

1.

Figure 1

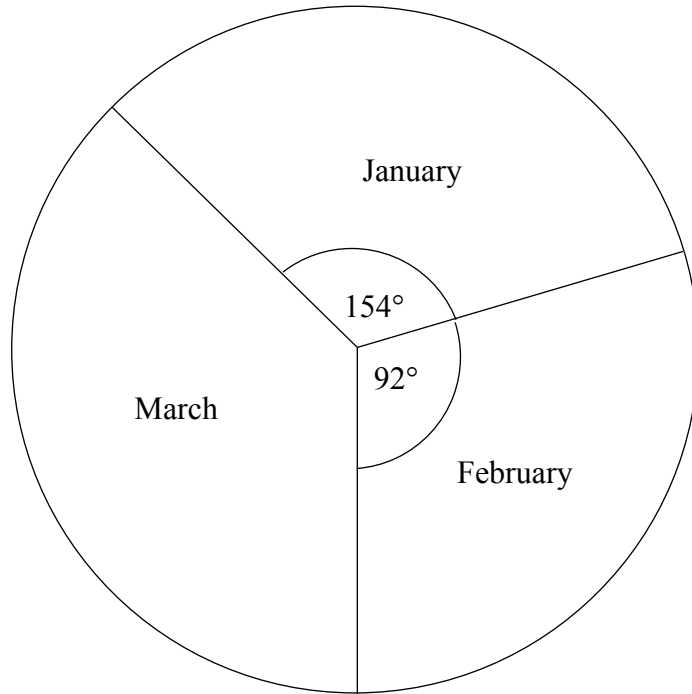


Figure 1 is a pie chart representing the production of cameras by a factory for the three months January, February and March. The angle of the sector representing the number of cameras produced in January is 154° and that for February is 92° .

- (a) Calculate the angle of the sector representing the number of cameras produced in March. **(2)**

2052 cameras were produced in March.

- (b) Calculate the total number of cameras that were produced in the three months January, February and March. **(3)**



Question 2 continued

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(Total 5 marks)

Q2



N 2 4 4 5 7 A 0 5 3 6

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Question 4 continued

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(Total 6 marks)

Q4



Question 5 continued

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Lined area for writing answers.

(Total 6 marks)

Q5



6.

Figure 2

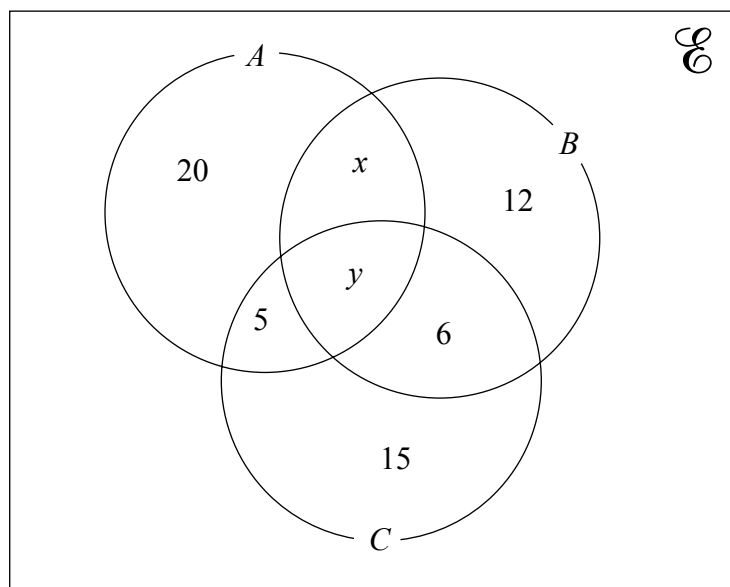


Figure 2 is a Venn diagram showing three intersecting sets A , B and C and also the number of elements in each region in the diagram.

Given that,

$$n(A \cup B \cup C) = 69,$$

$$n(A \cap B) + n(B \cap C) + n(A \cap C) = 28,$$

find the value of x and the value of y .



