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, 2005

90285 Draw straightforward non-linear graphs

Credits: Three
2.00 pm Thursday 24 November 2005

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 that 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 2–12 in the correct order and that none of these page(s) 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 40 minutes answering the questions in this booklet.

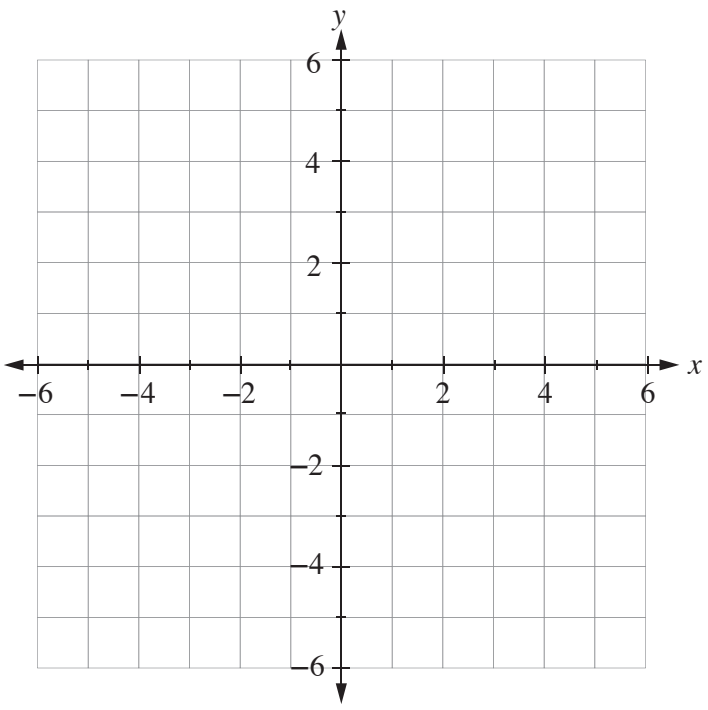
Assessor's use only

Show working.

