Name	Class

🎓 MATHS TEACHER HUB

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Non linear graphs
(9 – 1) Topic booklet
HIGHER

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

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*.
•Diagrams are NOT accurately drawn, unless otherwise indicated.
•You must **show all your working out.**
•If the question is a **1F** question you are not allowed to use a calculator.
•If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information
•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.
•Keep an eye on the time.
•Try to answer every question.
•Check your answers if you have time at the end.

Answer ALL questions
Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

3 (a) Complete this table of values for $y = x^2 + x - 4$

x	-3	-2	-1	0	1	2	3
y		-2	-4		-2		

(2)

(b) On the grid, draw the graph of $y = x^2 + x - 4$ for values of x from -3 to 3
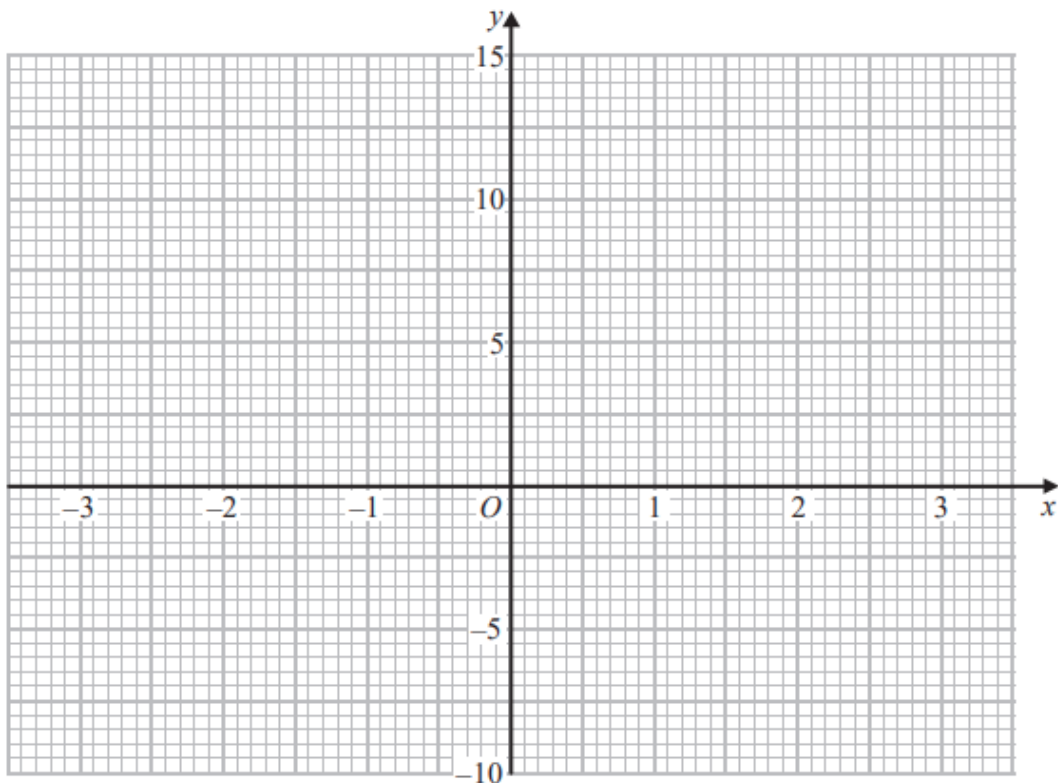
(2)

