

4 Tom is on holiday in France.

The table shows the distances, in kilometres, between four cities in Northern France.

	Calais	Amiens	Lille	Paris
Calais	-	159	110	288
Amiens	159	-	144	145
Lille	110	144	-	221
Paris	288	145	221	-

In this question use 8 kilometres = 5 miles.

Tom is going to drive from Calais to Lille, spend 6 hours in Lille, and then drive to Paris.

He will drive on the motorway for 90% of the distance and on rural roads for the other 10%.

He expects to have an average speed of 75 miles per hour on the motorway and an average speed of 40 miles per hour on the rural roads.

He says,

“If I set off at 9.00 am I should arrive in Paris at about 6.00 pm.”

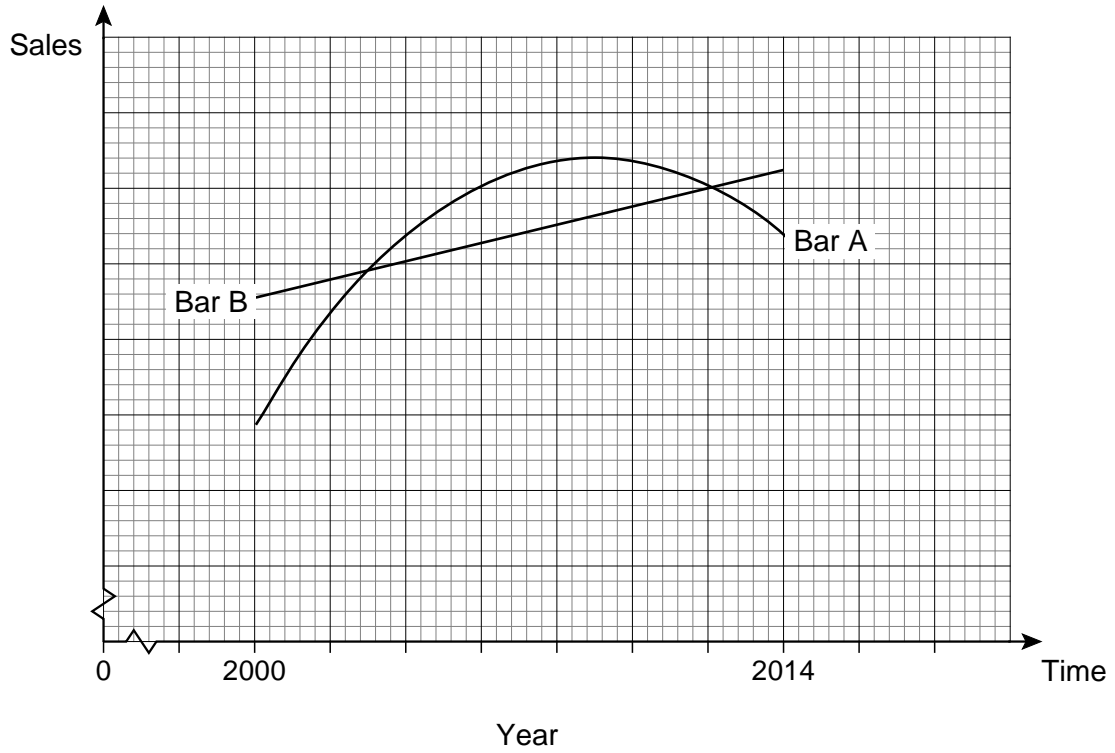
Is he correct?

You **must** show your working.

[7 marks]

Turn over for the next question

- 5 The sales of two chocolate bars (A and B) for the period 2000 to 2014 are shown.



- 5 (a) A marketing executive says that from 2000–2010 bar A sales more than doubled.
Is she correct? Justify your answer.

[2 marks]

5 (b) Both chocolate bars are produced by the same company.

