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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Mathematics, 2008

90285 Draw straightforward non-linear graphs

Credits: Three
2.00 pm Monday 24 November 2008

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 the Formulae Sheet L2-MATHF.

You should answer ALL the questions in this booklet.

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 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) ☐		

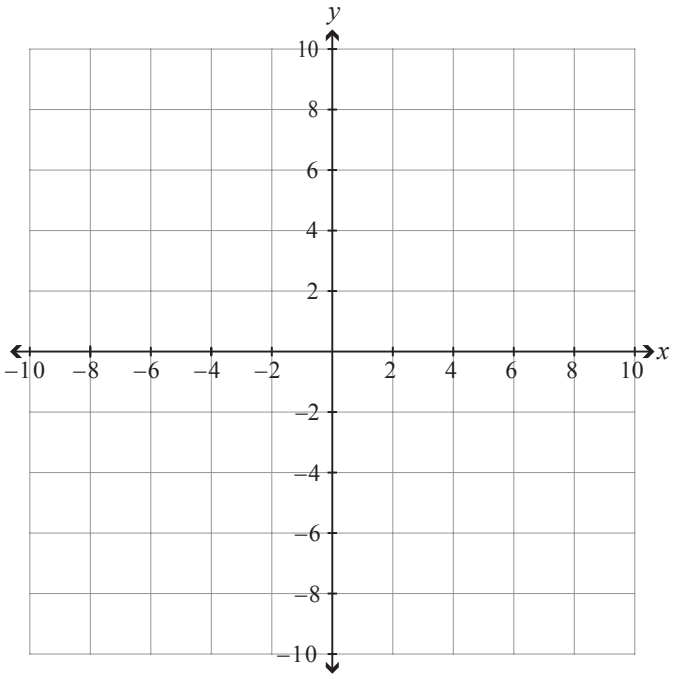
You are advised to spend 30 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

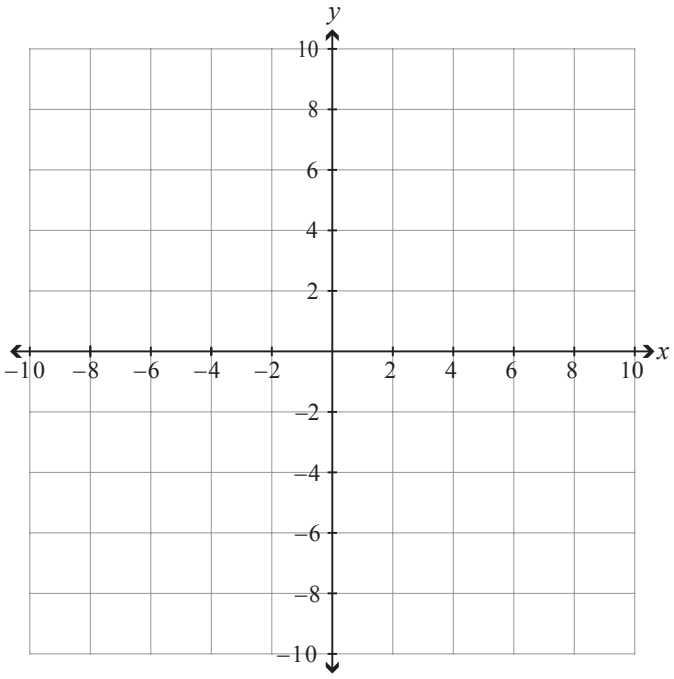
Draw the following graphs, clearly showing any key features.

(a) $y = x^2 - 6x + 8$



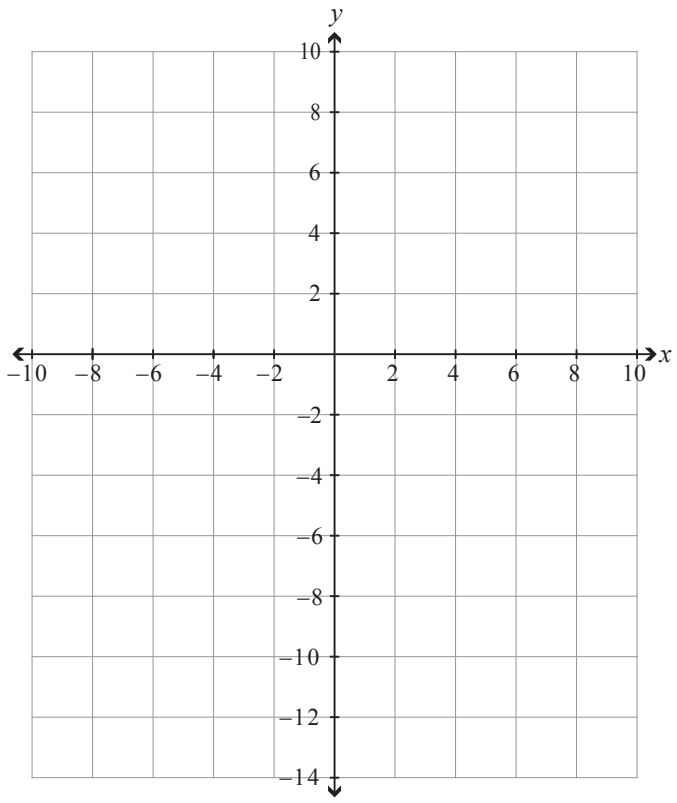
If you need to redraw either of these graphs, use the grids on page 9.

(b) $y = \frac{4}{x}$



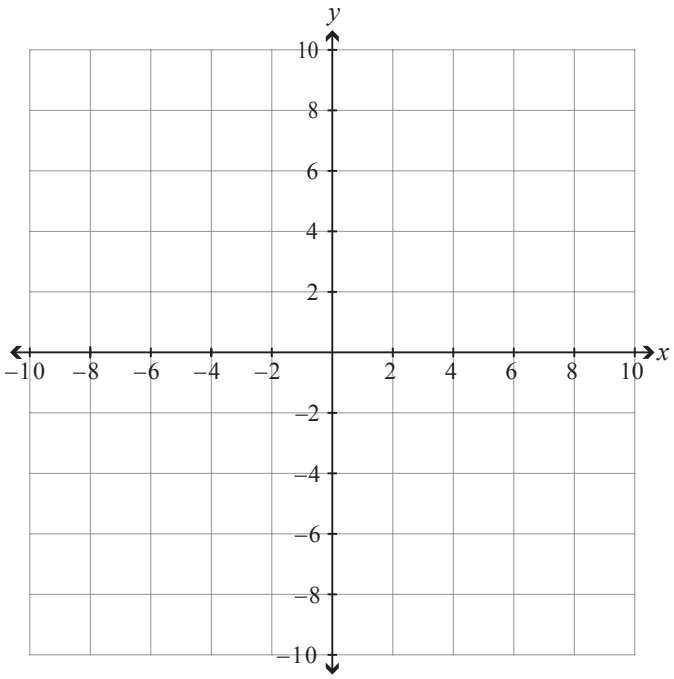
Assessor's use only

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



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

(d) $(x - 2)^2 + y^2 = 16$



(e) $y = 3^{(x-1)}$

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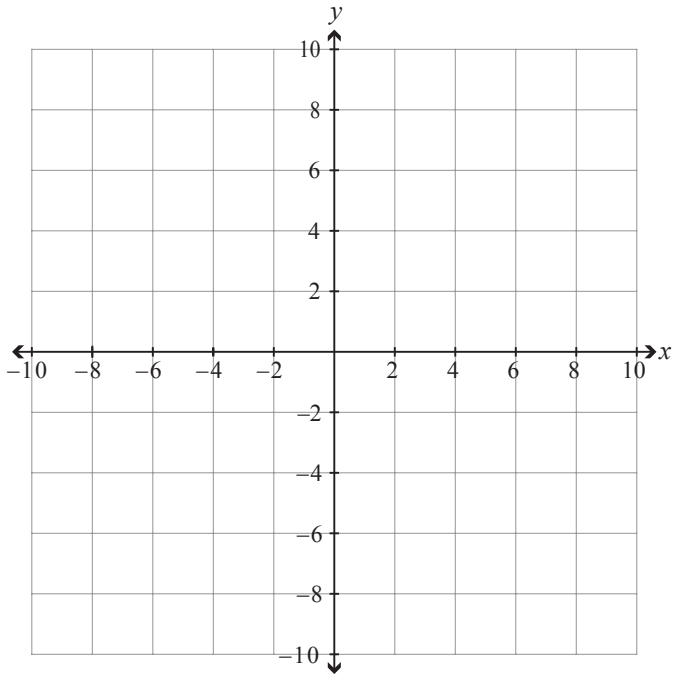
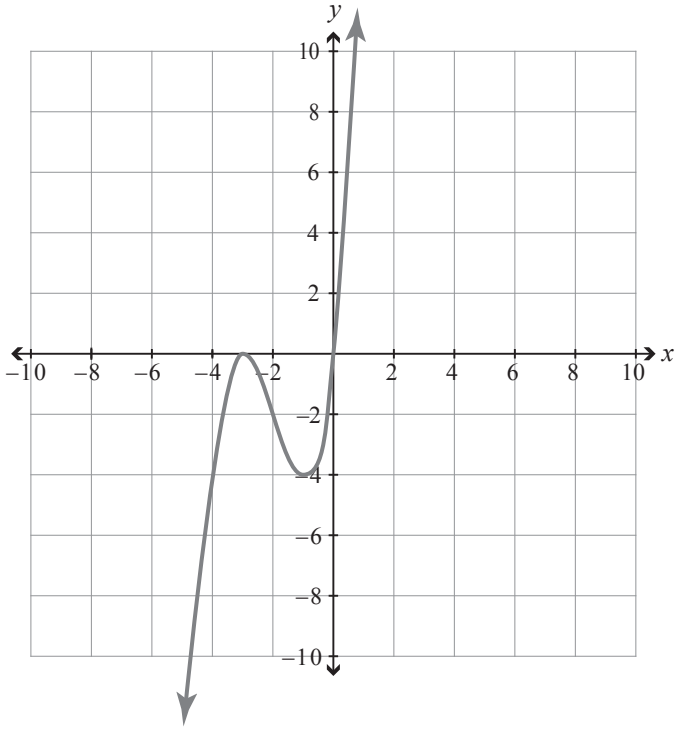


If you need to redraw this graph, use the grid on page 11.

QUESTION TWO

Assessor's use only

Write the equation for the following graph.

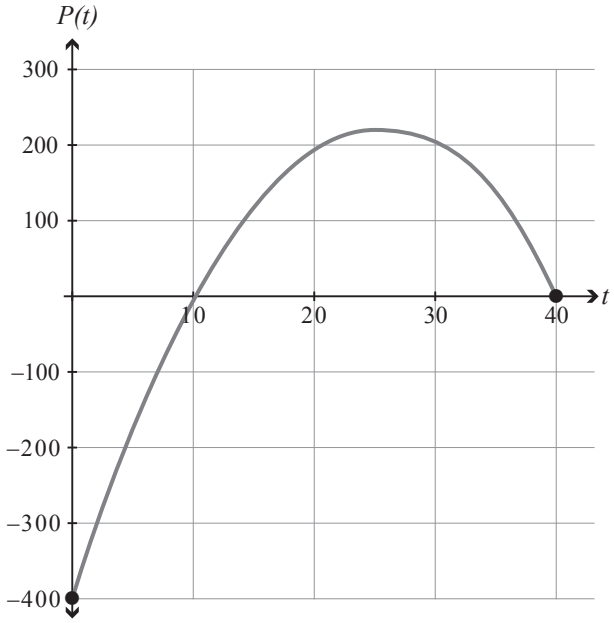


Equation is : _____

QUESTION THREE

Assessor's use only

The Young Enterprise Group at Springfield College ran a business for 40 weeks.



(a) The group's weekly profit, $P(t)$, for the 40 weeks is modelled by a quadratic function, as shown in the graph above, where t is the number of weeks since the business started.

The equation of the function is: _____

(b) Describe in **full** what happens to the profit **over the 40 weeks**.

