AQA

PRACTICE PAPER

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 2C Graphical Techniques

Date Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a clean copy of the Preliminary Material (enclosed)
- a scientific calculator or a graphics calculator
- a copy of the formulae sheet
- a ruler.

Instructions
- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions should be given to an appropriate degree of accuracy.
- You may **not** refer to the copy of the Preliminary Material that was available prior to this examination. A clean copy is enclosed for your use.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You may ask for more answer paper and graph paper, which must be tagged securely to this answer booklet.

The paper reference for this paper is 1350/2C.

Answer **all** questions in the spaces provided.

1 Gerry is a teaching assistant.

The four students he supports each completed a short test consisting of four questions.

Their marks in the short test are shown in the table.

Student	Question 1	Question 1	Question 3	Question 4	Total mark	Percentage (%)
Rachel	3	3	4	5	15	60
Shafi	3	3	4	9	19	76
Ash	2	1	2	5	10	40
Karen	3	2	4	5	14	56
Mode	3	3	4	5		

1 (a) A teacher wants to find out the **maximum total mark** available in the short test.

Circle the **maximum total mark**.

[1 mark]

19 25 76 100

1 (b) Identify **one** formatting error in Gerry's table and suggest **three** improvements he could make to the table.

[4 marks]

Error _____

Improvement 1 _____

Improvement 2 _____

Improvement 3 _____

Question 1 continues on the next page

1 (c) Amy gave the same test to the five students she supports.

Their marks are shown in the table.

Student	Question 1	Question 2	Question 3	Question 4	Total mark	Percentage (%)
Ben	3	2	5	6	16	64
Cho	3	1	6	8	18	72
Liz	2	1	2	5	10	40
Nick	3	4	3	7	17	68
Paul	3	3	4	6	16	64

In a meeting, Amy presented her students' marks to her colleagues.

Two of her colleagues made the statements below.

'Most of the students that Amy supports did very well in Question 1.'

(Richard)

'The mean percentage for the five students that Amy supports is 60%.'

(Din)

Critically analyse these two statements.
Show working to justify your comments where necessary.

[4 marks]

Richard's statement

Din's statement

Turn over for the next question

2 Use **Communications Market Report** in the Preliminary Material.

2 (a) A journalist suggested that the format and content of the report were not presented well.

Give **three** examples to support her suggestion.

[3 marks]

Example 1

Example 2

Example 3

2 (b) Christopher wants to find out the average time, in hours, spent per day browsing online on PCs or laptops in 2013 using the data from the CMR.

His calculation is as follows.

> 31.24 × 12 = 374.88 hours
>
> 374.88 ÷ 355 = 1.056 hours
>
> The average time spent per day browsing online is 1.056 hours.

Critically analyse Christopher's calculation.

[3 marks]

Question 2 continues on the next page

2 (c) Three online bloggers made claims about the CMR as follows.

'The number of superfast broadband connections had increased by a factor of three fifths in one year.'

(Rasheed)

'Overall, BT lost over 20 000 landline customers in 2013.'

(Francoise)

'*Overall in 2014, the number of national radio stations declined*.'

(Eugene)

Does the data support these claims? Justify your answers.

[5 marks]

Rasheed

Francoise

Eugene

3 The amount charged by a taxi firm may consist of a fixed charge plus an amount per mile travelled.

For example, if a firm has a fixed charge of £2.20 and a charge of £4 per mile, then a journey of 3.3 miles costs £15.40

3 (a) The amount, £C, charged by the taxi firm Quick Cars is given by the formula

$$C = 2.4D + 3.6$$

where D miles is the distance travelled.

Write down the fixed charge and the charge per mile for Quick Cars.

[2 marks]

