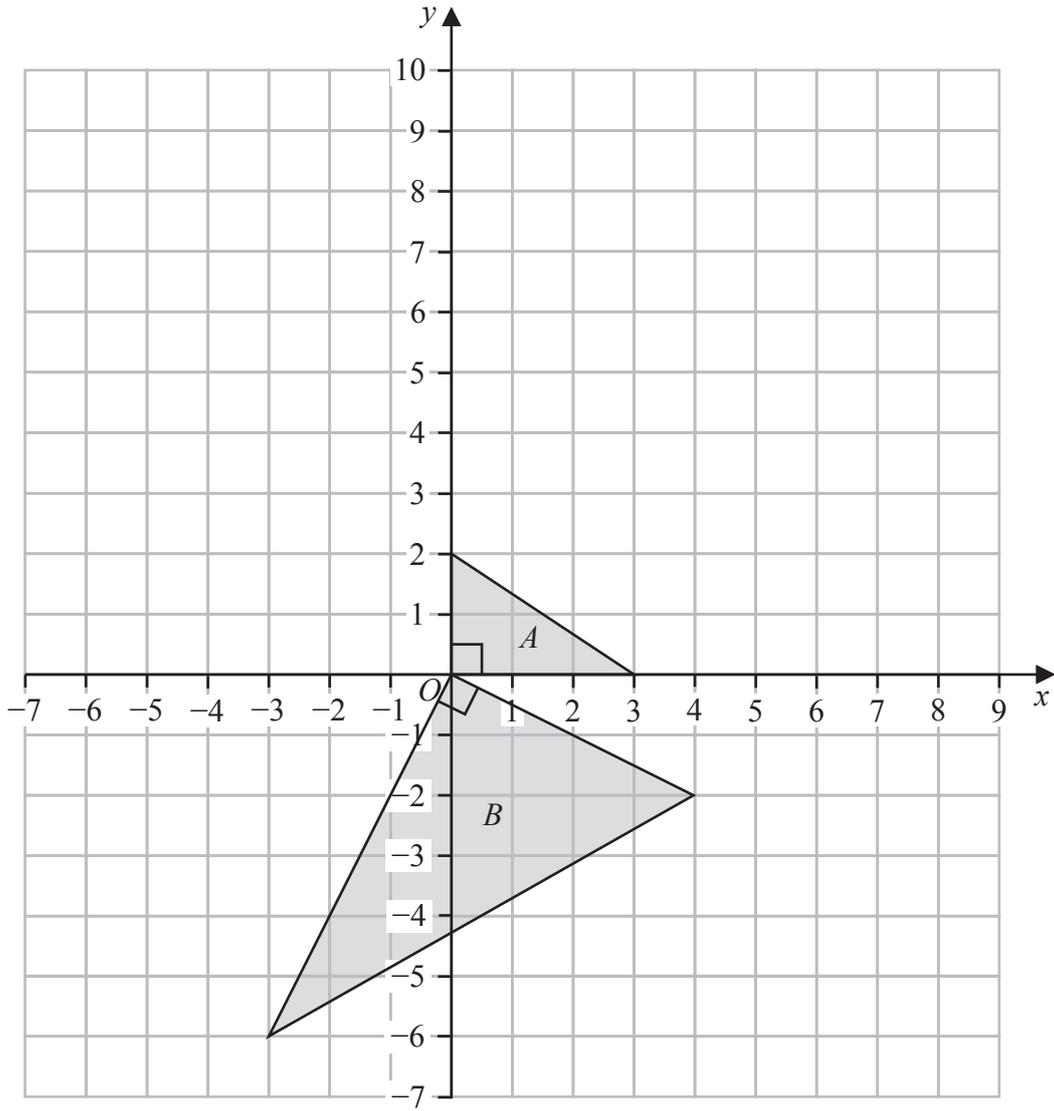
Turn over for a spare grid if you need to redraw your triangles.