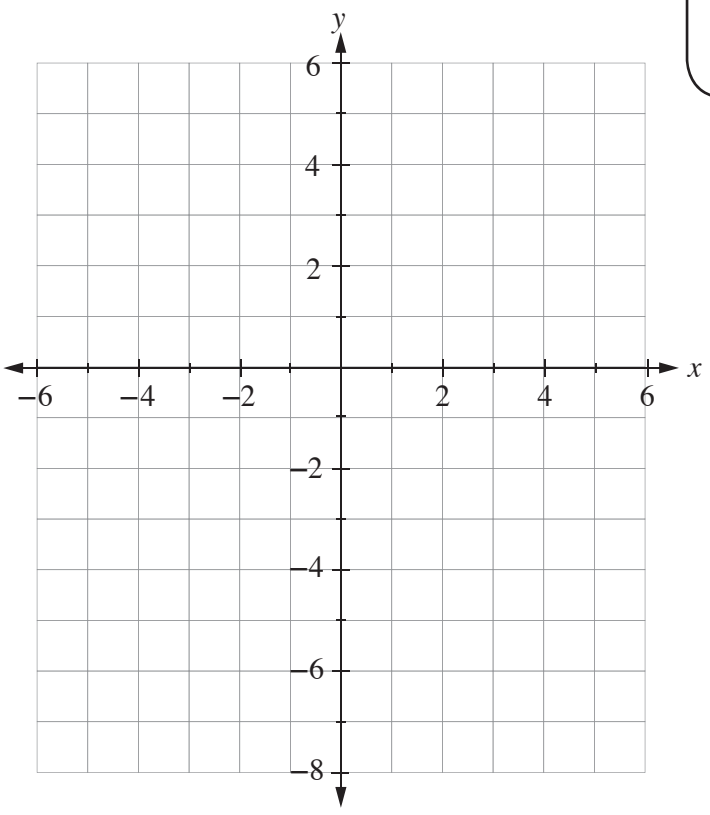
QUESTION ONE

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

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



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



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

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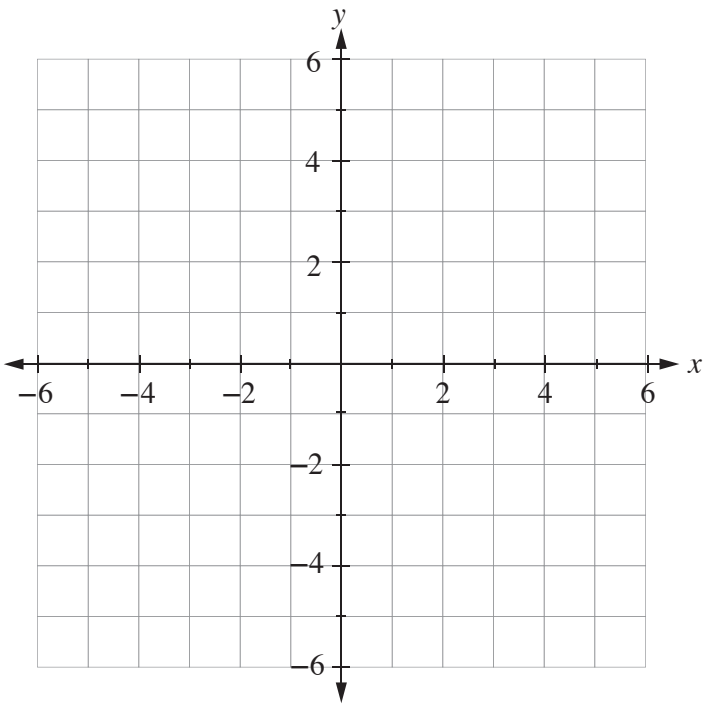
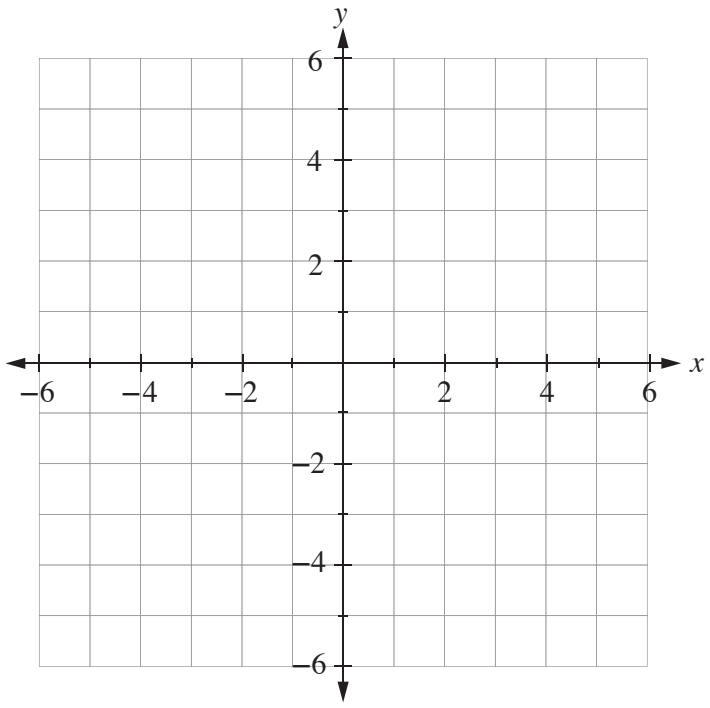
(c) $y = \dfrac{-2}{x}$



