

Write your name here

Surname

Other names

Pearson Edexcel
International GCSE

Centre Number

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Candidate Number

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Mathematics B

Paper 2



Thursday 4 June 2015 – Morning
Time: 2 hours 30 minutes

Paper Reference
4MB0/02

You must have: Ruler graduated in centimetres and millimetres, protractor, 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 ►

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P 4 4 3 9 6 A 0 1 3 2

PEARSON

Answer ALL ELEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Robert went on a holiday to France.

He changed £1400 (British pounds) into euros.

The exchange rate was £1 = 1.20 euros.

By the end of his holiday in France, he had spent a total of 1230 euros.

(a) Calculate the number of euros that Robert had left at the end of his holiday.

(2)

Robert changed 75% of these euros to British pounds.

The exchange rate was the same.

(b) Calculate the amount, in British pounds, that he should receive.

(3)

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(Total for Question 1 is 5 marks)



3 Solve $\frac{2}{x} - \frac{3}{x-2} = 5$



(Total for Question 3 is 5 marks)



(Total for Question 4 is 6 marks)



5

$$f : x \mapsto 5x - 6$$

$$g : x \mapsto 2(2 + x)$$

- (a) Find the value of $gf(-1)$ (2)
- (b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \dots$ (2)
- (c) Find the value of x for which $fg(x) = 3g(x)$ (4)



(Total for Question 5 is 8 marks)



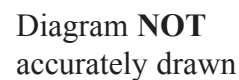


Figure 2

(a) Calculate as a multiple of π , the volume, in cm^3 , of the water in the can.

(2)

The depth of the water in the can is now 16.4 cm.

(b) Find the exact value of r .

(6)

$$\left[\begin{array}{l} \text{Area of circle} = \pi r^2 \\ \text{Volume of sphere} = \frac{4}{3}\pi r^3 \end{array} \right]$$



(Total for Question 6 is 8 marks)



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- $$s = 2t^3 + 7t^2 + 13t + 4 \quad t \geq 0$$

Find an expression, in terms of t ,

- (b) for a . (2)

- (c) Calculate, to 3 significant figures, the value of t for which the numerical value of v equals the numerical value of a .

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



(Total for Question 7 is 9 marks)



- (a) On the grid, draw and label triangle A .

(b) On the grid, draw and label triangle B .

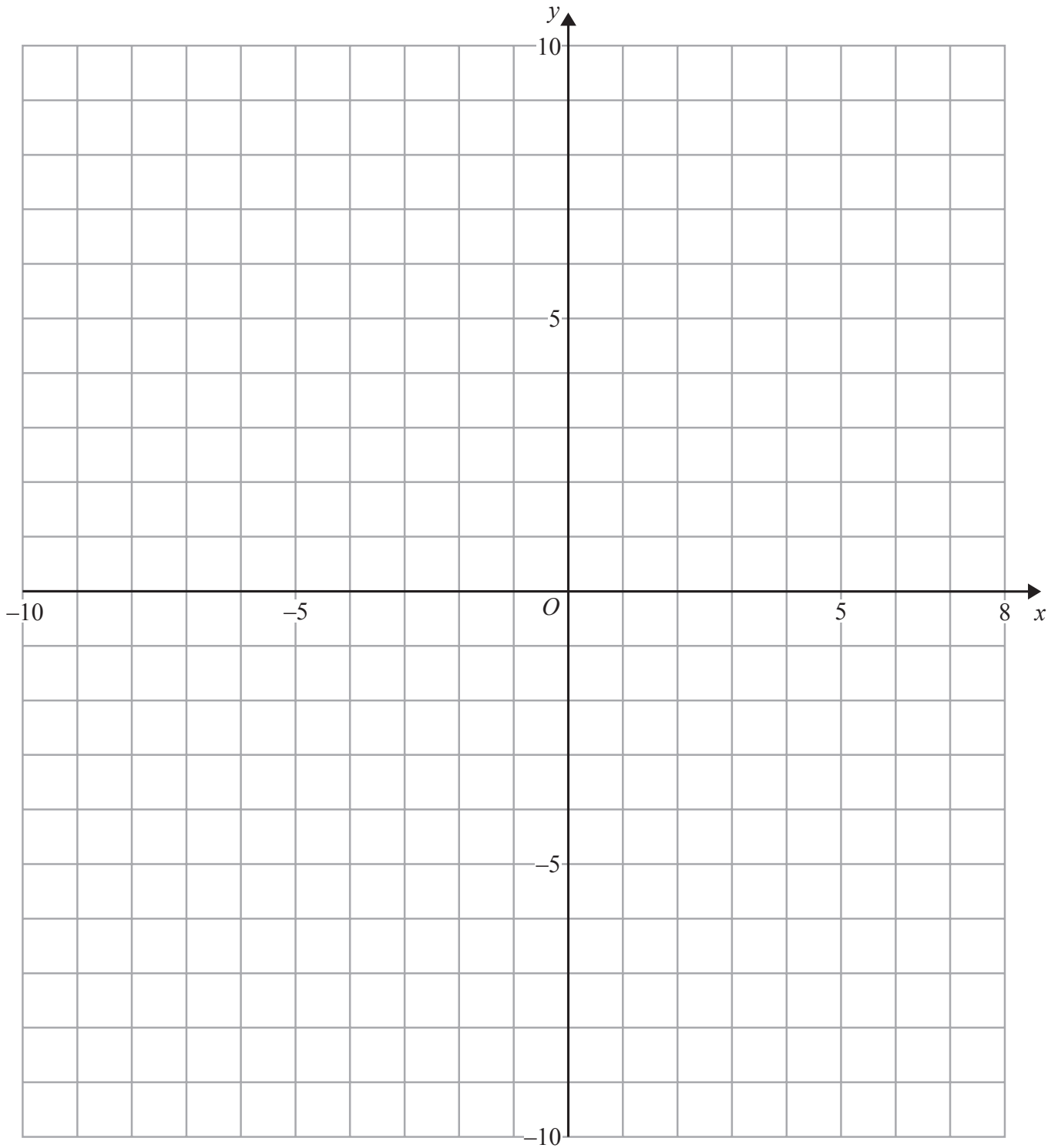
(c) On the grid, draw and label triangle C.