7. $f : x \mapsto 5x - 2,$
 $g : x \mapsto \frac{x+1}{2x}, x \neq 0.$

(a) Find the value of $g\left(\frac{1}{2}\right).$ **(1)**

(b) Copy, complete and simplify $fg : x \mapsto \dots\dots\dots$ **(2)**

(c) State the value of x that needs to be excluded from any domain of $fg.$ **(1)**

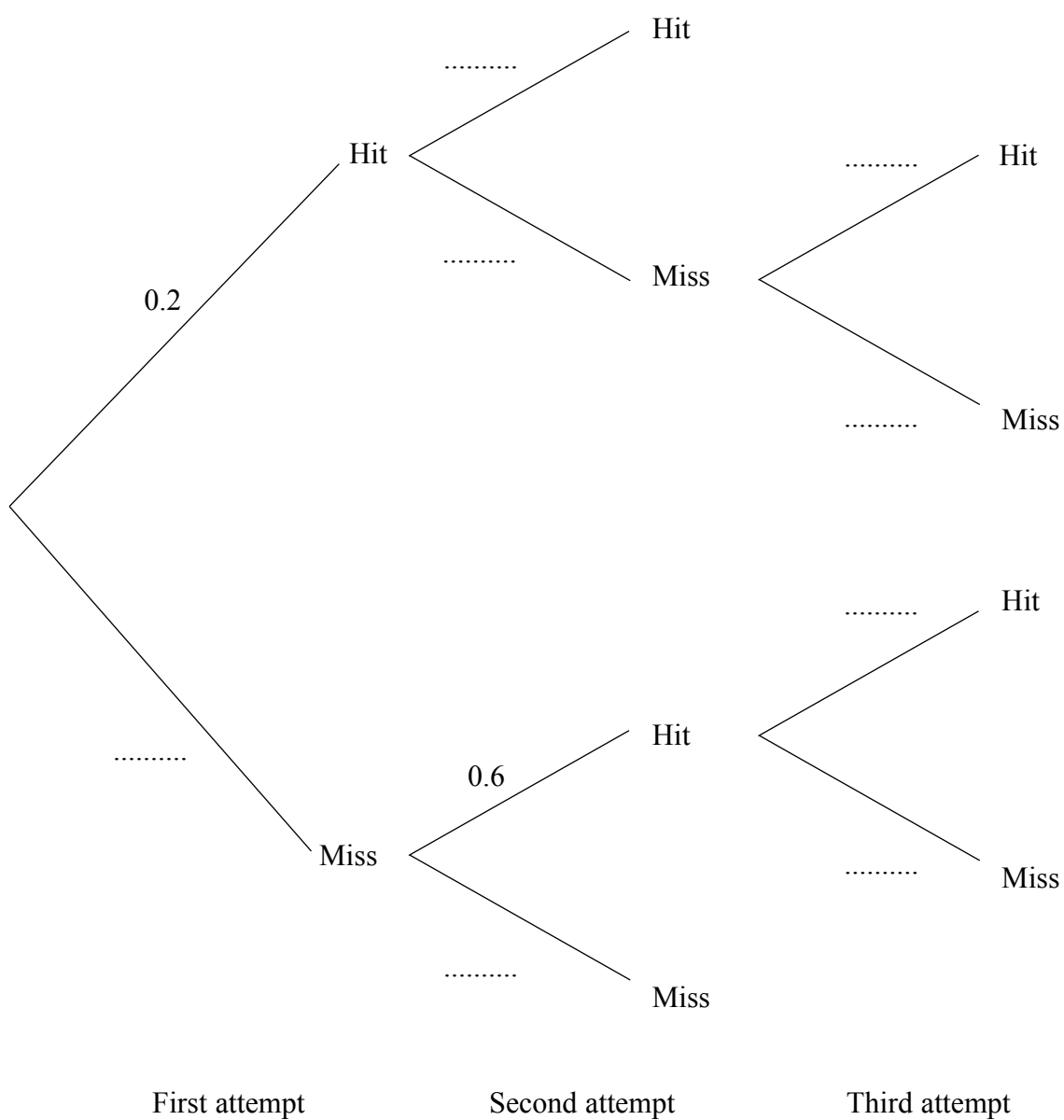
(d) Solve the equation $fg(x) = 2x.$ **(4)**



8. An archer has up to 3 attempts to hit a target. If the archer hits the target on both of his first two attempts or if he misses the target on both of his first two attempts then he is not allowed a third attempt. The probability that he will hit the target on his first attempt is 0.2, that he will hit the target on his second attempt is 0.6 and that he will hit the target on his third attempt is 0.7.