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

(d) $y = \dfrac{3}{x-2} - 1$



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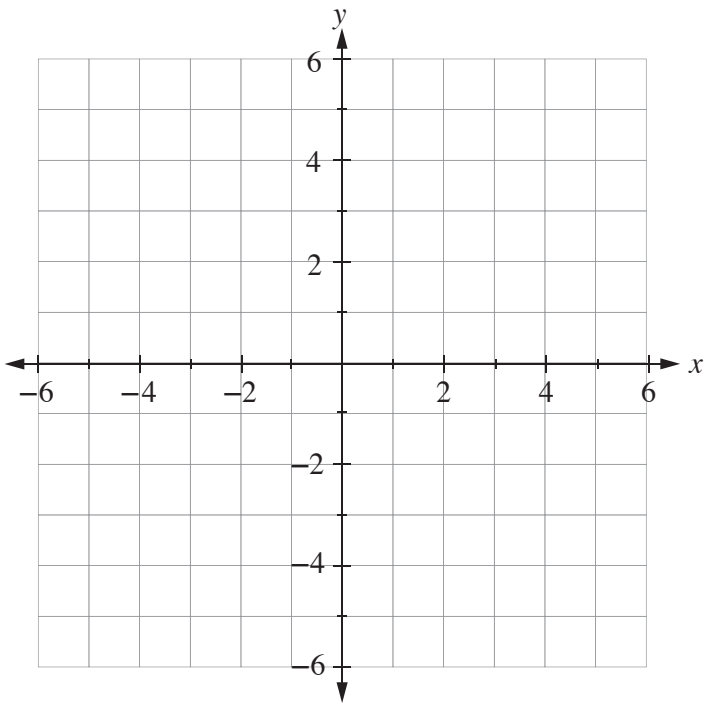
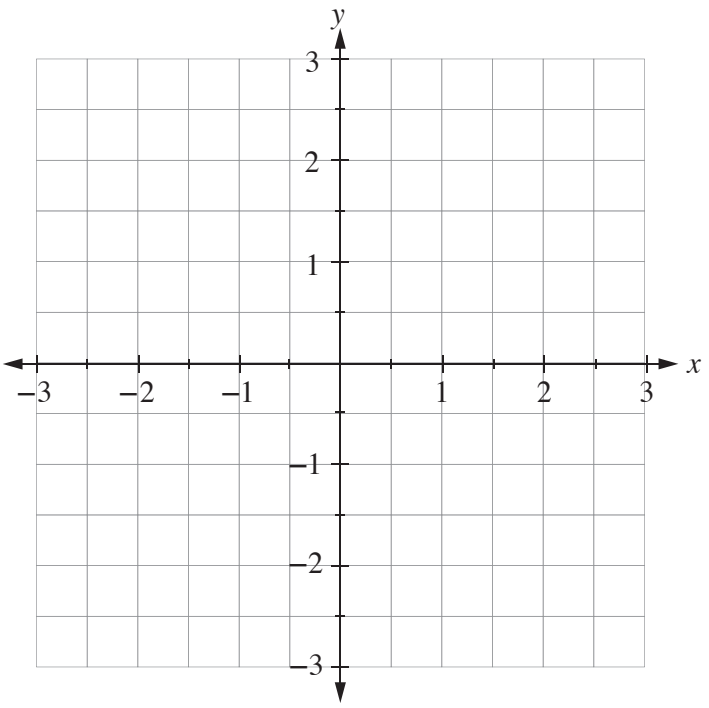
(e) $(x + 1)^2 + (y - 3)^2 = 9$



If you need to redraw either of these graphs, use page 10.

