For Supervisor's use only

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90285

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Mathematics, 2006

90285 Draw straightforward non-linear graphs

Credits: Three
2.00 pm Wednesday 29 November 2006

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure you have a copy of Formulae Sheet L2-MATHF.

You should answer ALL the questions in this booklet.

Show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–11 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Draw straightforward non-linear graphs. ☐	Draw non-linear graphs. ☐	Determine and apply an appropriate model for a situation involving graphs. ☐
	Use non-linear graphs to solve problems. ☐	
Overall Level of Performance (all criteria within a column are met) ☐		

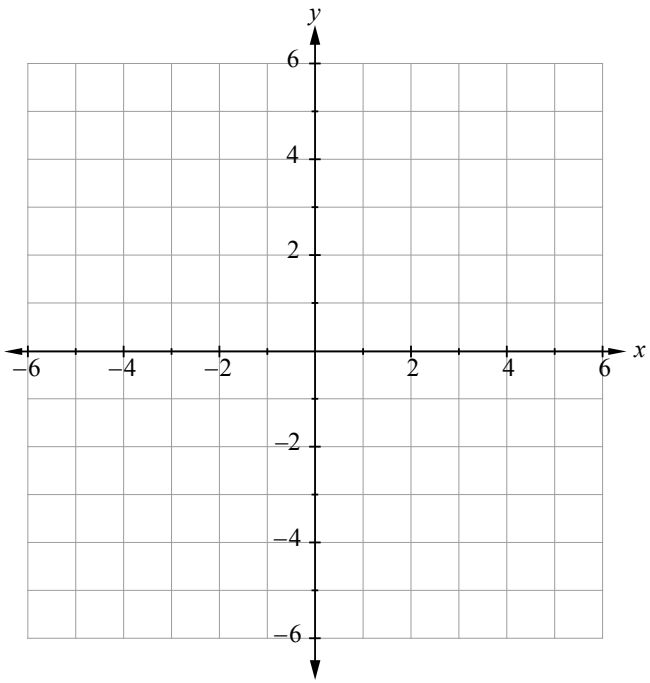
You are advised to spend 25 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

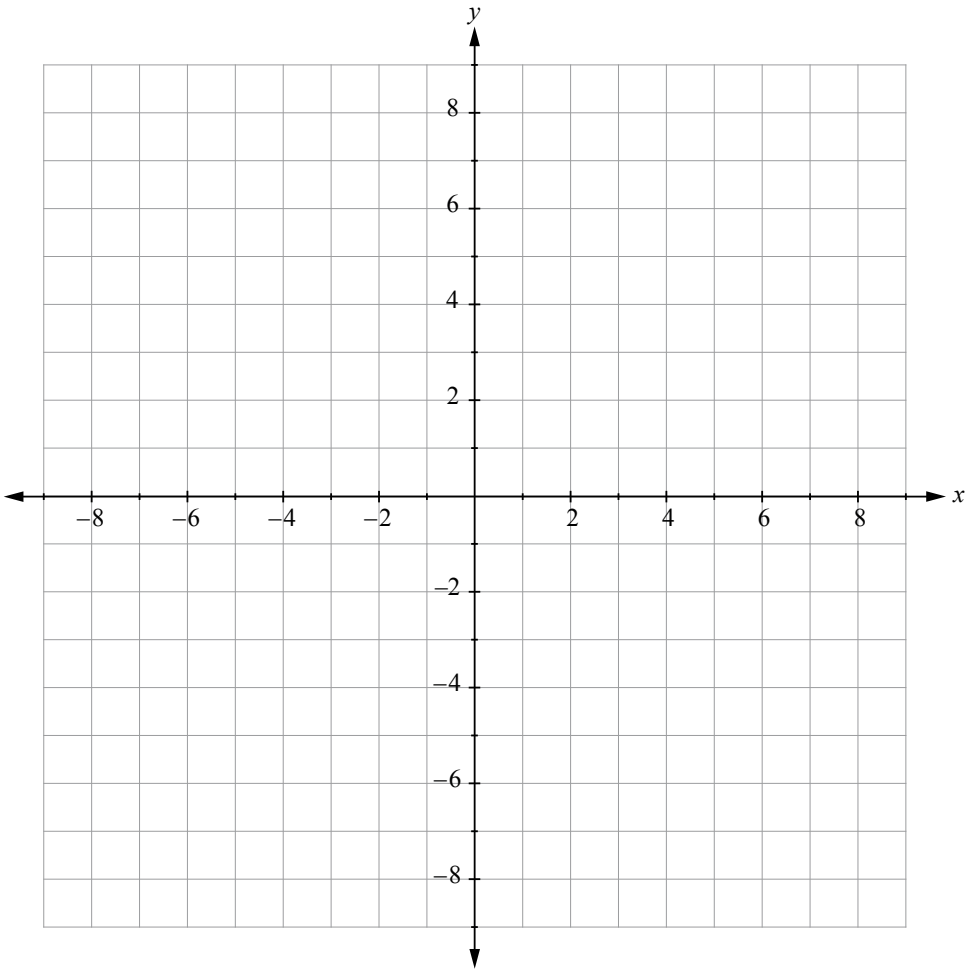
Draw the graphs of each of the following equations.
You **must** indicate the key features.