$$\mathbf{T} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

- (d) On the grid, draw and label triangle D .

(e) Describe fully the single transformation which maps triangle B onto triangle D .

Question 8 continued



Use the grid on page 19 if you need to redraw your triangles.

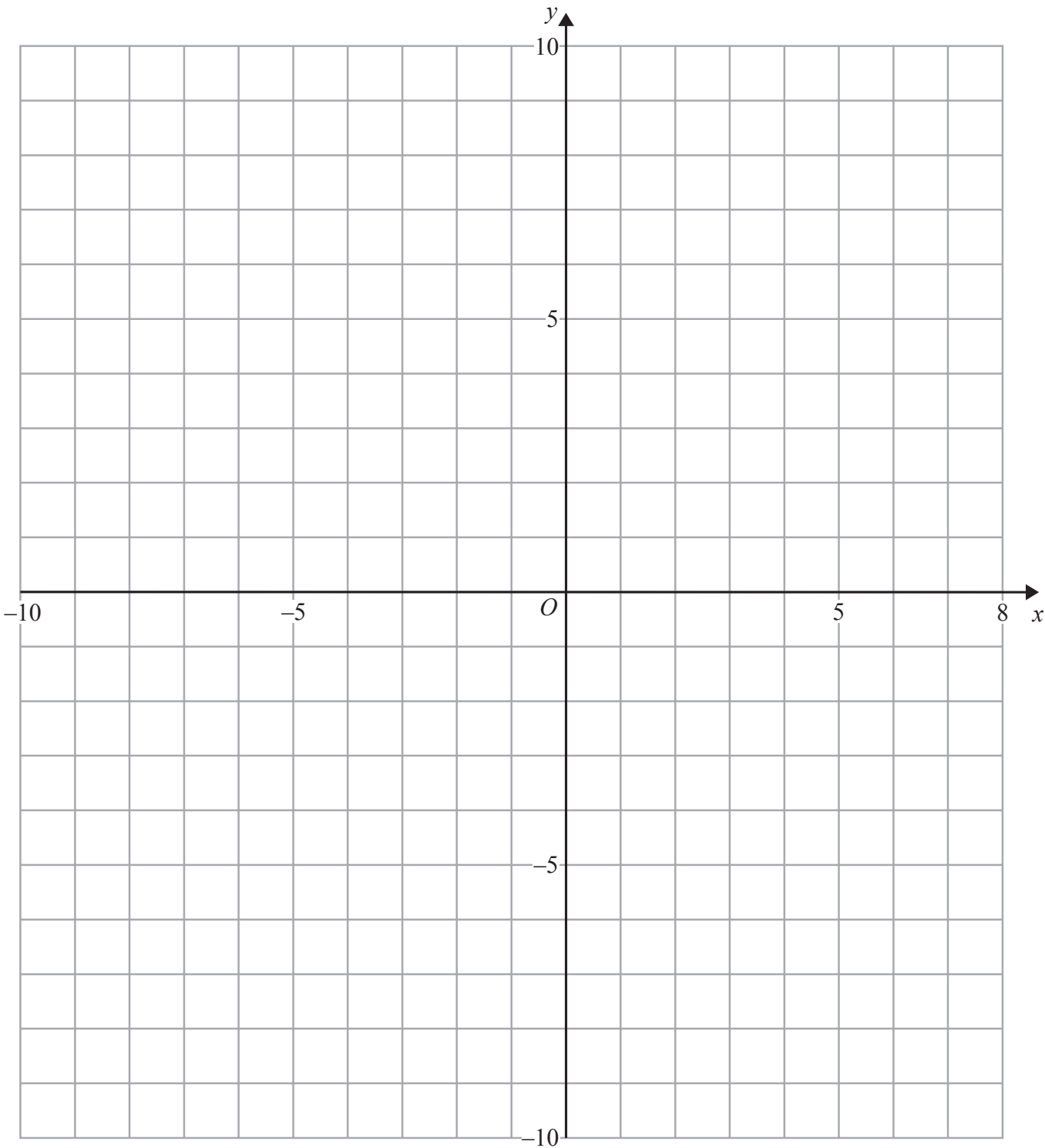


Question 8 continued



Question 8 continued

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



(Total for Question 8 is 11 marks)



9 The table gives information about the times taken, in minutes, by 200 students to complete an examination paper.