(c) Use the graph to estimate a solution to $x^2 + x - 4 = 0$
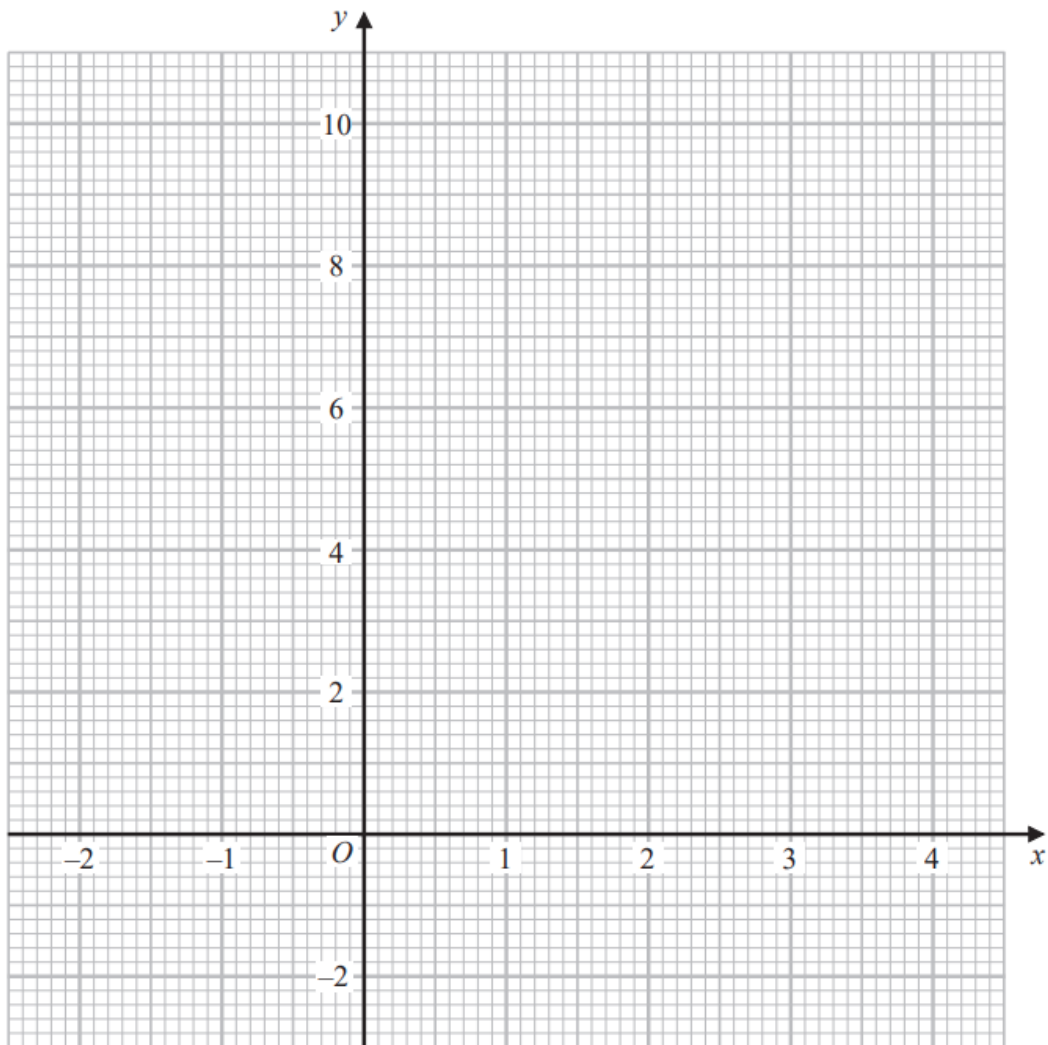
....

(1)

(Total for Question 3 is 5 marks)

4 (a) Complete the table of values for $y = x^2 - 2x + 2$

x	-2	-1	0	1	2	3	4
y	10		2			5	

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from -2 to 4

(2)

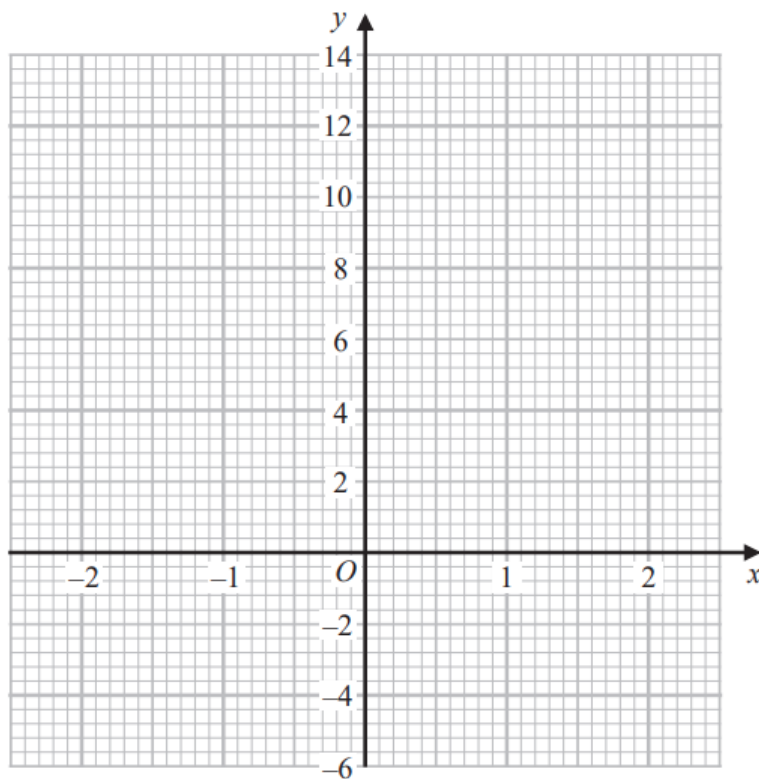(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

....