(a) Complete the following tree diagram.

Figure 3



(3)

- (b) Calculate the probability that the archer will hit the target at least once.

(2)

- (c) Calculate the probability that the archer will hit the target twice.

(5)



Question 8 continued

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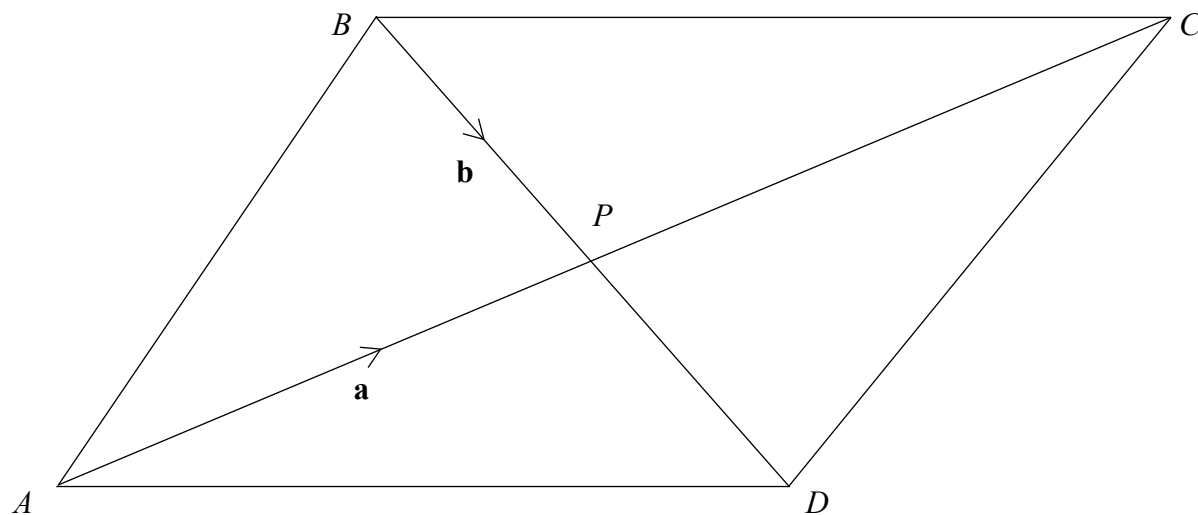
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Q8



9.

Figure 4



In Figure 4, $\vec{AP} = \mathbf{a}$, $\vec{BP} = \mathbf{b}$, $\vec{AC} = \mu \vec{AP}$ and $\vec{BD} = \lambda \vec{BP}$.

(a) (i) Find \vec{PD} in terms of \mathbf{b} and λ .

(ii) Find \vec{AD} in terms of \mathbf{a} , \mathbf{b} and λ .

(3)

(b) (i) Find \vec{PC} in terms of \mathbf{a} and μ .

(ii) Find \vec{BC} in terms of \mathbf{a} , \mathbf{b} and μ .

(3)

Given that $\vec{AD} = \vec{BC}$,

(c) find the value of λ and the value of μ .

(4)

(d) State the geometrical name of the quadrilateral ABCD.

(1)



10. The coordinates of the vertices of $\triangle ABC$ are $A(2, 2)$, $B(1, 1)$ and $C(0, 1)$.

- (a) Draw and label $\triangle ABC$ on the graph paper on page 23. Use a scale of 1 cm to represent one unit on each axis and take $-7 \leq x \leq 7$ and $-2 \leq y \leq 8$. (1)

The matrix $\mathbf{M} = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$.

- (b) Calculate the matrix product $\mathbf{M} \begin{pmatrix} 2 & 1 & 0 \\ 2 & 1 & 1 \end{pmatrix}$. (2)

$\triangle ABC$ is transformed to $\triangle A'B'C'$, where A' , B' and C' are respectively the images of A , B and C under the transformation with matrix \mathbf{M} .