Time taken (t minutes)	$0 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 60$	$60 < t \leq 80$	$80 < t \leq 90$
Frequency	10	14	90	54	32

- (a) Calculate an estimate, to the nearest minute, of the mean time taken to complete the examination paper. (4)
- (b) On the grid, draw a histogram to represent this information. (5)

One of these students is to be chosen at random.

- (c) Calculate an estimate of the probability that this student took less than 56 minutes to complete the examination paper.



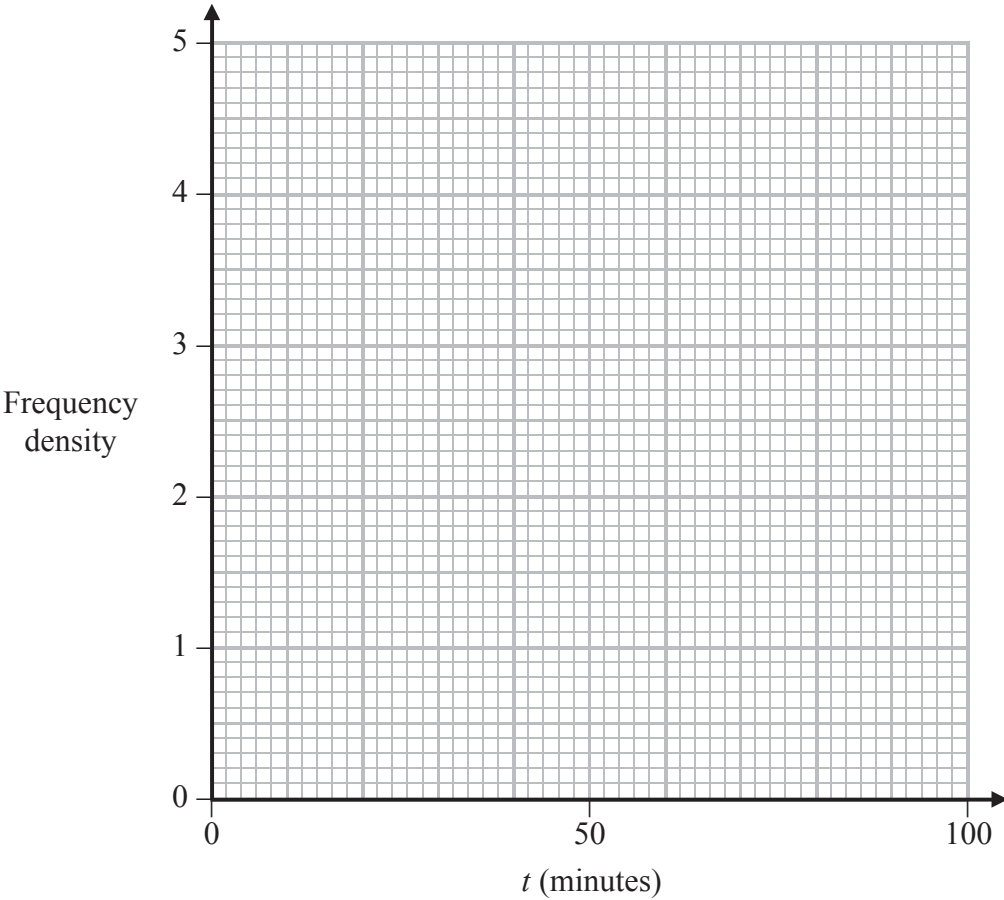
The graph is a coordinate plane with the following features:

- Y-axis:** Labeled "Frequency density". It has major tick marks at 0, 1, 2, 3, 4, and 5. The grid consists of 5 major horizontal units, each subdivided into 10 minor units (0.2 units each).
- X-axis:** Labeled " t (minutes)". It has major tick marks at 0, 50, and 100. The grid consists of 10 major horizontal units, each subdivided into 2 minor units (2 minutes each).
- Origin:** The point (0, 0) is the origin of the coordinate system.



Question 9 continued

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



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(Total for Question 9 is 13 marks)



10

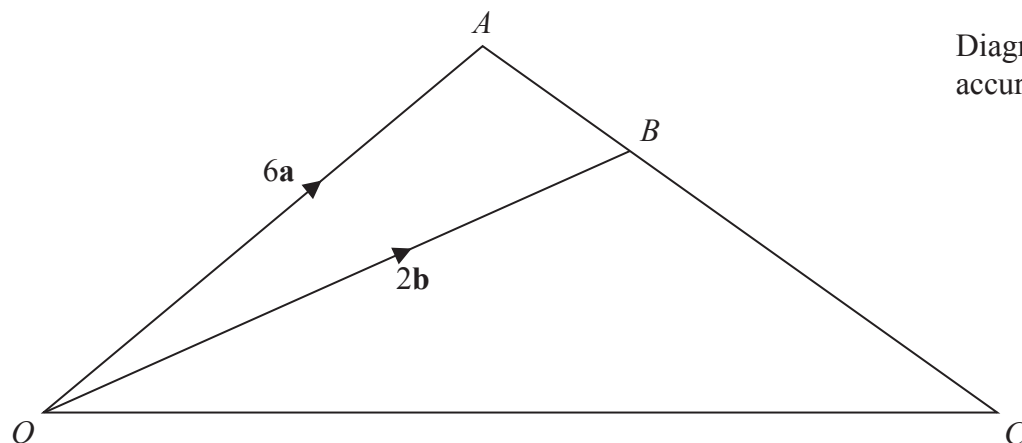


Diagram **NOT**
accurately drawn

Figure 3

Figure 3 shows the triangle OAC with the point B on AC such that $AB : AC = 1 : 3$

The point P is on the line OA such that $OP : OA = 1 : 2$

Given that $\vec{OA} = 6\mathbf{a}$ and that $\vec{OB} = 2\mathbf{b}$

(a) find, in terms of \mathbf{a} and \mathbf{b} or \mathbf{a} or \mathbf{b} , simplifying your answer where possible,

(i) \vec{AB}

(ii) \vec{OP}

(iii) \vec{OC}

(4)

The point Q lies on OC such that $OQ : OC = 1 : m$

(b) Find \vec{PQ} in terms of m , \mathbf{a} and \mathbf{b} .

Simplify your expression.

(3)

Given also that PQ is parallel to AC ,

(c) find the value of m .

(3)

(d) Hence write down \vec{PQ} in terms of \mathbf{a} and \mathbf{b} .

(1)

The area of triangle OAC is 12 cm^2

(e) Calculate the area, in cm^2 , of $PACQ$.

(3)





Question 10 continued



(Total for Question 10 is 14 marks)



11 $y = \frac{x^3}{6} + \frac{5}{x^2} - 8$

- (a) Complete the table of values for $y = \frac{x^3}{6} + \frac{5}{x^2} - 8$, giving your values to 1 decimal place.

x	0.8	1	1.5	2	2.5	3	3.5	4
y	-0.1		-5.2	-5.4		-2.9		3.0

(3)

- (b) On the grid, plot the points from your completed table and join them to form a smooth curve.