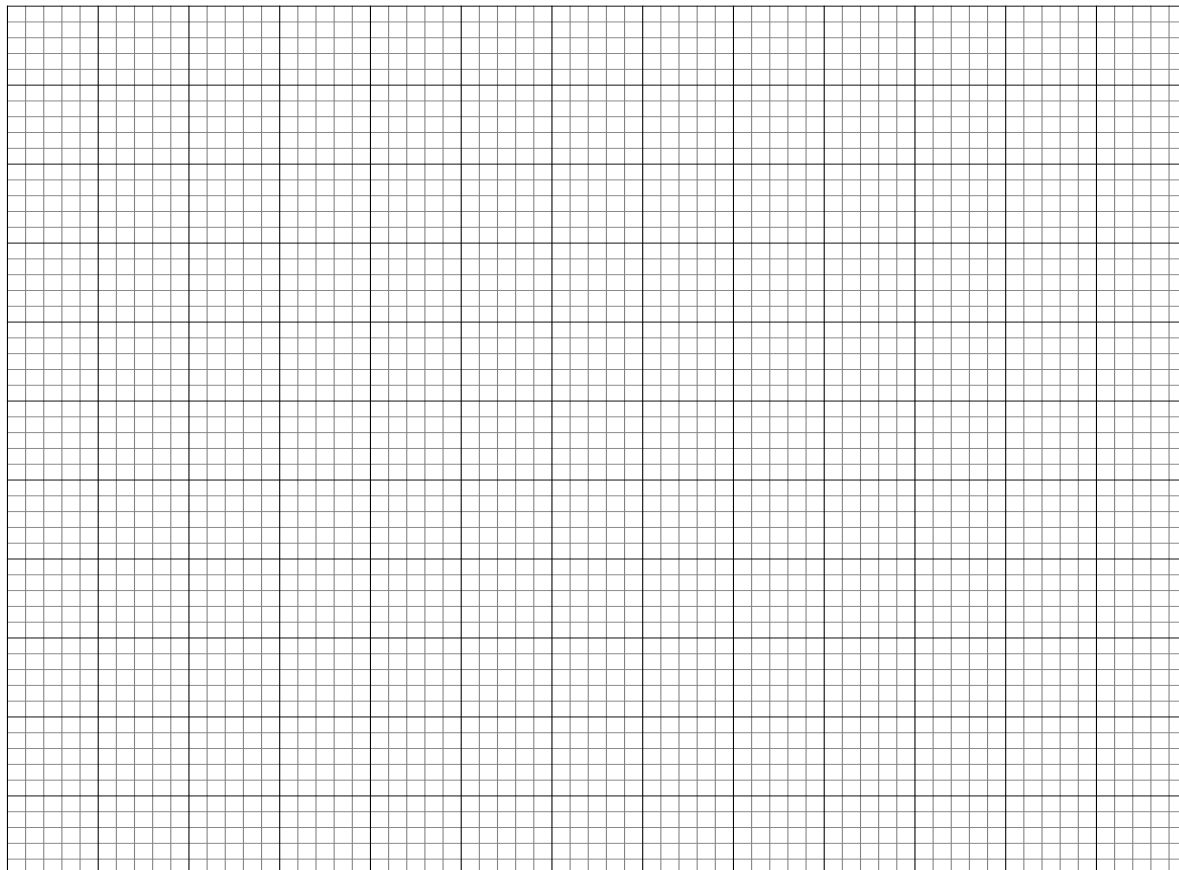
In 2014 the company decides to invest in a marketing campaign for **one** of the chocolate bars.

Use the evidence to advise the company which chocolate bar they should invest in for their marketing campaign.

Give reasons to justify your answer.

[3 marks]

Turn over for the next question



- 6 (b) The owner of the web browser estimates that the income from advertising per month is £23 000 per percentage point of market share.

Estimate the income from advertising in October 2010

[3 marks]

- 6 (c) Why would this model not be valid for large values of T ?