- (c) Draw and label $\triangle A'B'C'$ on your diagram. (1)

The matrix $\mathbf{N} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ and $\mathbf{P} = \mathbf{M} \begin{pmatrix} 2 & 1 & 0 \\ 2 & 1 & 1 \end{pmatrix}$.

- (d) Calculate the matrix product \mathbf{NP} . (2)

$\triangle ABC$ is transformed to $\triangle A''B''C''$, where A'' , B'' and C'' are respectively the images of A , B and C under the transformation with matrix \mathbf{NM} .

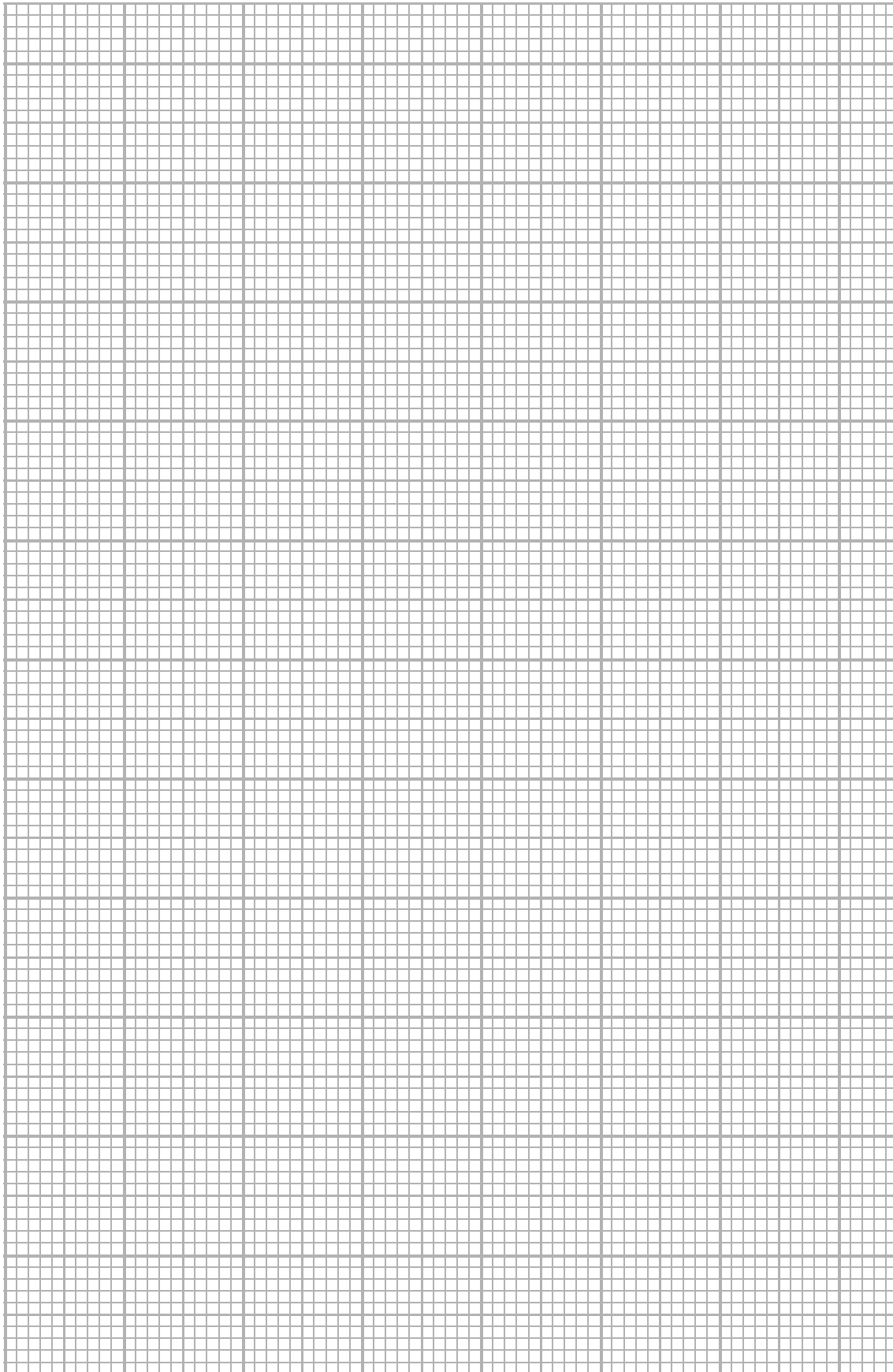
- (e) Draw and label $\triangle A''B''C''$ on your diagram. (1)