_____

_____

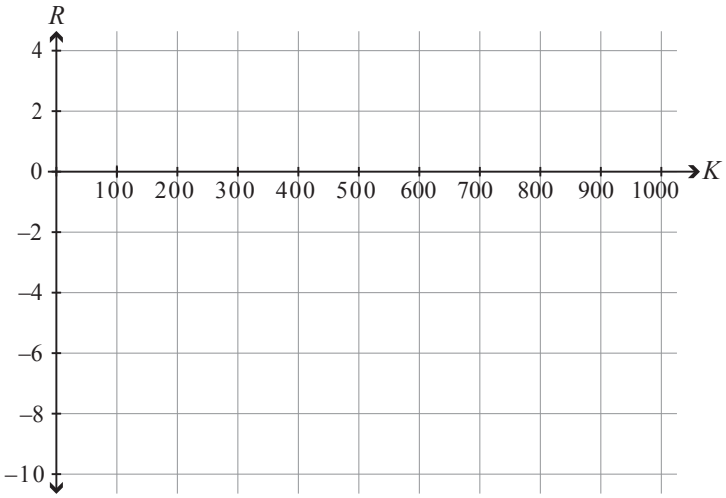
_____

_____

QUESTION FOUR

Assessor's use only

(a) Draw the graph of $R = \log_{10} K - 1.35$



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

(b) The Richter scale measures the amount of energy released by an earthquake.
The function $R = \log_{10} K - 1.35$ is to be used as an approximation for the Richter scale.
R is the Richter scale value for an earthquake that releases K kilojoules (kJ) of energy.

Using this approximation, is there an upper limit to the energy released by the earthquake as the kilojoules released increase? Give reasons for your answer.

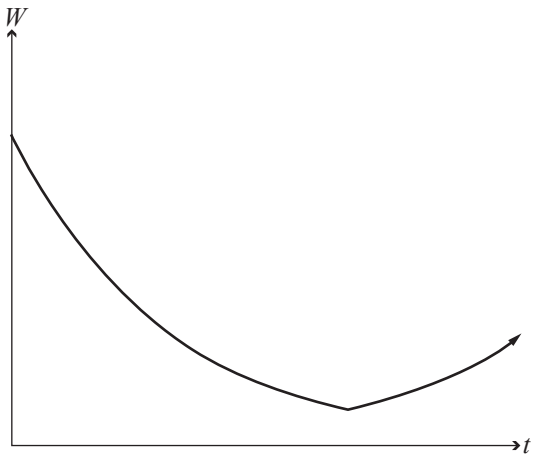
QUESTION FIVE

Assessor's use only

The local council has introduced a new recycling programme.

Rubbish is collected weekly.
It is found that the weight W kg of rubbish collected each week from one street can be modelled by a function of the form:

$$W = \begin{cases} A \times 2^{kt}, 0 \le t \le n \\ 2^{-kt}, t > n \end{cases}$$



where t is the number of weeks since the programme was introduced, and A and n have positive values.
Both functions give the same value when $t = n$.

At the beginning of the recycling programme ($t = 0$), the weight of rubbish collected from the street was 80.0 kg.
In the 10th week, the weight of rubbish collected from the street was 72.1 kg
After n weeks, the rubbish reached its lowest weight (where $n > 10$).

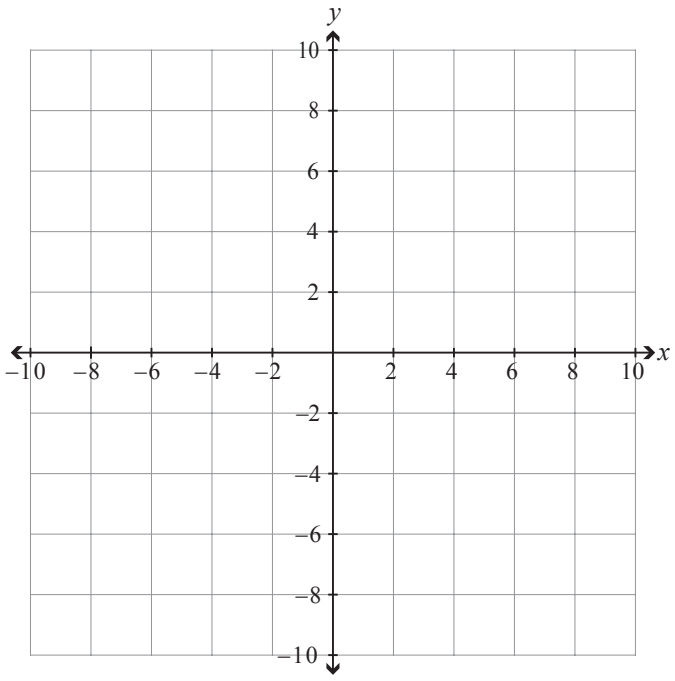
Calculate the minimum weight of the rubbish collected from the street using this model.