(2)

(Total for Question 4 is 6 marks)

4 (a) Complete the table of values for $y = 5 - x^3$

x	-2	-1	0	1	2
y		6			

(2)

(b) On the grid below, draw the graph of $y = 5 - x^3$ for values of x from -2 to 2

(2)

(Total for Question 4 is 4 marks)

5 (a) Complete the table of values for $y = x^2 - x - 6$

x	−3	−2	−1	0	1	2	3
y	6			− 6			

(2)

(b) On the grid, draw the graph of $y = x^2 - x - 6$ for values of x from −3 to 3

(2)
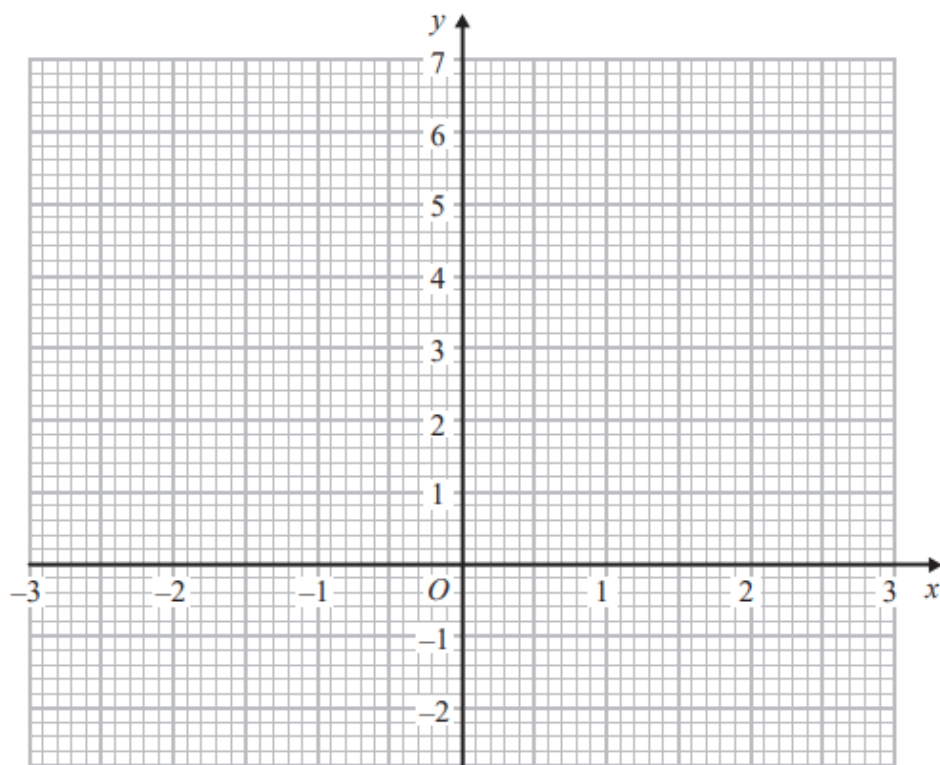
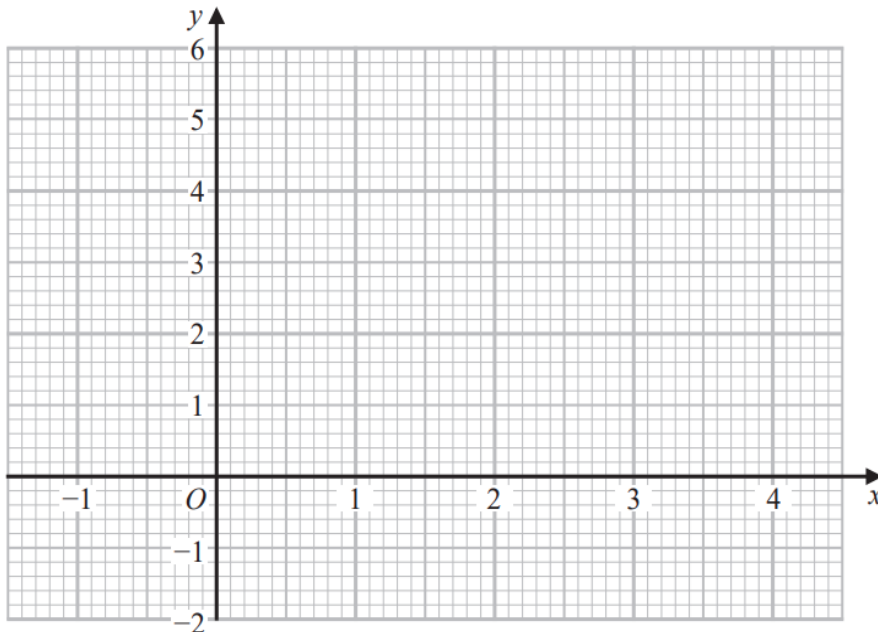(c) Use your graph to find estimates of the solutions to the equation $x^2 - x - 6 = -2$