Fixed charge = £ _____

Charge per mile = £ _____

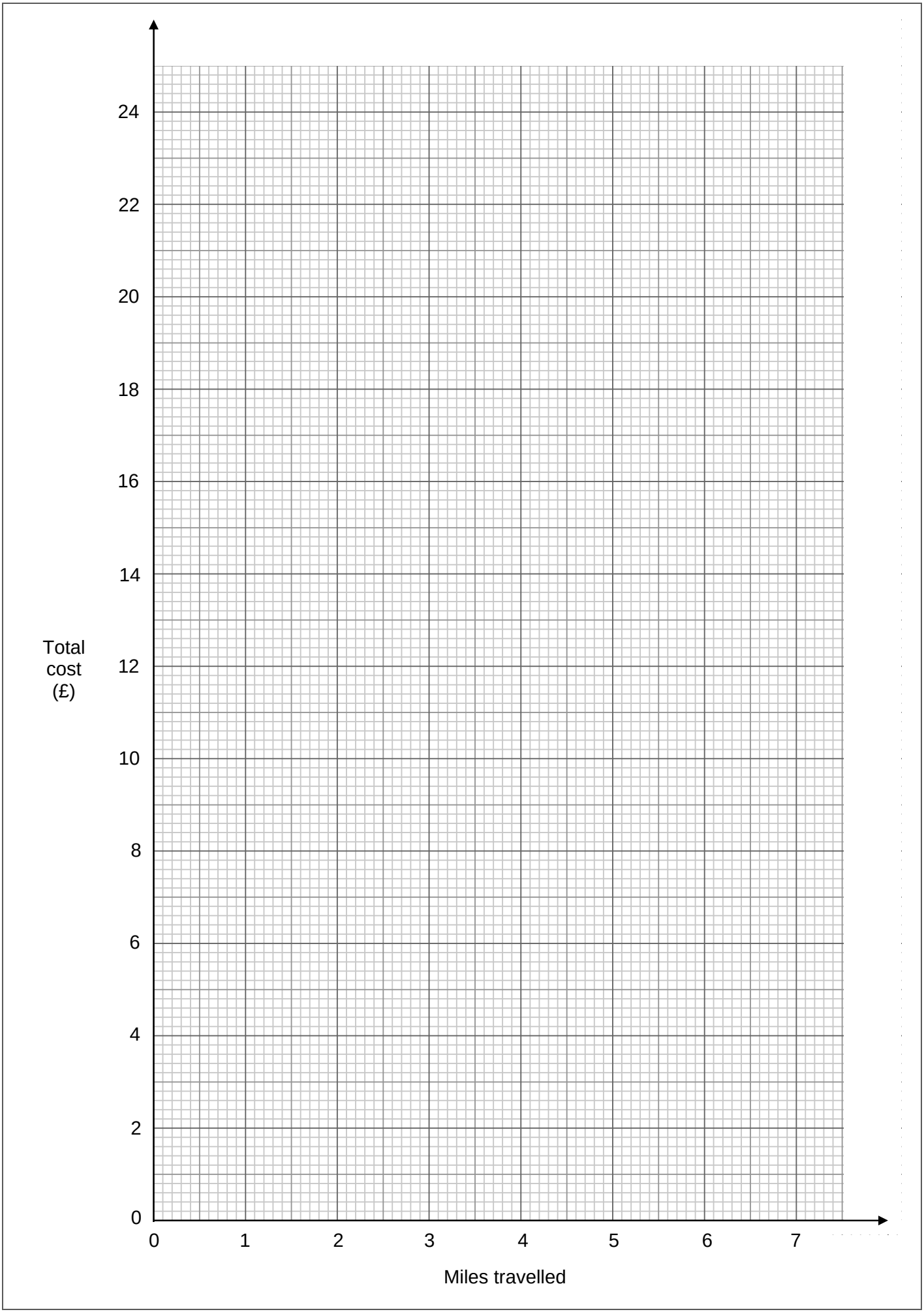
Question 3 continues on the next page

3 (b) The amounts charged by another taxi firm, Silver Cabs, are shown below.

Fixed Charge	Charge per mile
80p	£3.20

For what distances would it be cheaper to use Quick Cars rather than Silver Cabs?
You may use the grid opposite to help you if you wish.

[4 marks]