(3)

- (c) Using your curve, determine an estimate of the minimum value, to 1 decimal place, of $\frac{x^3}{6} + \frac{5}{x^2} - 8$ in the interval $0.8 \leq x \leq 4$

(1)

- (d) By drawing a suitable tangent to your curve, calculate an estimate, to 1 decimal place, of the gradient at the point where $x = 3$ on the curve.

(2)

- (e) By drawing and labelling a straight line on the grid, find estimates, to 1 decimal place, of the two solutions of the equation $\frac{x^3}{6} - \frac{x}{4} + \frac{5}{x^2} - 4 = 0$ in the interval $0.8 \leq x \leq 4$

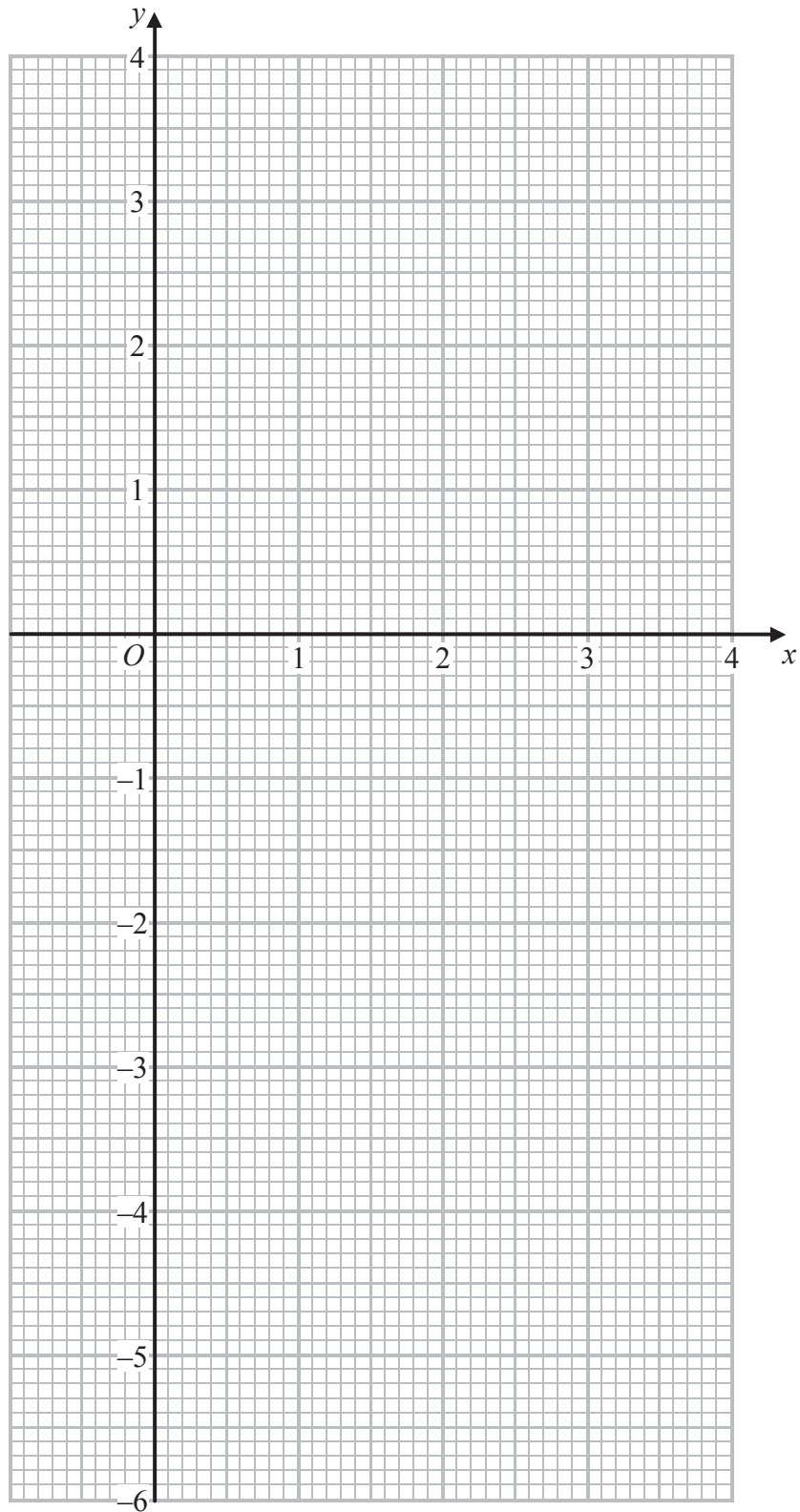
(4)

- (f) Explain clearly why the equation $\frac{x^3}{6} + \frac{5}{x^2} - 2 = 0$ has no solution in the interval $0.8 \leq x \leq 4$

(3)



Question 11 continued



Use the grid on page 31 if you need to redraw your curve.