(a) $x^2 + y^2 = 4$



If you need to redraw either of these graphs, use page 8.

(b) $y = (x + 2)(x - 1)(x - 3)$



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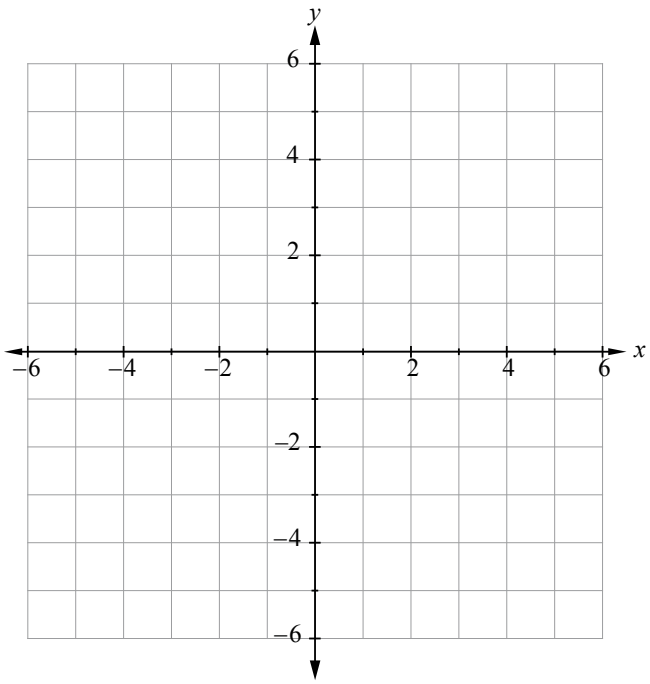
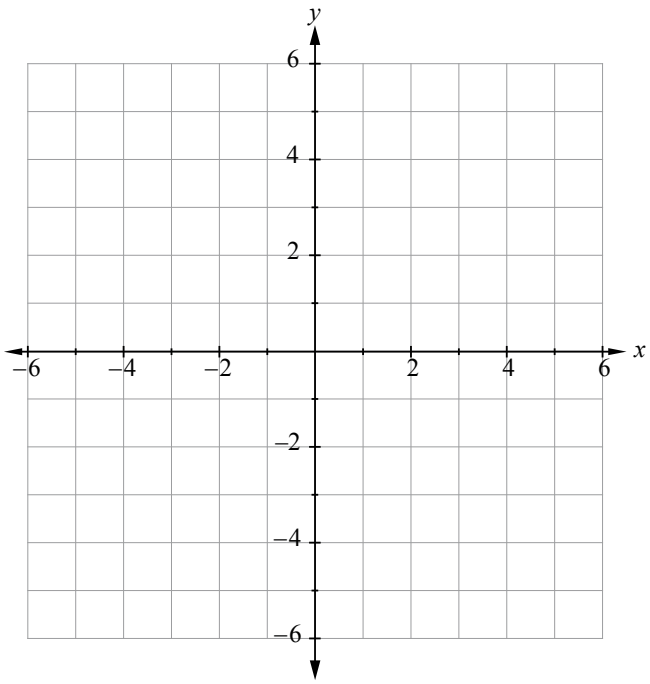
(c) $y = -x^2 + 2x + 3$