(f) $y = \log_{10}(x + 1)$

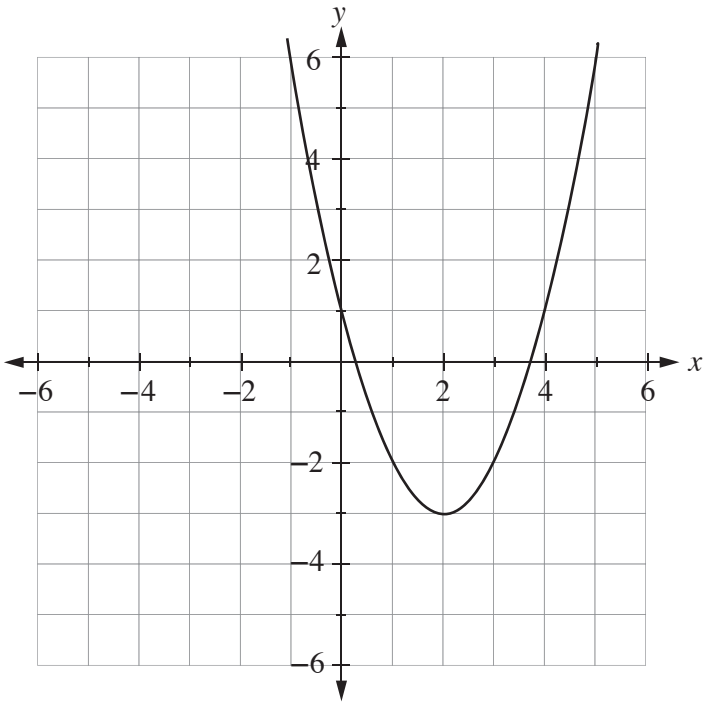


QUESTION TWO

Assessor's use only

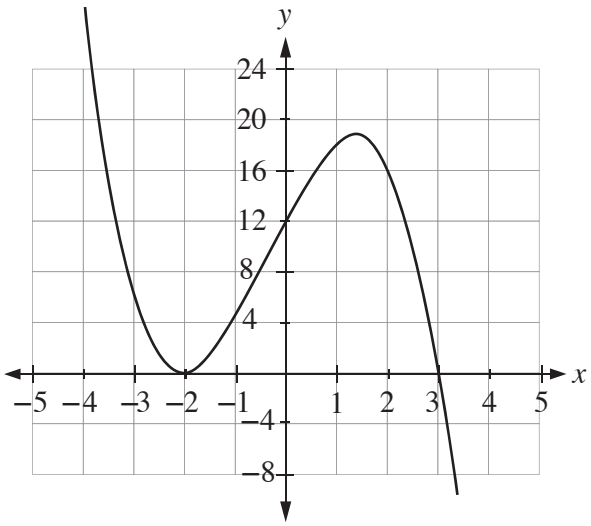
Give the equation of each of the following graphs:

(a)



Equation: _____

(b)



Equation: _____

QUESTION THREE

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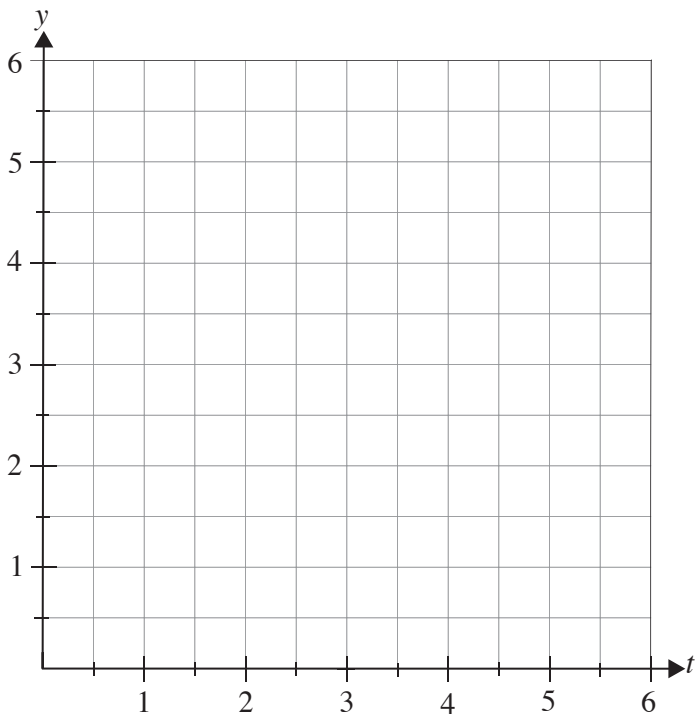
When heated, cooking oil evaporates. The volume of the oil, y ml, in a pan is given by

$$y = 5 \times 0.8^t$$

where t is the time in minutes after the heating begins.

(a) Draw the graph of the equation on the grid below.



If you need to redraw this graph, use page 11.

(b) **Use your graph** to estimate how long it will take for half of the oil to evaporate.

Time = _____ minutes

QUESTION FOUR

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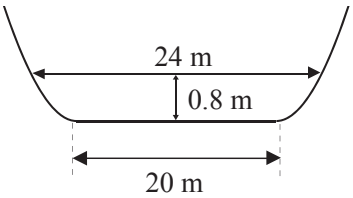
The base of a canal is horizontal and has a width of 20 metres.
The banks of the canal are symmetrical and parabolic in shape.

The width of the water surface from bank to bank is 24 metres when the depth of the water in the middle of the canal is 0.8 metres.