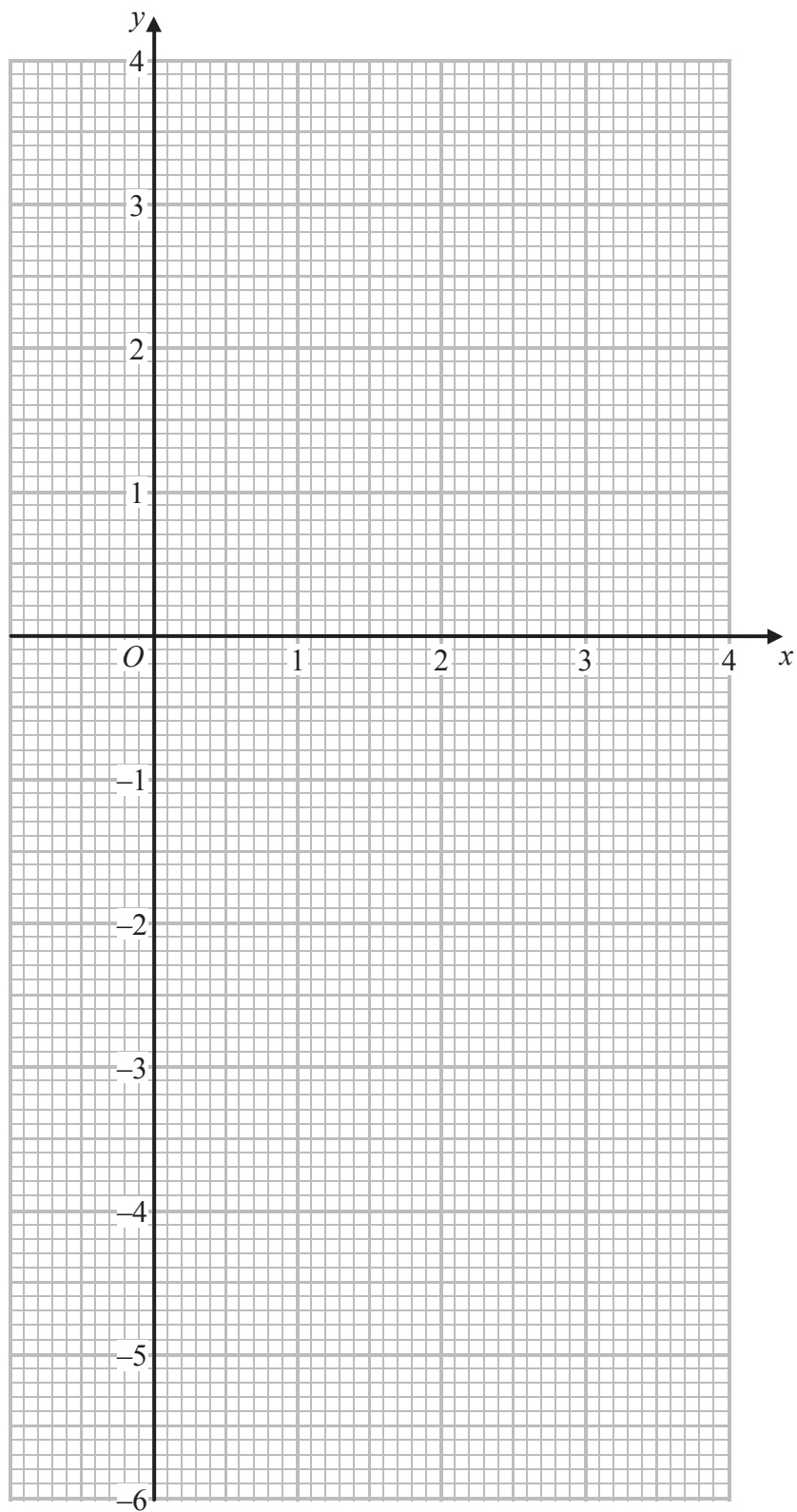


Question 11 continued



Question 11 continued

Only use this page if you need to redraw your curve.



Question 11 continued

(Total for Question 11 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS