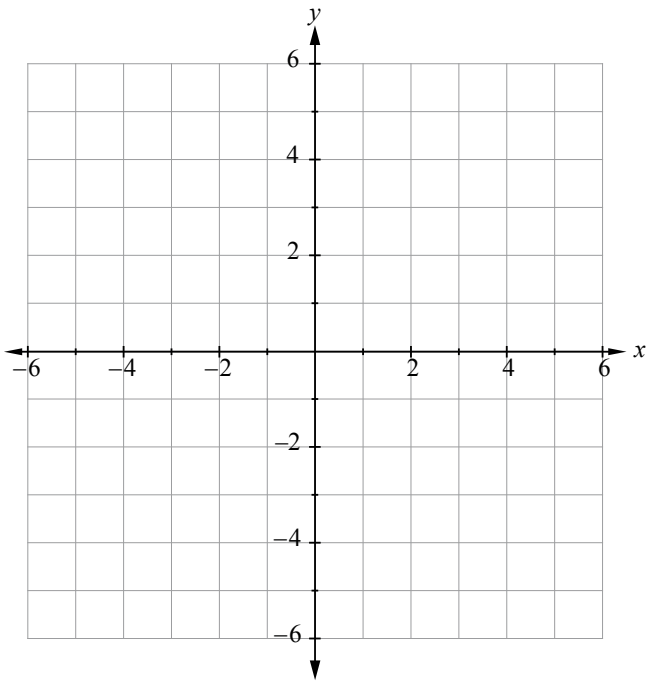


(d) $y = 2^{x-1}$



If you need to redraw either of these graphs, use page 9.

(e) $y = \log_{10} x + 2$



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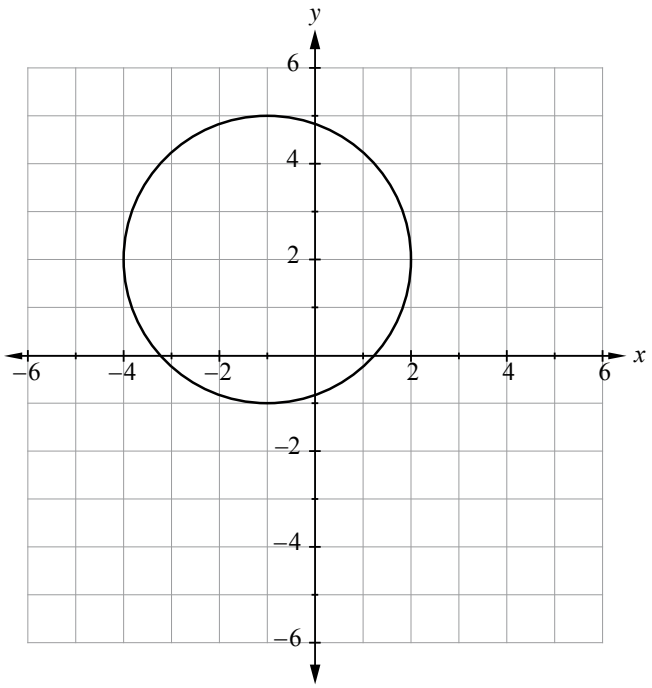
If you need to redraw this graph, use page 10.

QUESTION TWO

Assessor's use only

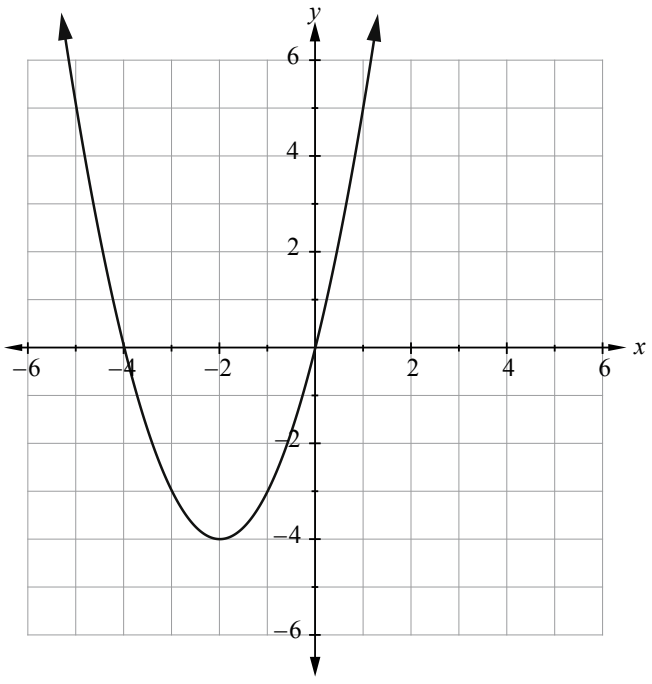
Give the equation for each of the following graphs:

(a)



Equation: _____

(b)



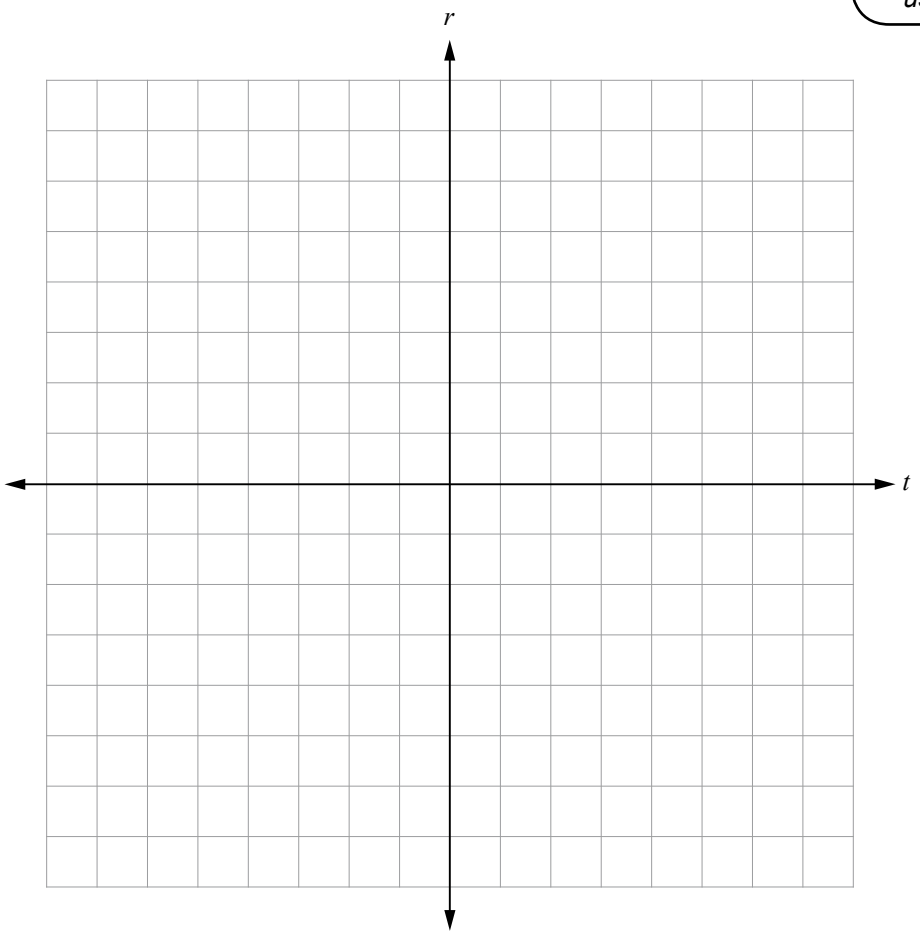
Equation: _____

QUESTION THREE

Assessor's use only

(a) Draw the graph of the equation $r = \frac{6}{t+1}$ on the grid below.

If you need to redraw this graph, use page 10.



(b) The rate at which oil is produced by a well can be modelled by the function

$r = \frac{6}{t+1}$ where r is the rate in thousands of barrels per day and t is the number of years after production begins ($t \geq 0$).

The oil well becomes uneconomical to operate when production falls below 1 250 barrels per day.

Use your graph from part (a) above to estimate how long the well should operate before being shut down.

Length of time: _____ years

QUESTION FOUR

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Water is pumped into a tank at a constant rate.
Pumping stops at the end of the fourth day.
At this time a valve is opened and water flows from the tank at a decreasing rate. After the valve is opened, the volume of water in the tank, until it is empty, can be modelled by a parabola.
The volume (in litres) of water in the tank at the end of each of eight days is shown in the following table:

Day	Litres
1	2000
2	4000
3	6000
4	8000
5	4500
6	2000
7	500
8	0

Calculate the volume of water left in the tank after six and a half days.

If you need to redraw a graph from page 2, draw it on the grids below and clearly number the question.