[2 marks]

- 7 A colony of bacteria initially contains 4000 bacteria.
A scientist wants to know how long it will take for the size of the colony to double.
The number of bacteria, N , after t hours is given by

$$N = 4000e^{0.034t}$$

- 7 (a) On the axes below, sketch the graph of $N = 4000e^{0.034t}$ for $t \geq 0$
Show the coordinates of any points where the curve crosses an axis.

[2 marks]



- 7 (b) Work out the number of bacteria after 6 hours.

[2 marks]

- 7 (c) Work out how long it takes for the number of bacteria to double from its initial value of 4000

[3 marks]

7 (d)

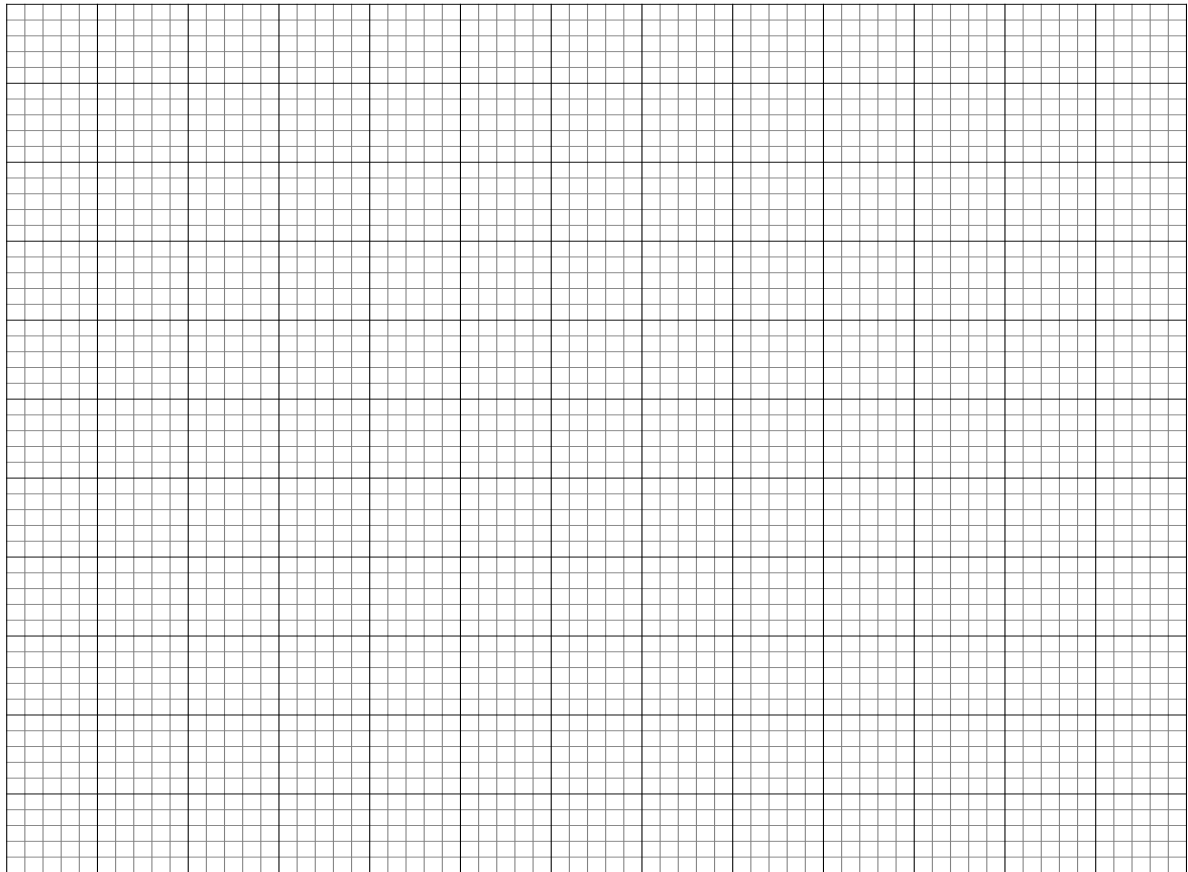
Alia says,

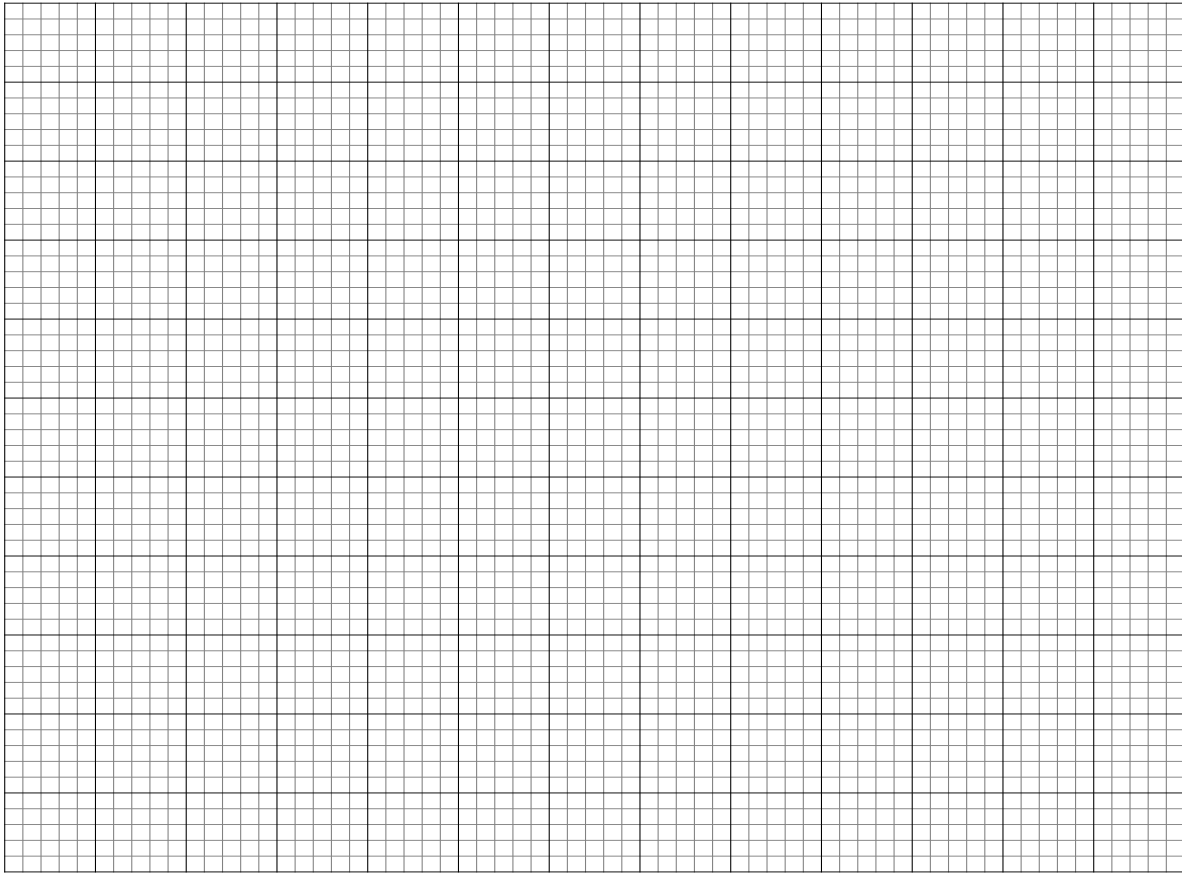
“It will always take the same amount of time for the size of the colony to double from one given value to a size that is twice that value.”

Is Alia correct? Justify your answer.

[3 marks]

Turn over for the next question





END OF QUESTIONS