Question 7 continued

Only use this grid if you need to redraw your triangles.

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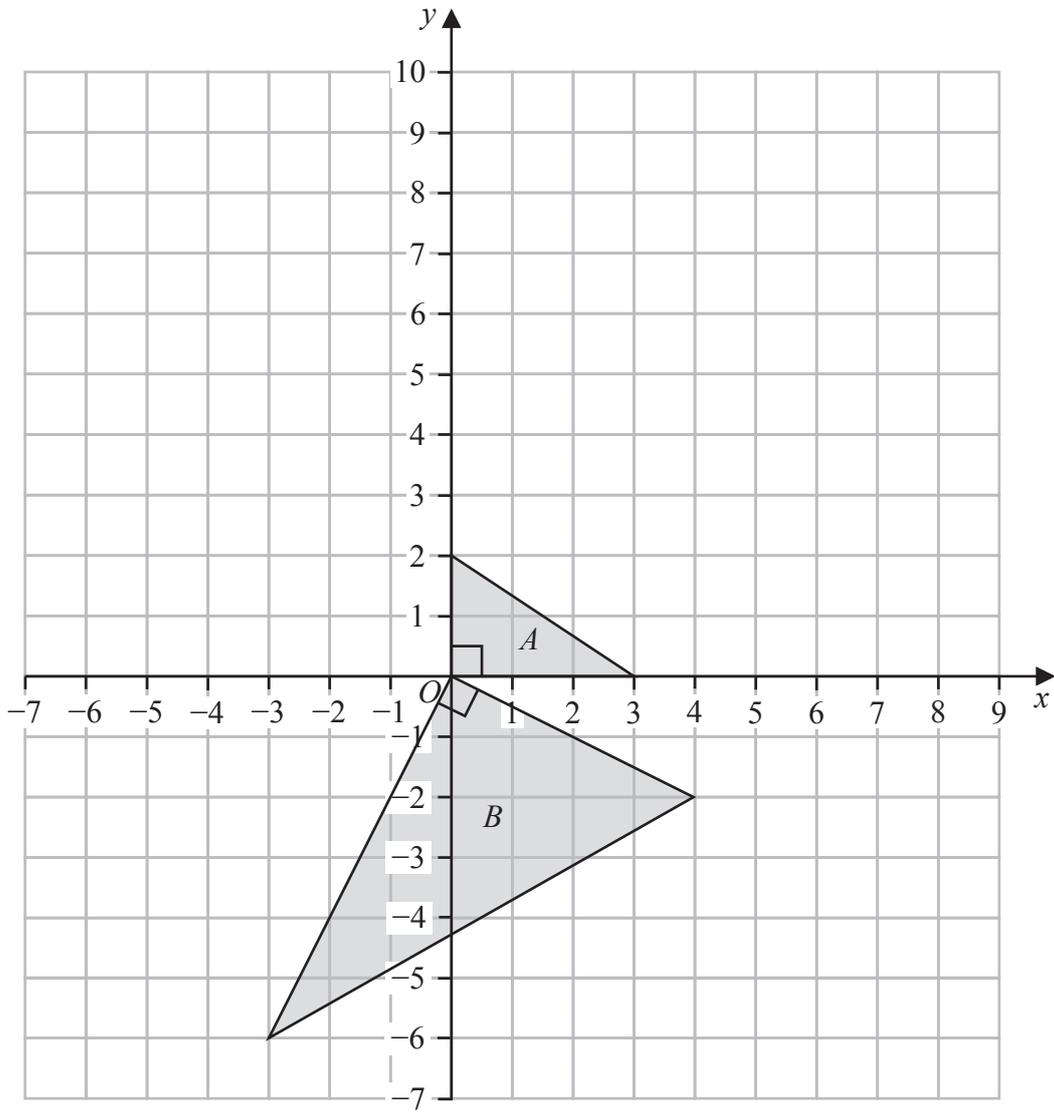
(Total for Question 7 is 7 marks)

8 Table 1 gives information about the probability that a biased red six-sided dice will land on each of the numbers 1, 2, 5, 7, 9, 11

Table 1

Number	1	2	5	7	9	11
Probability	0.1	0.15	0.2	$2x$	$2x + 0.1$	x

Calvin rolls the red dice once.