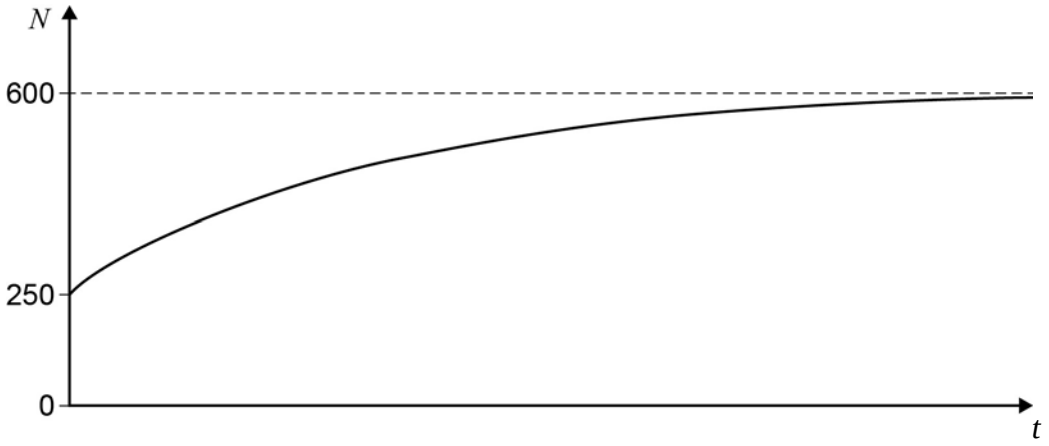

Total cost (£)
0
2
4
6
8
10
12
14
16
18
20
22
24
0
1
2
3
4
5
6
7
Miles travelled

4 A biologist is modelling the population of rabbits on a small, isolated island.

4 (a) This graph shows one model that he produces.

It assumes that an initial population of 250 rabbits has been counted.

N represents the number of rabbits at time t days after the initial count.

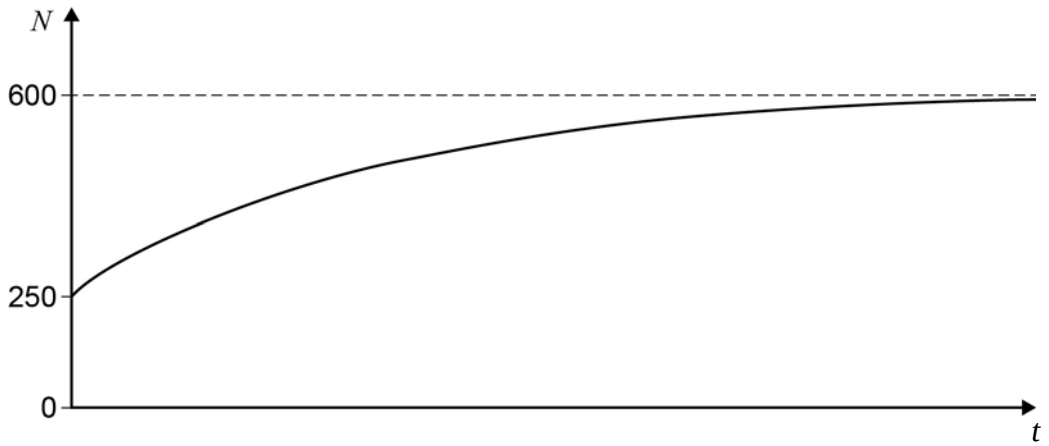


4 (a) (i) Describe what happens to the population of rabbits on the island according to this model.

[1 mark]

4 (a) (ii) On the copy of the graph below, sketch a graph to show how the population would vary with time if the biologist assumes the same model and an initial population of 400 rabbits.

[2 marks]



4 (b) The biologist then produces the model below for the population of rabbits, starting with a different initial population.

$$N = 600 + 400e^{-0.2t}$$

4 **(b) (i)** Work out the initial population for this model.

[2 marks]

4 (b) (ii) On the axes below, sketch a graph to show how the population of rabbits varies with time using this model.