(2)

(Total for Question 5 is 6 marks)

6 (a) Complete the table of values for $y = x^2 - 3x + 1$

x	-1	0	1	2	3	4
y		1	-1			

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$ for values of x from -1 to 4

(2)

(c) Using your graph, find estimates for the solutions of the equation $x^2 - 3x + 1 = 0$

(2)

(Total for Question 6 is 6 marks)

7 Here is the graph of $y = x^2 - 6x + 4$
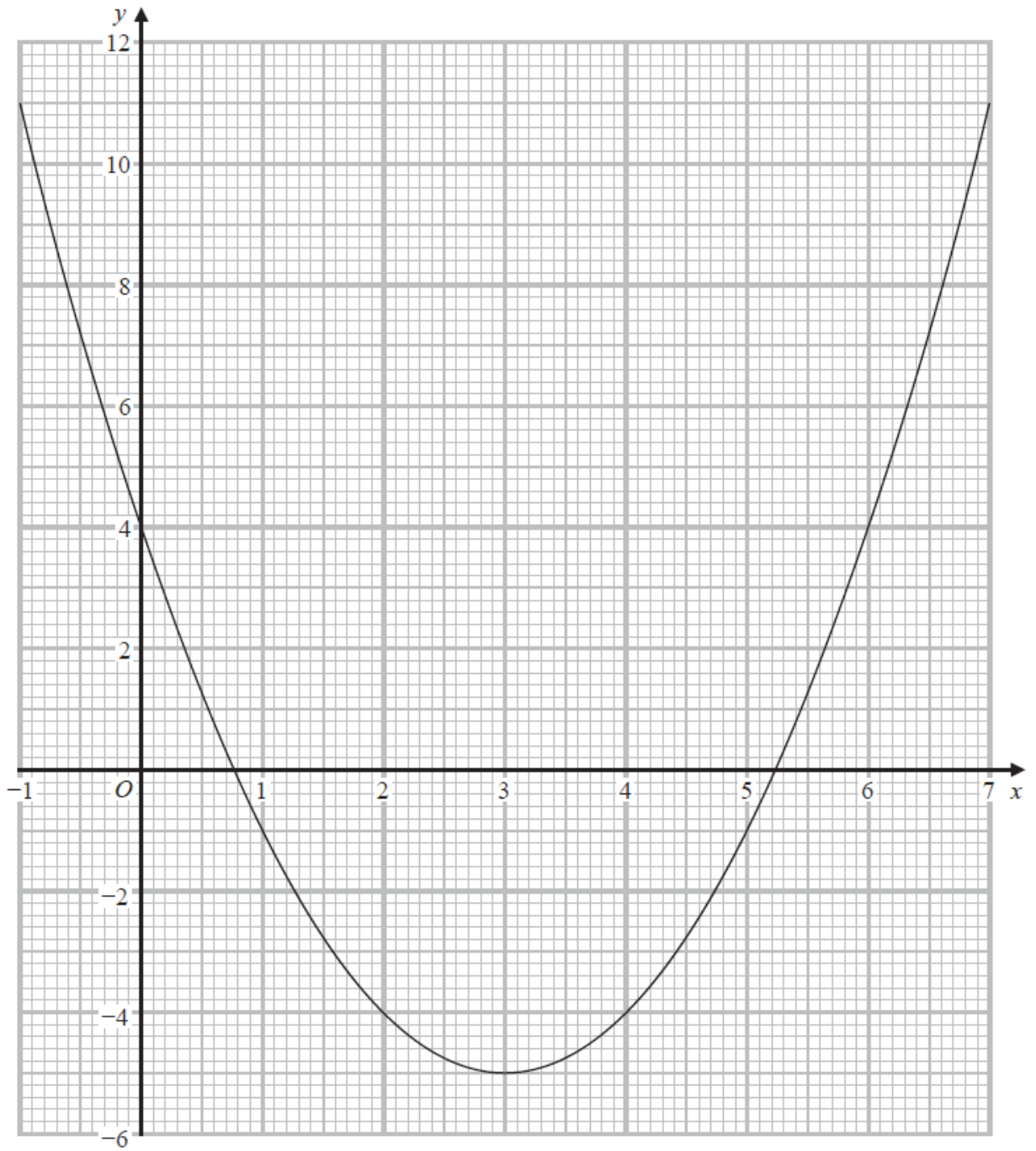
(a) Write down the y intercept of the graph of $y = x^2 - 6x + 4$

....