- (f) Describe fully the two transformations that map $\triangle ABC$ onto $\triangle A''B''C''$. (4)



Question 10 continued

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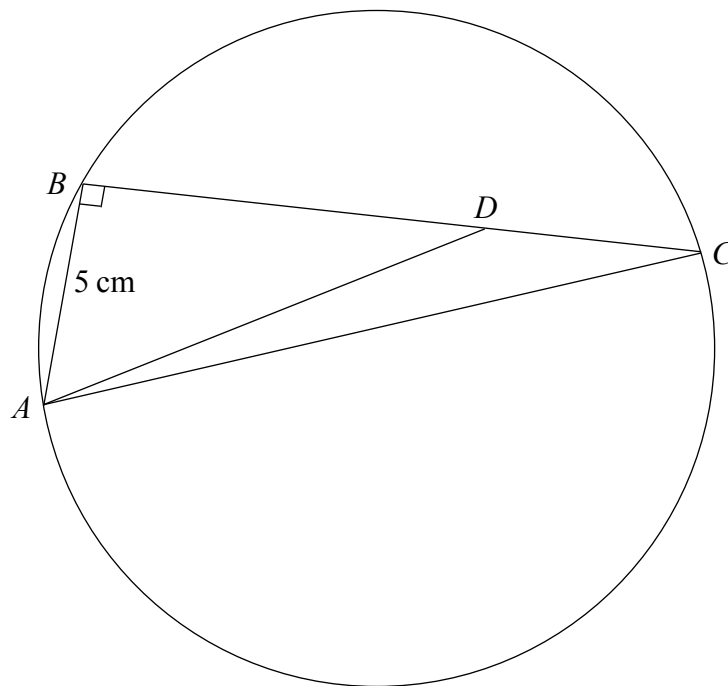
Question 10 continued

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11.

Figure 5



In Figure 5, ABC is a circle with $AB = 5$ cm, $\angle ABC = 90^\circ$, D lies on BC , and the area of $\triangle ABD$ is 25 cm².

- (a) Calculate the length, in cm, of BD . (2)
 - (b) Calculate the length, in cm to 3 significant figures, of AD . (2)
 - (c) Calculate the size, in degrees to three significant figures, of $\angle BDA$. (2)
- (The area of $\triangle ABC$) : (the area of $\triangle ABD$) = 3 : 2.
- (d) Calculate, in cm, the length of CD . (3)
 - (e) Calculate, in cm² to 3 significant figures, the area of the circle ABC . (3)
- [Area of circle = πr^2]



12. Given that $y = x^3 - 5x + 1$,

- (a) complete the table, giving your values of y to 2 decimal places, where appropriate. **(3)**

x	-2.5	-1.5	-1.25	-1	0	1	1.25	1.5	2.5
x^3	-15.63		-1.95		0	1			15.63
$-5x$	12.5		6.25		0	-5			-12.5
1	1	1	1	1	1	1	1	1	1
y	-2.13		5.30		1.00	-3.00			4.13

- (b) On the graph paper on page 31, using a scale of 2 cm to represent 1 unit on each axis and taking $-3 \leq x \leq 3$ and $-4 \leq y \leq 6$, plot the points from your completed table and join them to form a smooth curve. **(3)**

- (c) Find from your graph, the value of x to 1 decimal place, at which $x^3 - 5x + 1$ has

- (i) a maximum value,
 (ii) a minimum value.

(2)

- (d) From your graph estimate the sets of values of x for which $x^3 - 5x + 1 > 0$.