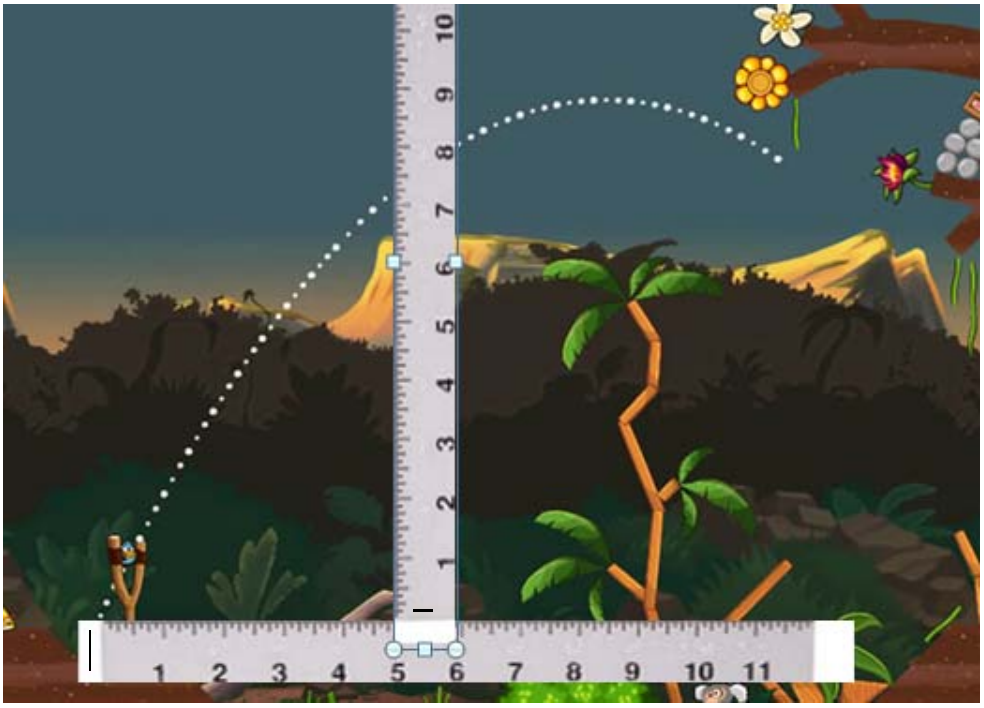
[3 marks]

4 (c) Give a possible reason why the value of 600 is so important in both models.

[1 mark]

5 The photograph shows a path produced in the “Angry Birds” game.

A student wants to work out the equation of the path shown and takes measurement from the photograph as shown.



The student creates the table below.

x-coordinate	y-coordinate
5	
10	8.5

5 (a) Complete the student’s table.

[1 mark]

5 (b) The equation of the path can be modelled as $y = ax - bx^2$

The student thinks that the value of a is 2.05

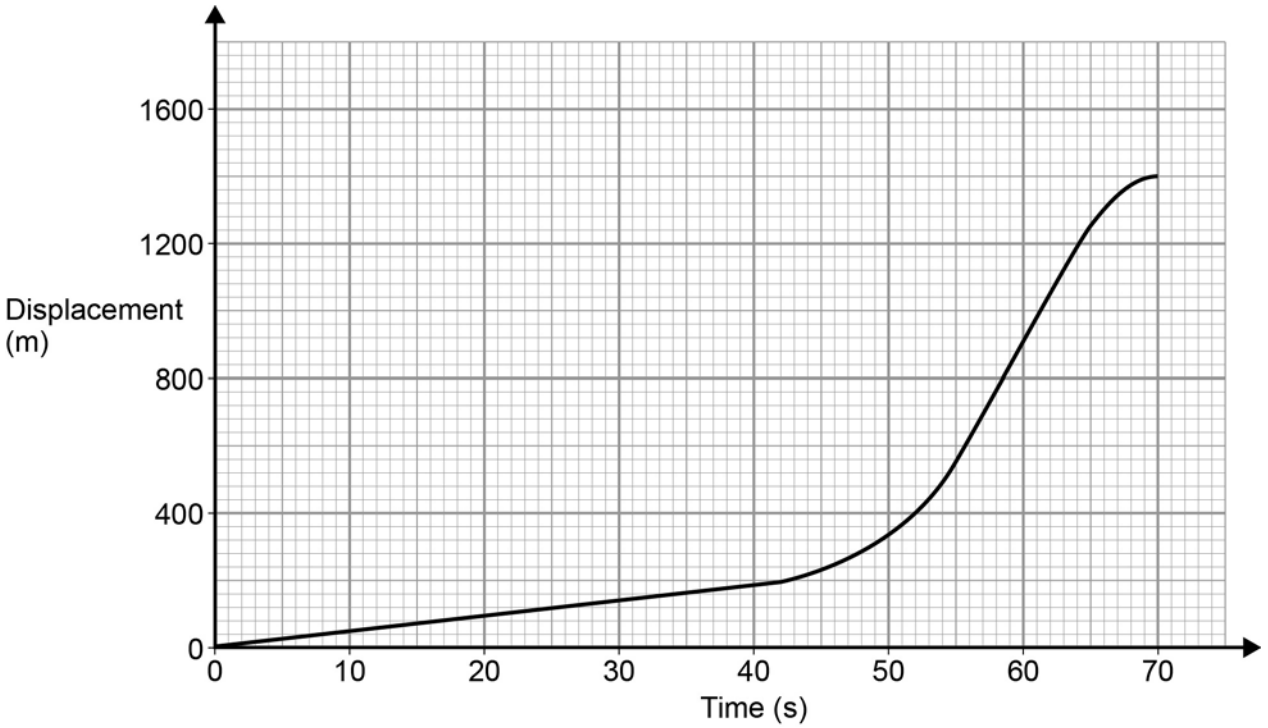
For this value of a, work out the value of b.