Show how you found your solution.

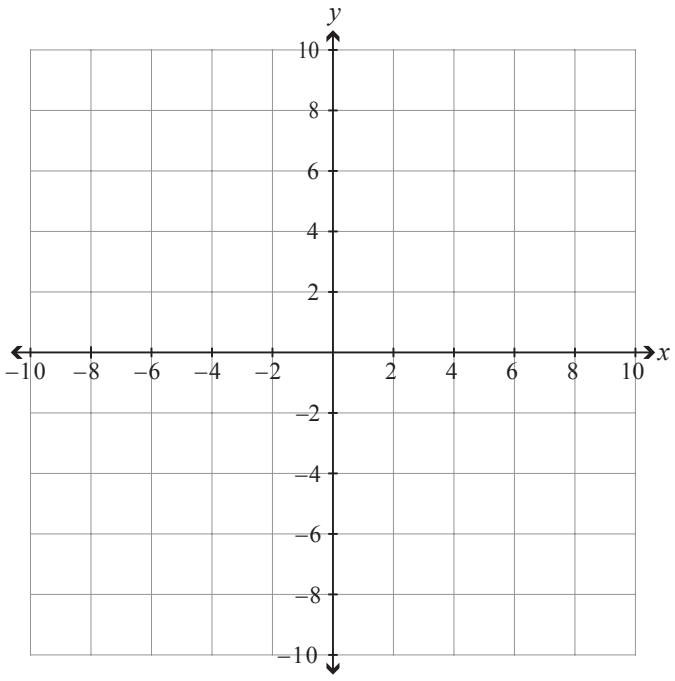
If you need to redraw a graph from page 2, draw it on a grid below and carefully number the question. Make sure it is clear which graph from each question you want marked.