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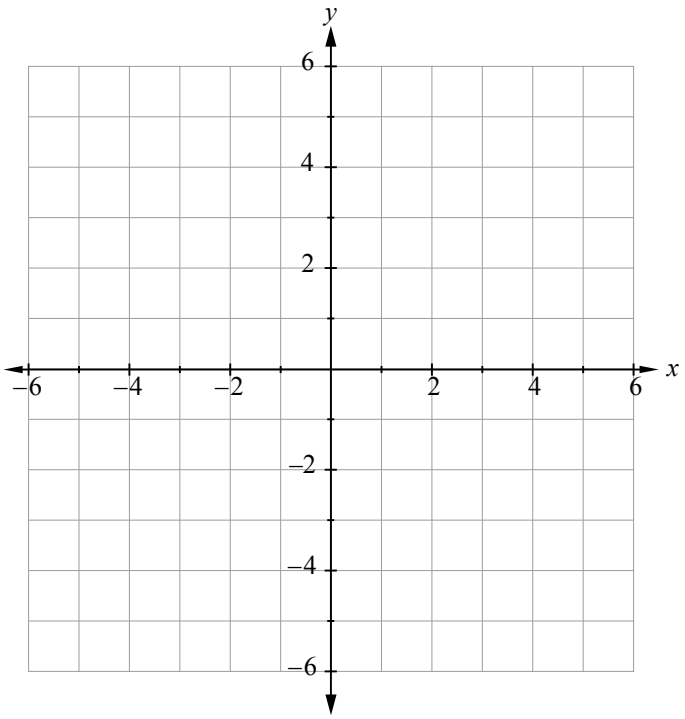