(1)

(b) Write down the coordinates of the turning point of the graph of $y = x^2 - 6x + 4$

(........................ , ...)

(1)

(c) Use the graph to find estimates for the roots of $x^2 - 6x + 4 = 0$

....

(2)

(Total for Question 7 is 4 marks)

7 Brogan needs to draw the graph of $y = x^2 + 1$

Here is her graph.
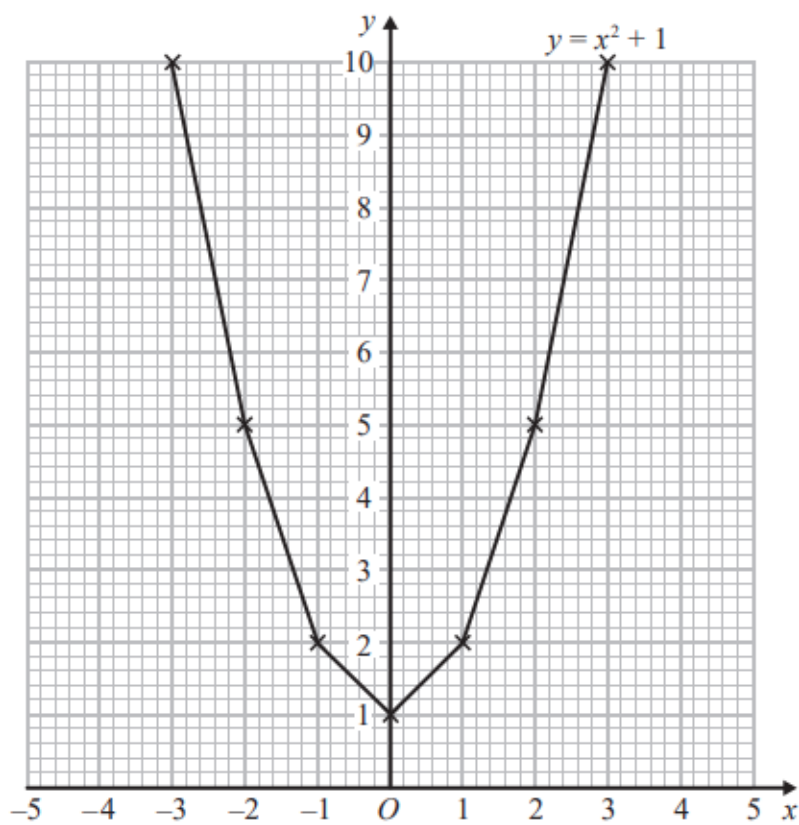
Write down one thing that is wrong with Brogan's graph.

....

....

(Total for Question 7 is 1 mark)

7 The graph of $y = f(x)$ is drawn on the grid.
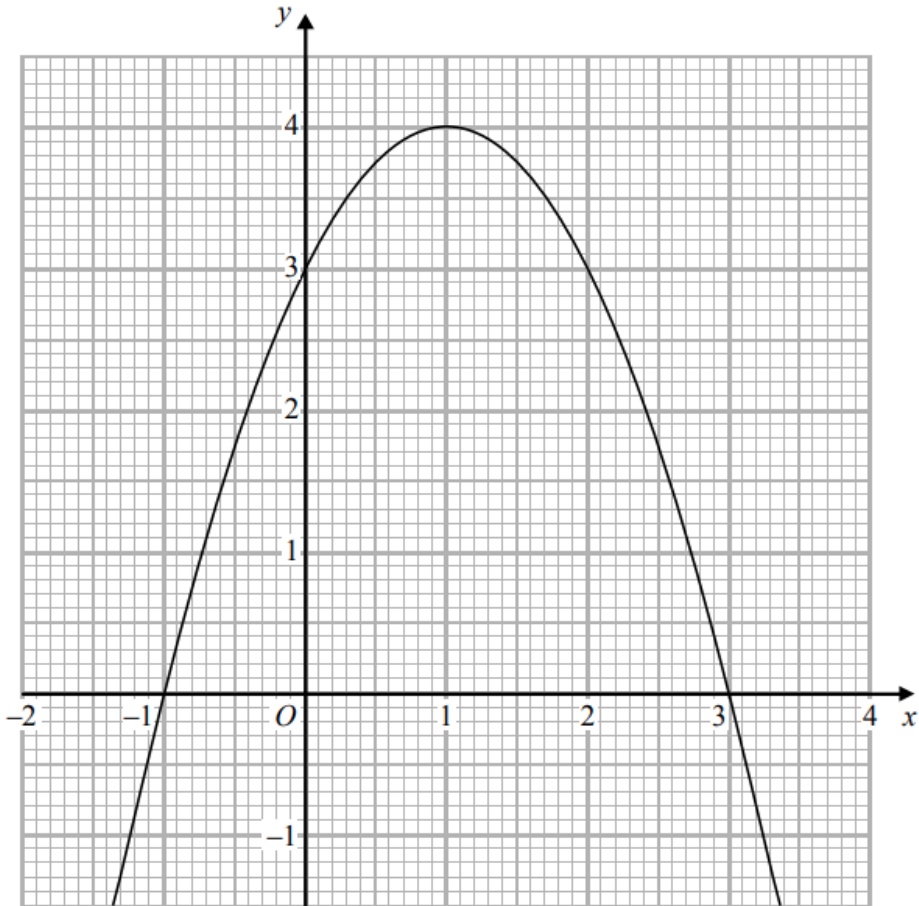
(a) Write down the coordinates of the turning point of the graph.