(a) Calculate the probability that the red dice lands on

   (i) either the number 2 or the number 5

(1)

   (ii) an odd number

(1)

   (iii) a number less than 8

(3)

Pabel rolls the red dice twice.

(b) Calculate the probability that the red dice lands on the numbers 2 and 5

(2)

Tai rolls the red dice 80 times.

(c) Calculate the expected number of times the red dice lands on a number less than 5

(2)

A biased blue six-sided dice has faces numbered 2, 4, 6, 8, 10, 12

The probability that the blue dice lands on the number 2 is 0.24

The probability that the blue dice lands on the number 4 is 0.12

In a game Tai rolls the red dice once and the blue dice once.
The number that the red dice lands on is added to the number that the blue dice lands on to give his score in the game.

Given that his score is less than 6

(d) find the probability that the red dice lands on the number 2

(3)

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P 7 9 5 5 7 A 0 2 1 4 0

P 7 9 5 5 7 A 0 2 2 4 0

(Total for Question 8 is 12 marks)

Diagram **NOT** accurately drawn
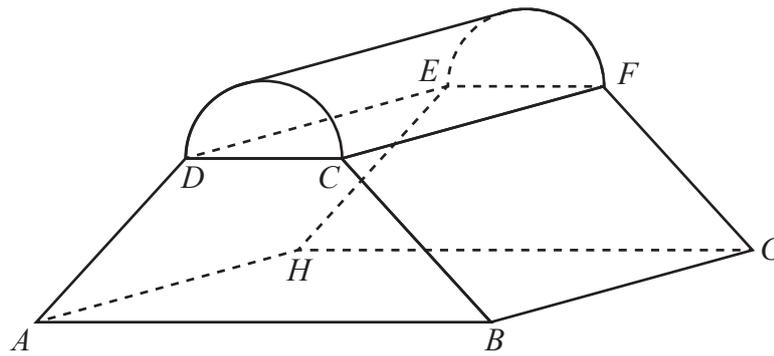
Figure 2

Figure 2 shows a solid made by joining a half cylinder to a prism.

The plane face of the half cylinder coincides with the top face of the prism.
The rectangular base *ABGH* of the solid is horizontal.
The cross section *ABCD* of the prism is a trapezium such that *AB* is parallel to *DC*

$$AB = 26 \text{ cm} \qquad DC = 10 \text{ cm} \qquad BG = 20 \text{ cm} \qquad AD = BC = 17 \text{ cm}$$

The perpendicular height of the trapezium *ABCD* is 15 cm

(a) Calculate, in cm^2 to 2 significant figures, the total surface area of the solid.
Show all your working.

(5)

O is the midpoint of *EF*
N is the point on the edge of the half cylinder vertically above *O*

(b) Calculate the size, in degrees to 3 significant figures, of ∠*AON*

(3)

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$$\left[\textbf{Area of trapezium } = \frac{1}{2}(a + b)h \right]$$

P 7 9 5 5 7 A 0 2 5 4 0

Question 9 continued

P 7 9 5 5 7 A 0 2 6 4 0

Question 9 continued

(Total for Question 9 is 8 marks)
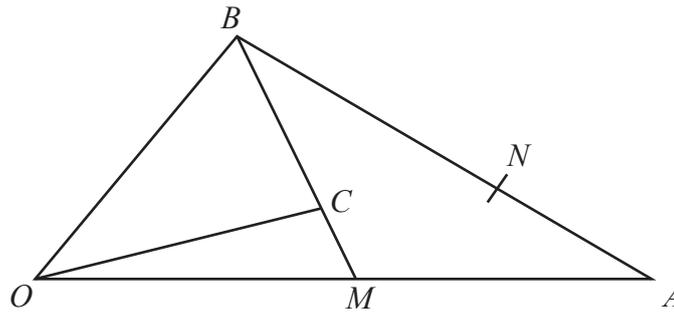
Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows triangle OAB where $\overrightarrow{OA} = 10\mathbf{a}$ and $\overrightarrow{OB} = 5\mathbf{b}$