Assessor's use only

Question _____



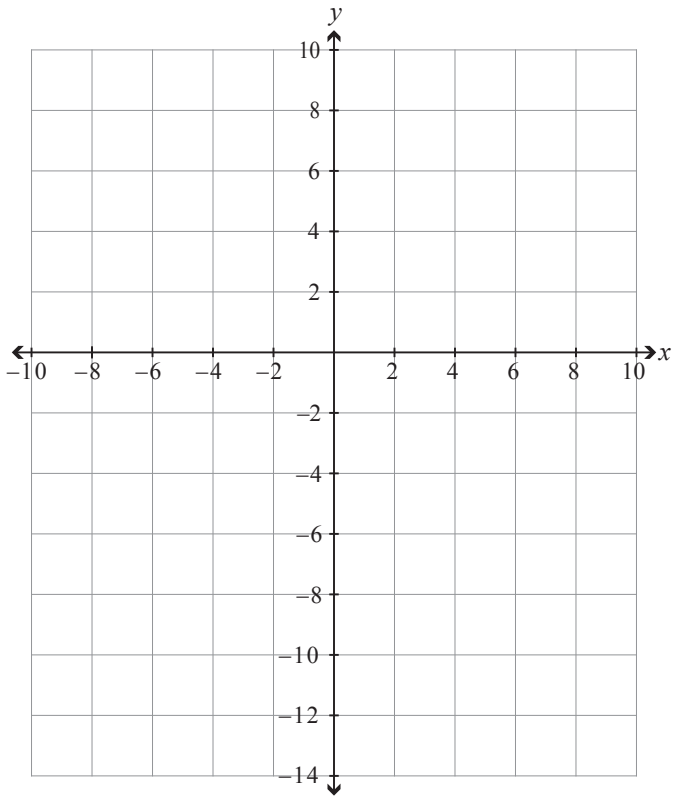
Question _____



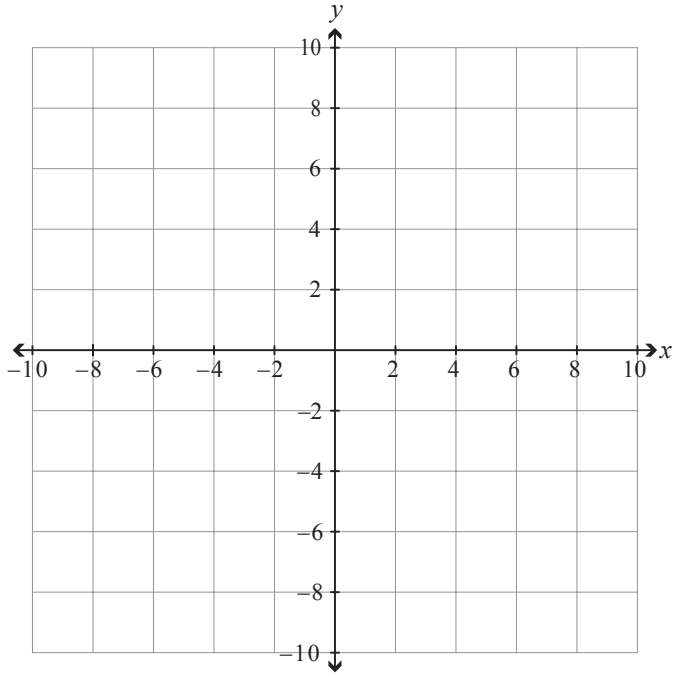
If you need to redraw a graph from page 3, draw it on a grid below and carefully number the question. Make sure it is clear which graph from each question you want marked.

Assessor's use only

Question _____



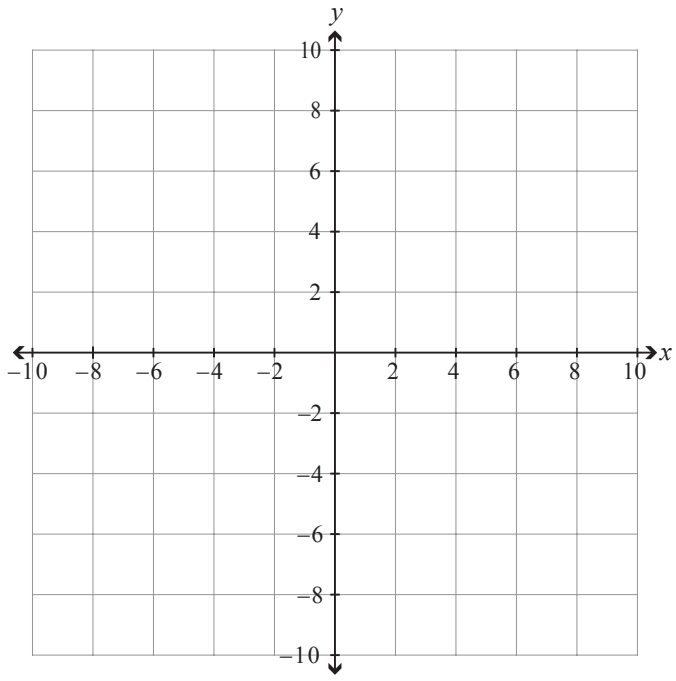
Question _____



Assessor's use only

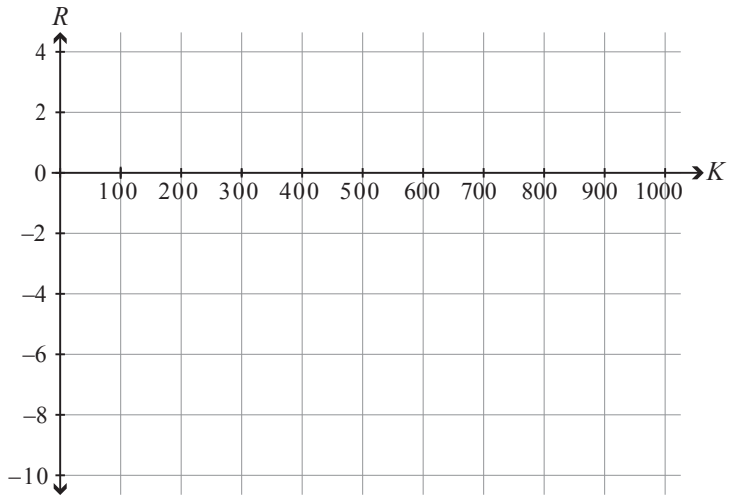
If you need to redraw the graph from page 4, draw it on the grid below and carefully number the question. Make sure it is clear which graph from the question you want marked.

Question _____



If you need to redraw the graph from page 7, draw it on the grid below and carefully number the question. Make sure it is clear which graph from the question you want marked.

Question _____



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

Assessor's use only

Question number