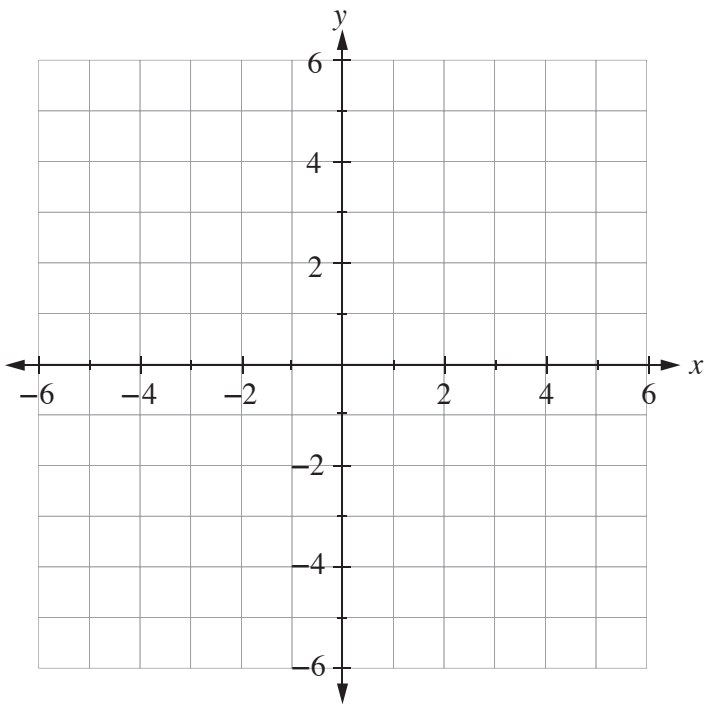


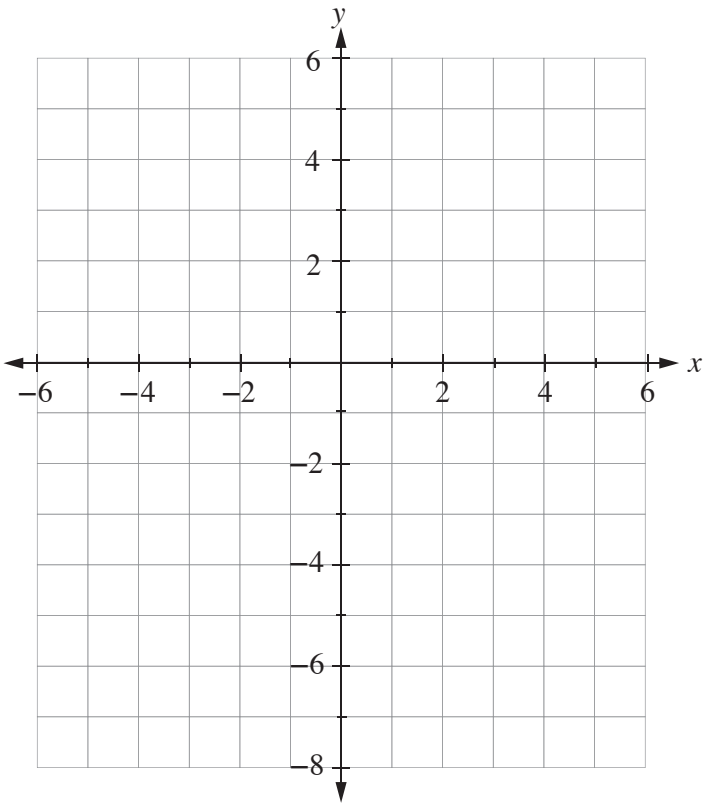
NOT TO SCALE

Find the width of the water surface from bank to bank if the depth of the water in the canal is increased by one metre.