(..................., ...)

(1)

(b) Write down the roots of $f(x) = 2$

....

(1)

(c) Write down the value of $f(0.5)$

....

(1)

(Total for Question 7 is 3 marks)

9 (a) Complete the table of values for $y = 6x - x^3$

x	-3	-2	-1	0	1	2	3
y	9					4	-9

(2)

(b) On the grid, draw the graph of $y = 6x - x^3$ for values of x from -3 to 3

(2)

(Total for Question 9 is 4 marks)
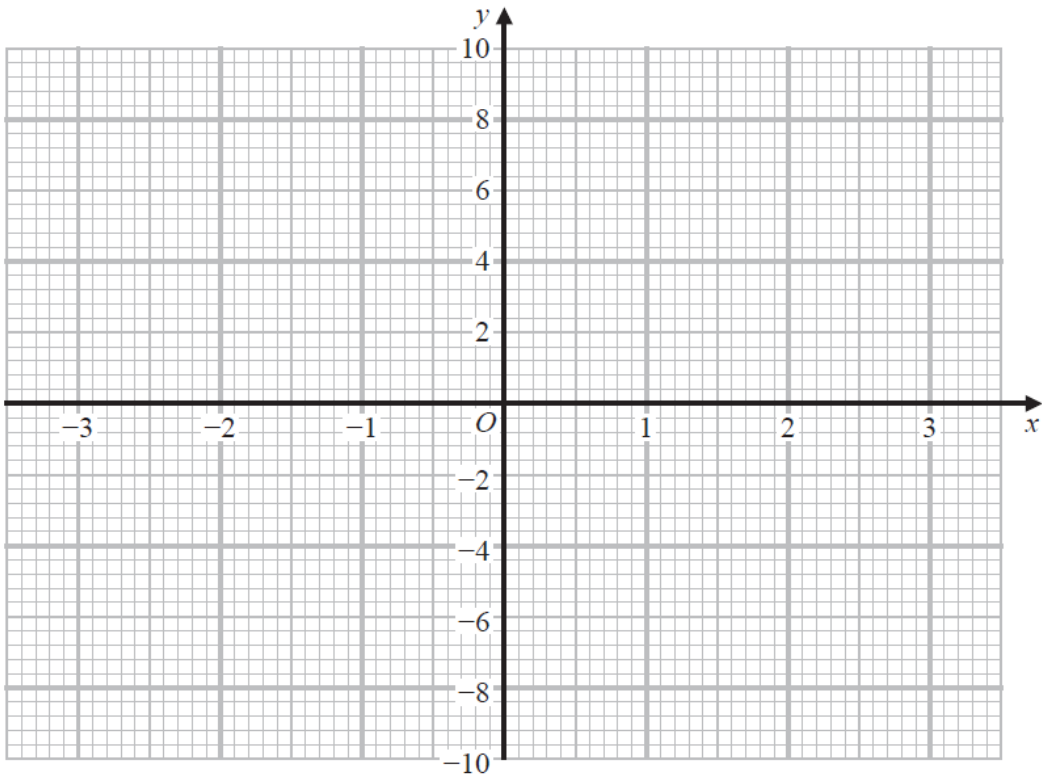
11 The graph of $y = f(x)$ is drawn on the grid.
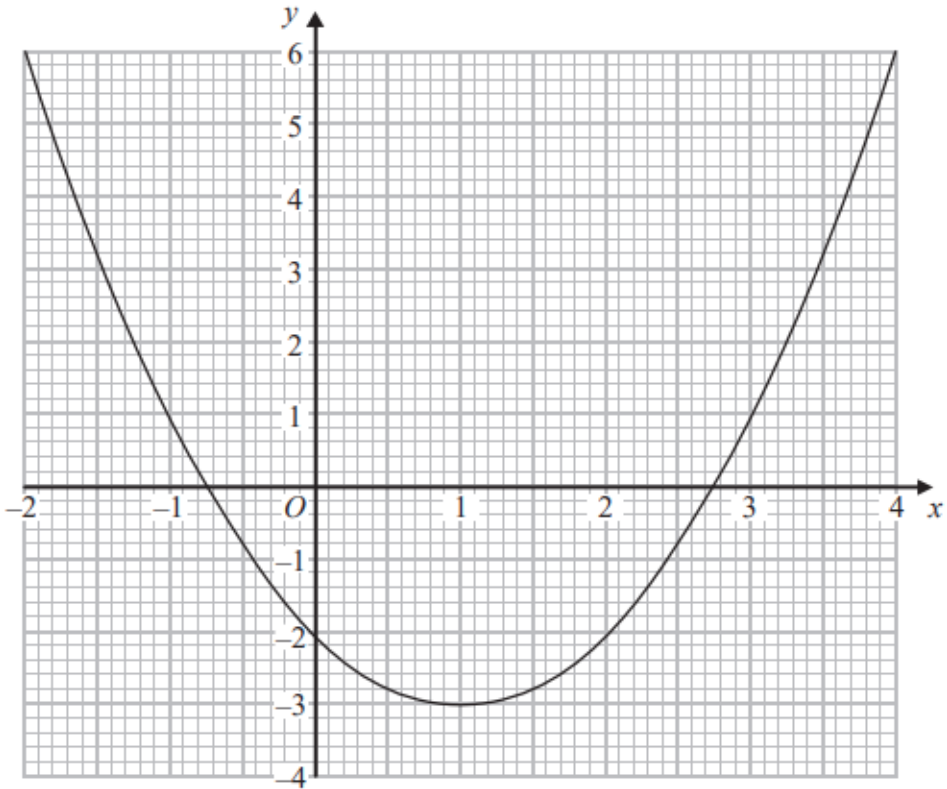
(a) Write down the coordinates of the turning point of the graph.