[3 marks]

5 (c) Check if the student's value of a is correct.

[3 marks]

6 The displacement-time graph shows the motion of a car on a straight race track.



6 (a) Work out the average speed of the car.

[2 marks]

6 (b) The driver claims that the car is travelling faster than the average speed for less than 20% of the time.

Investigate this claim and decide if you agree or disagree with the driver.
You **must** show working to justify your conclusion.

[5 marks]

Turn over for the next question

7 (a) Sandra has a habit of making a cup of tea then forgetting to drink it.

She makes a cup of tea which has an initial temperature of 90°C

It is left in a room that has a temperature of 20°C

The temperature of the tea falls until it eventually reaches room temperature.

The temperature, T°C, of the tea can be modelled as

$$T = 20 + a\mathrm{e}^{-0.08t}$$

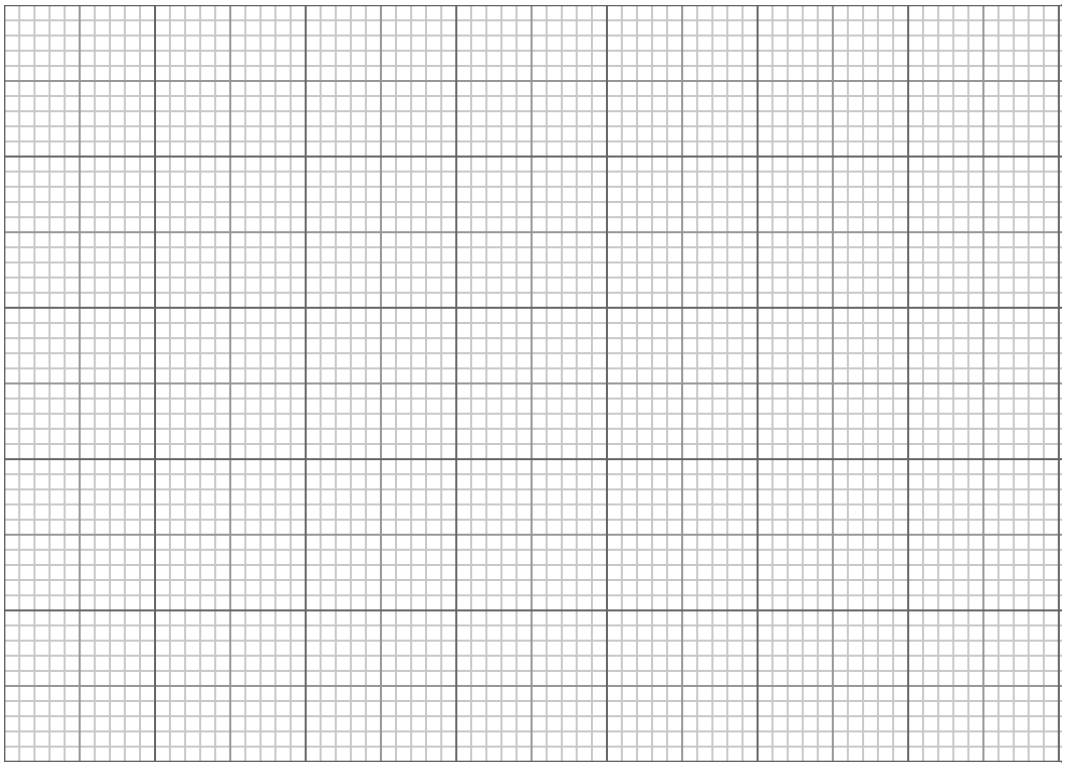
where a is a constant and t is the time in minutes since the tea was left to cool.

Work out the temperature of the tea when $t = 30$

[4 marks]

7 (b) Work out the rate at which the temperature is falling when $t = 30$
You may use the grid below to help you if you wish.

[5 marks]



7 (c) What would you suggest is the longest time that Sandra can leave a cup of tea before drinking it?

State clearly any assumptions that you make.

[2 marks]

END OF QUESTIONS

There are no questions printed on this page

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