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

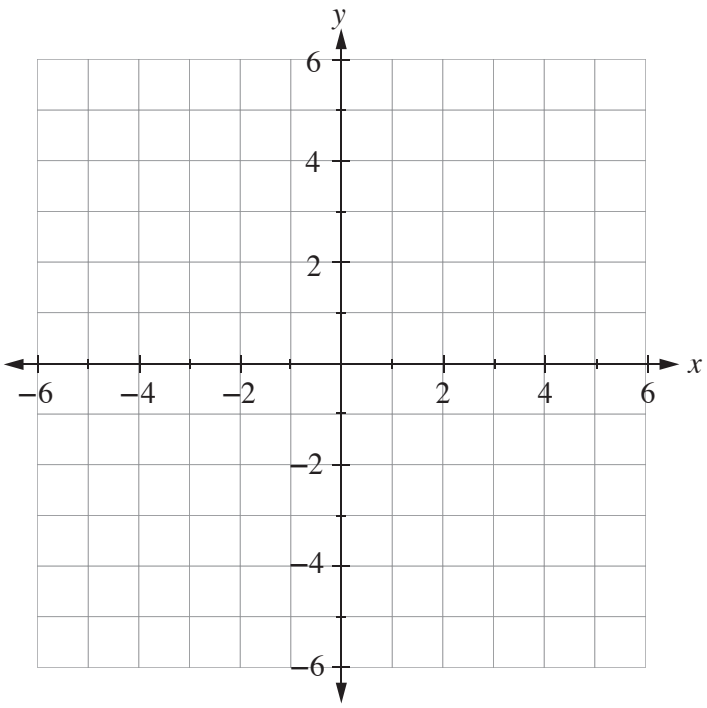
Assessor's use only

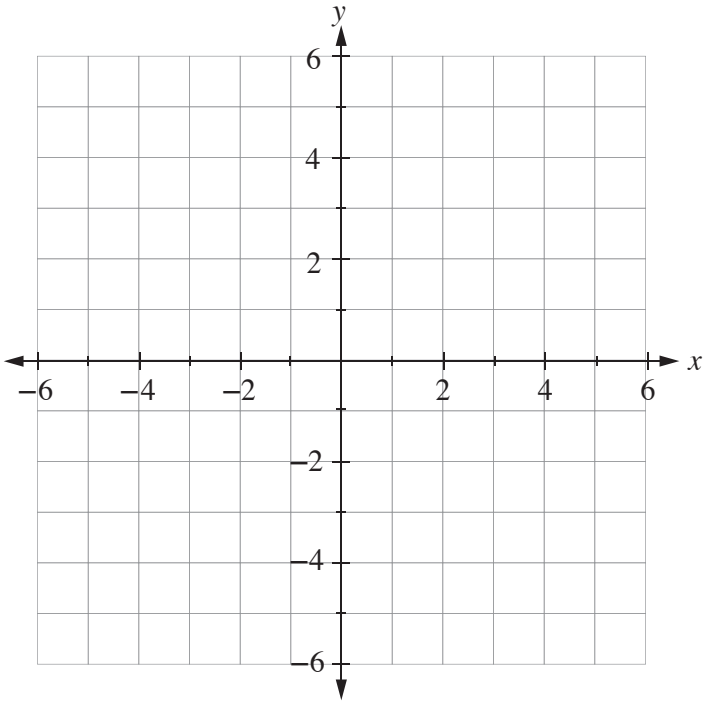




If you need to redraw a graph from page 3, draw it on the grids below and clearly number the question.