(.................... , ...)
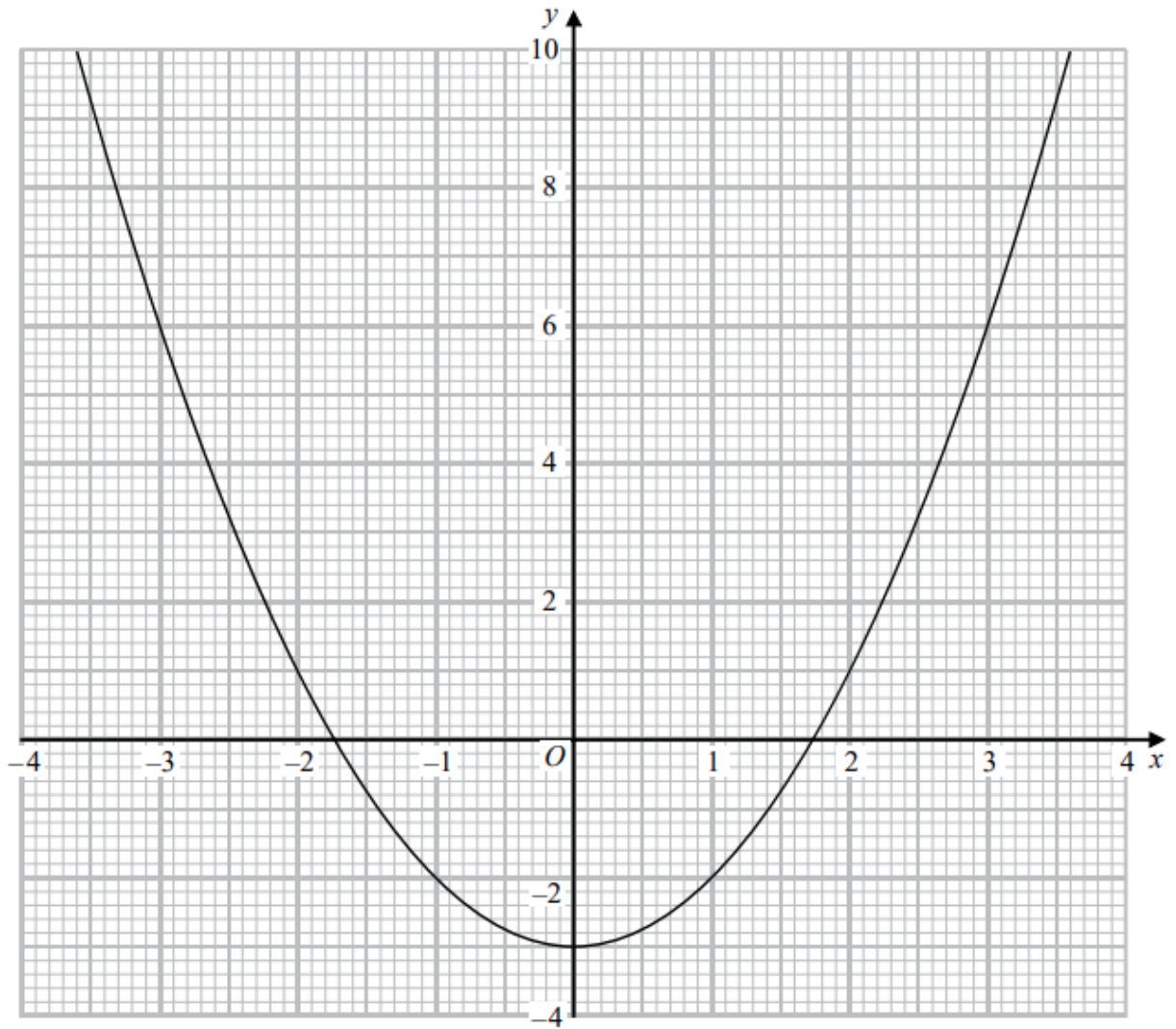
(1)