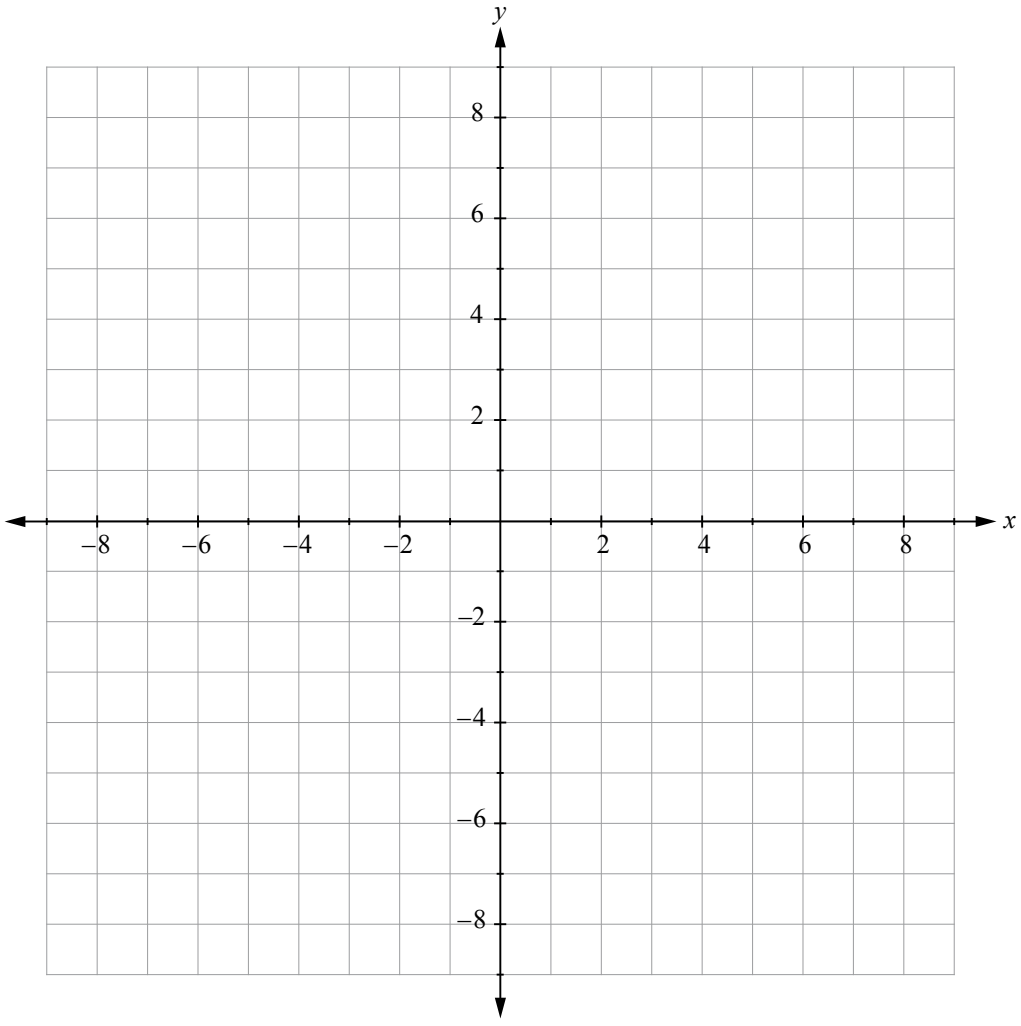

If you need to redraw a graph from page 3, draw it on the grids below and clearly number the question.

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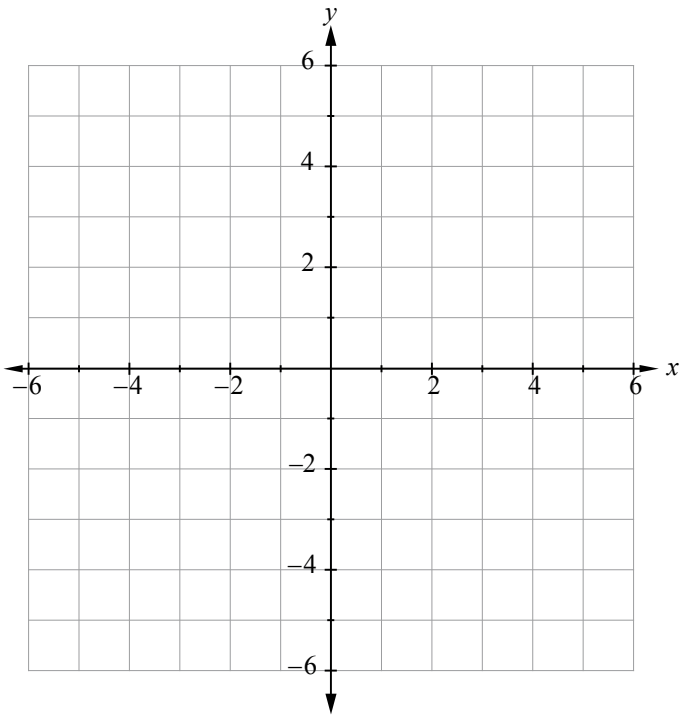