M is the midpoint of OA

The point N lies on the line AB such that $AN = \dfrac{2}{5} AB$

(a) Find an expression for $\overrightarrow{ON}$ in terms of $\mathbf{a}$ and $\mathbf{b}$
Give your answer in its simplest form.

(3)

The point C lies on BM such that $BC : BM = 3 : 4$
The area of triangle $OBM = 45\,\text{cm}^2$

Given that $|\mathbf{a}| = |\mathbf{b}| = 2\,\text{cm}$

(b) find the length, in cm to 3 significant figures, of OC

(4)

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\begin{array}{ll}
\textbf{Sine Rule} & \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin c} \\[2mm]
\textbf{Cosine Rule} & a^2 = b^2 + c^2 - 2bc\cos A \\[2mm]
\textbf{Area of triangle} & = \dfrac{1}{2}ab\sin C
\end{array}
$$

P 7 9 5 5 7 A 0 2 9 4 0

Question 10 continued

(Total for Question 10 is 7 marks)

P 7 9 5 5 7 A 0 3 1 4 0

11 The curve C has equation $f(x) = 2x^3 - x^2 - 5x - 2$

(a) Use the factor theorem to show that $(x - 2)$ is a factor of $f(x)$

(2)

(b) Hence find the x coordinate of each point where curve C crosses the x-axis.
   Show clear algebraic working.

(4)

The curve C has two turning points.
The x coordinates of the turning points are such that $6x^2 - 2x - 5 = 0$

(c) Find the coordinates, to 2 decimal places, of these two turning points.
   Show your working clearly.

(3)

(d) Complete the table of values for $y = f(x)$

x	-1.5	-0.75	0	0.75	1.5	2.25
y		0.3	-2	-5.5		4.5

(1)

(e) (i) On the grid opposite, plot the points where curve C crosses the x-axis,
      the two turning points and all the points from your completed table.

   (ii) Join all the points to form a smooth curve.

(4)

(f) By drawing a suitable line on the grid, find estimates to one decimal place, of the
   solutions to the equation $2x^3 - x^2 - 3x + 1 = 0$ in the interval $-1.5 \leqslant x \leqslant 2.25$

(3)

(g) By drawing a suitable line (at least 3 cm long) on the grid, find the gradient of
   curve C at the point where $x = 1.5$

(2)