(b) Write down estimates for the roots of $f(x) = 0$

....

(1)

(c) Use the graph to find an estimate for $f(1.5)$

....
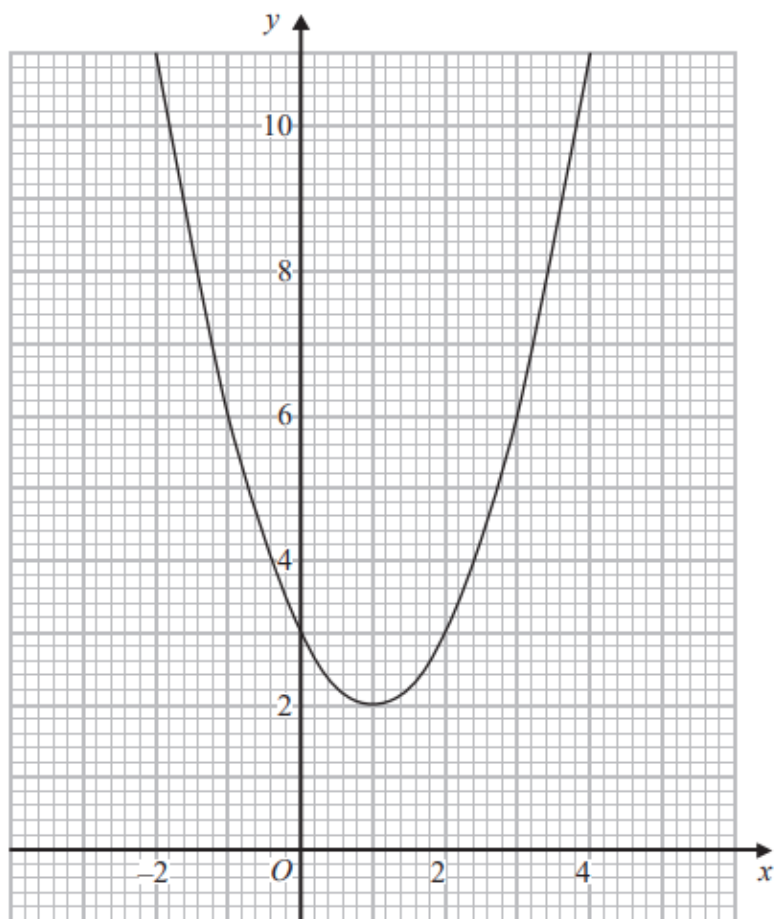
(1)

(Total for Question 11 is 3 marks)

17 Here is the graph of $y = x^2 - 3$

Use the graph to find estimates for the solutions to the equation $x^2 - 2x - 2 = 0$
You must show how you get your solutions.

....

(Total for Question 17 is 4 marks)

20 The diagram shows part of the graph of $y = x^2 - 2x + 3$

(a) By drawing a suitable straight line, use your graph to find estimates for the solutions of $x^2 - 3x - 1 = 0$

....

(2)

P is the point on the graph of $y = x^2 - 2x + 3$ where $x = 2$

(b) Calculate an estimate for the gradient of the graph at the point P.

....

(3)

(Total for Question 20 is 5 marks)

21 Sketch the graph of

$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.