(2)

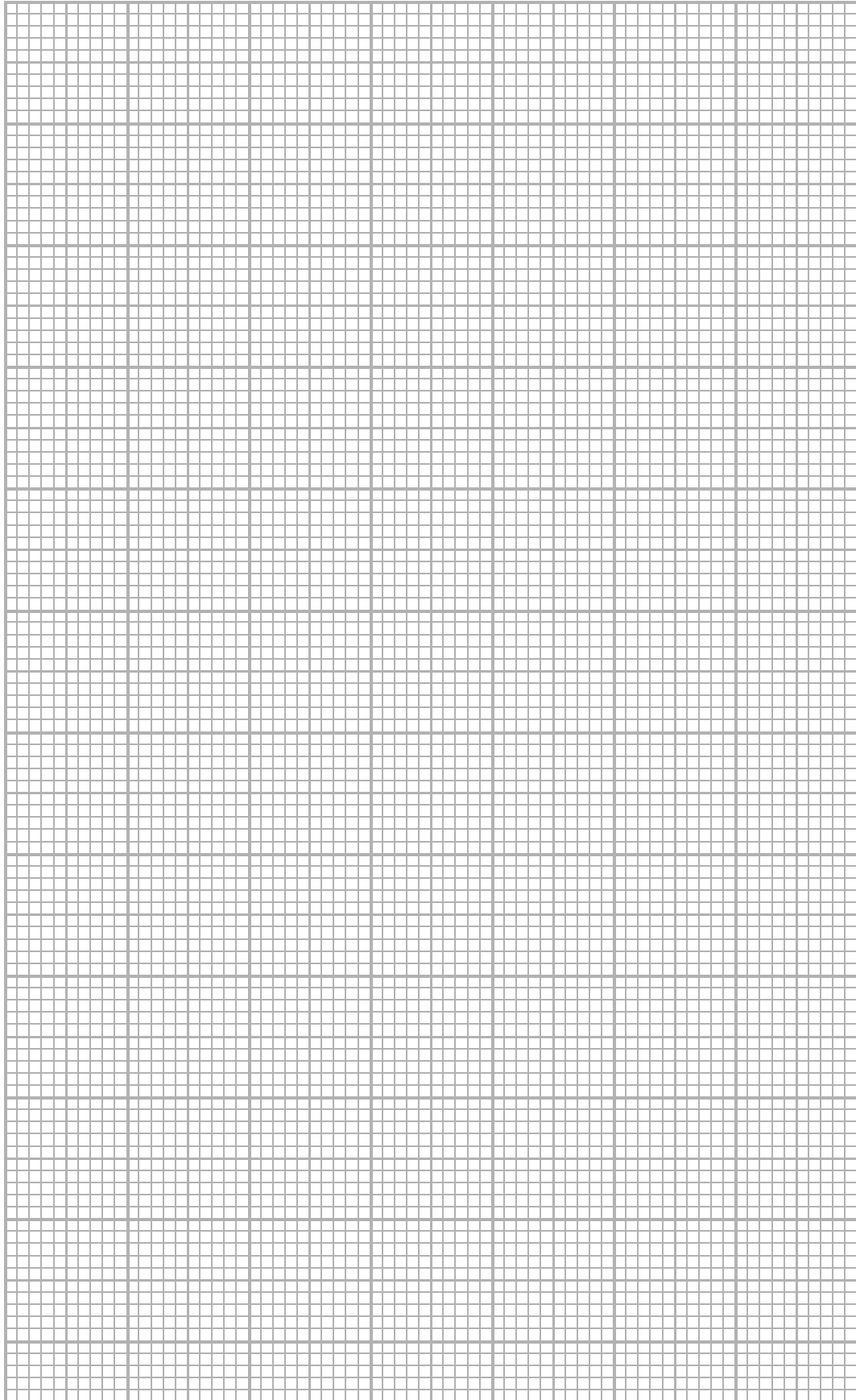
- (e) By drawing and labelling a suitable line, find estimates for the 3 values of x , to 1 decimal place, which are the solutions of the equation $x^3 - 4x + 1 = 0$.

(4)



Question 12 continued

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