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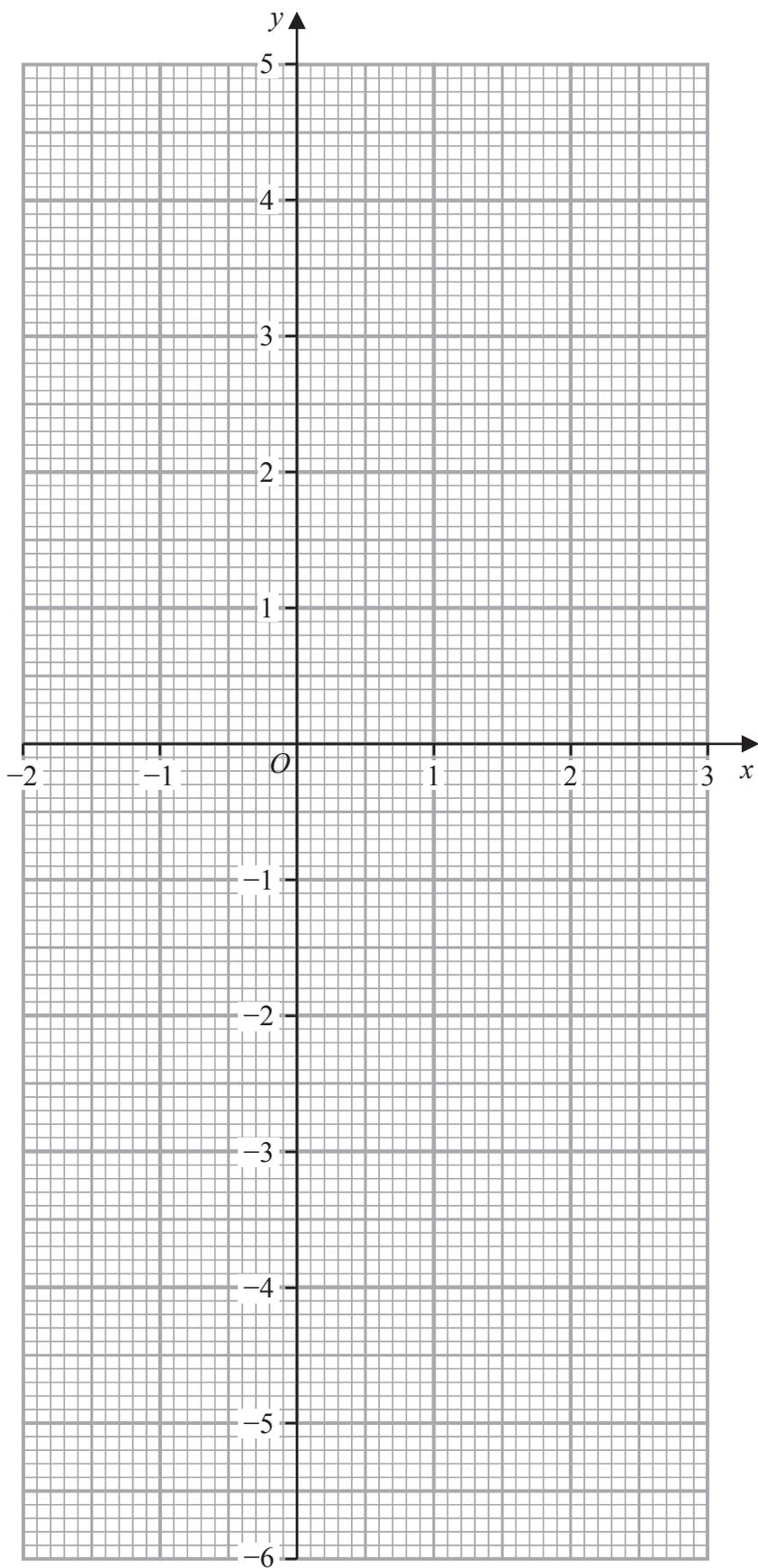$$\left[\text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right]$$

Turn over to page 37 for a spare grid if you need to redraw your graph.

P7 9 5 5 7 A 0 3 5 4 0

Question 11 continued

Only use this grid if you need to redraw your graph.
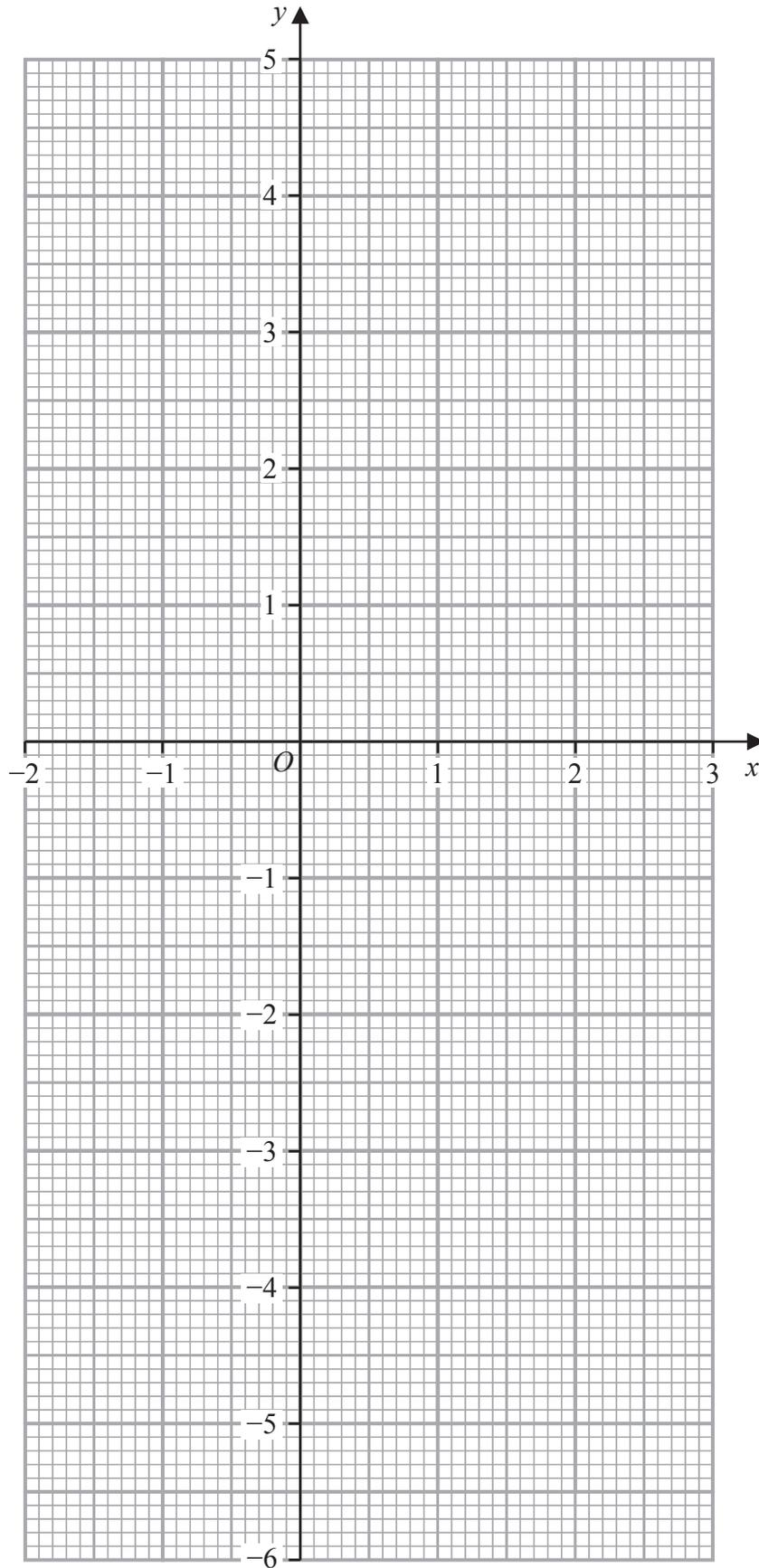
(Total for Question 11 is 19 marks)

P 7 9 5 5 7 A 0 3 7 4 0

12 A particle P is moving along a straight line.

At time t seconds, the displacement, x metres, of P from a fixed point O on the line is

$$x = k(48t - t^3) \quad \text{where } k \text{ is a constant.}$$

When $t = 2$, the particle P is at the point A on the line.
P is instantaneously at rest at the point B on the line.

Given that $AB = 5$ metres

calculate the distance, in metres, of P from O when $t = 2$
Show all your working.

(6)

P 7 9 5 5 7 A 0 3 9 4 0

Question 12 continued

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(Total for Question 12 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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