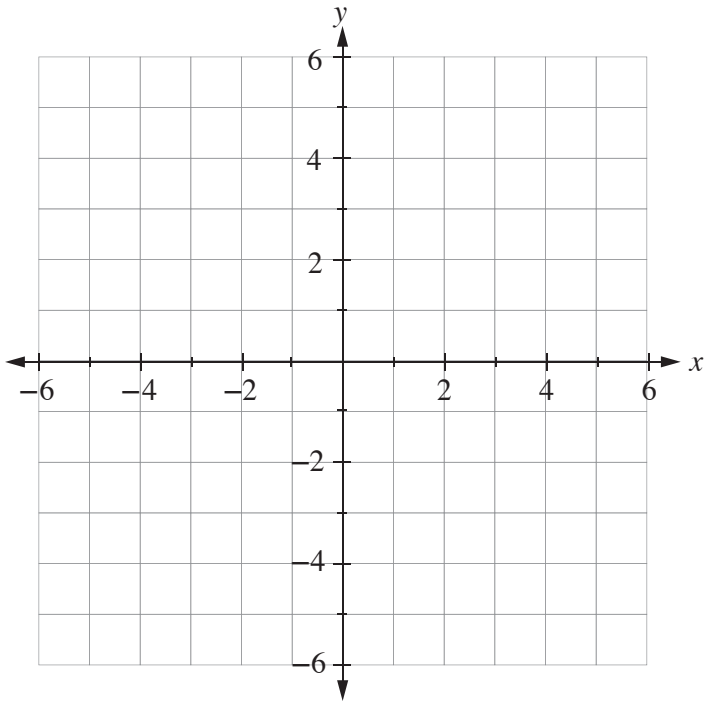
Assessor's use only

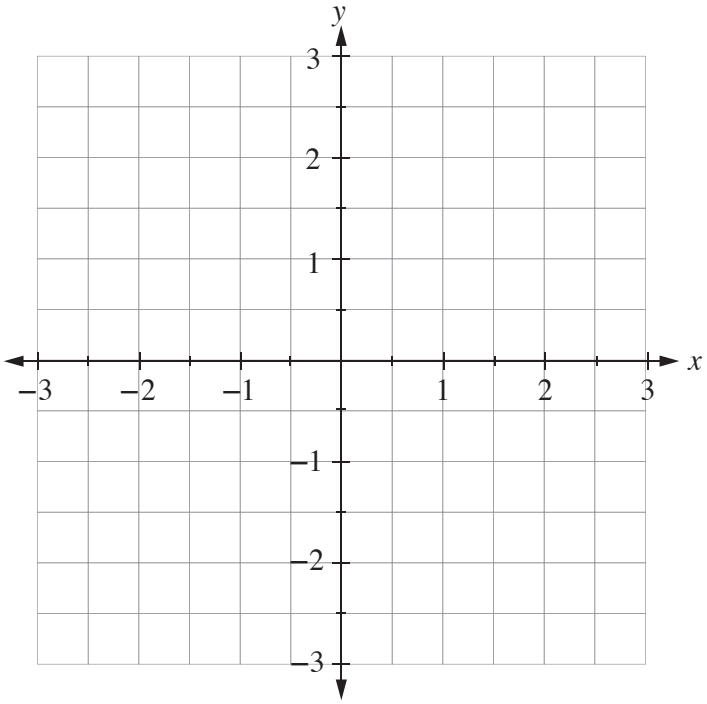




If you need to redraw a graph from page 4, draw it on the grids below and clearly number the question.

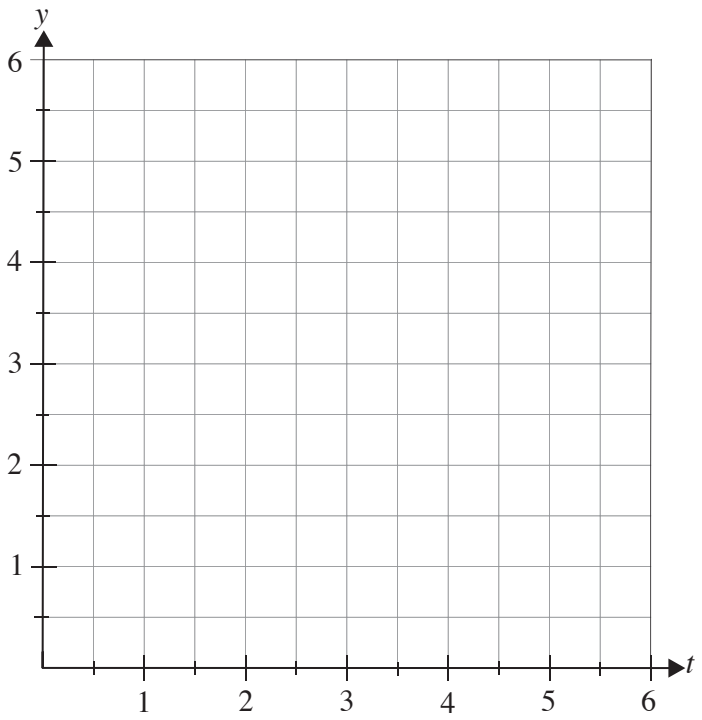
Assessor's use only





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

Assessor's use only



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

Assessor's use only

Question number