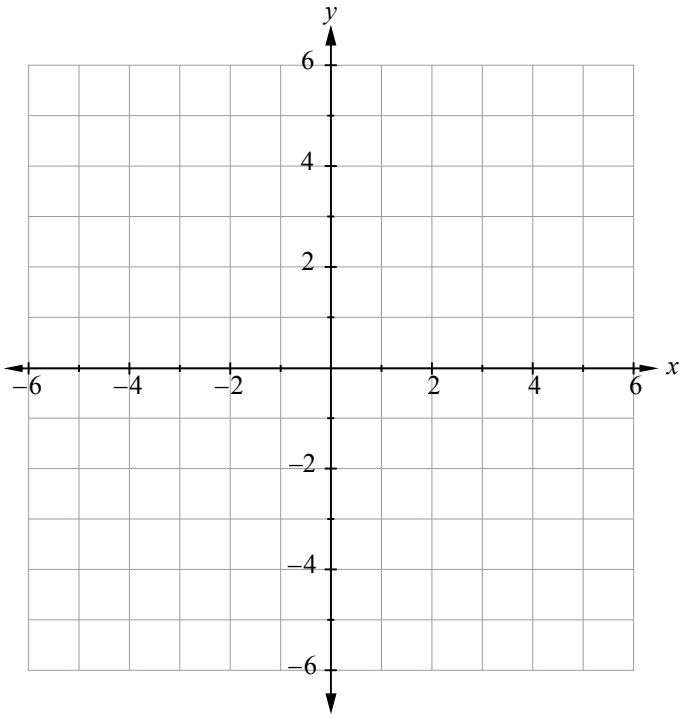

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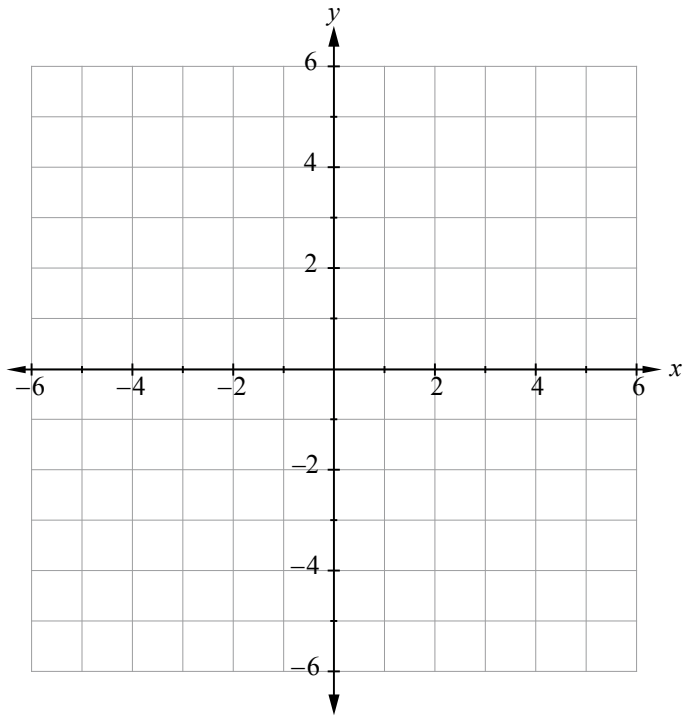
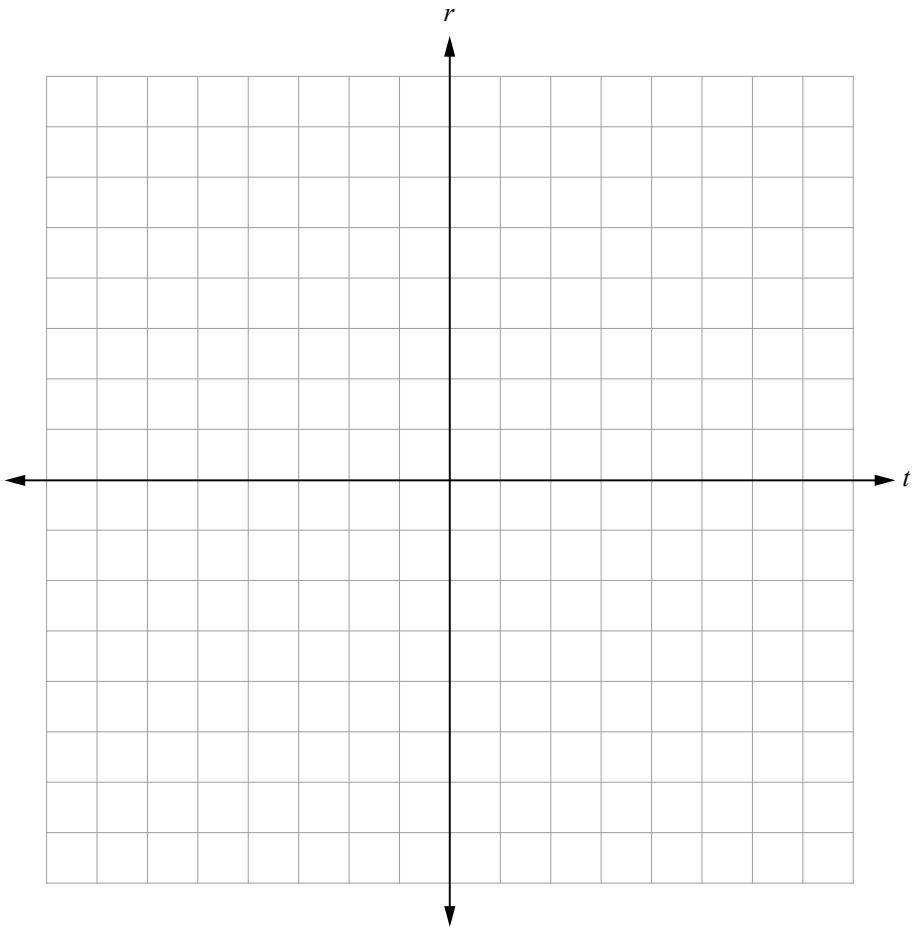
If you need to redraw the graph from page 4, draw it on the grid below and clearly number the question.



If you need to redraw the graph from page 6, draw it on the grid below and clearly number the question.



Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number	