

# SCATTER GRAPHS

DATE OF SOLUTIONS: 30/05/2018  
MAXIMUM MARK: 29

# SOLUTIONS

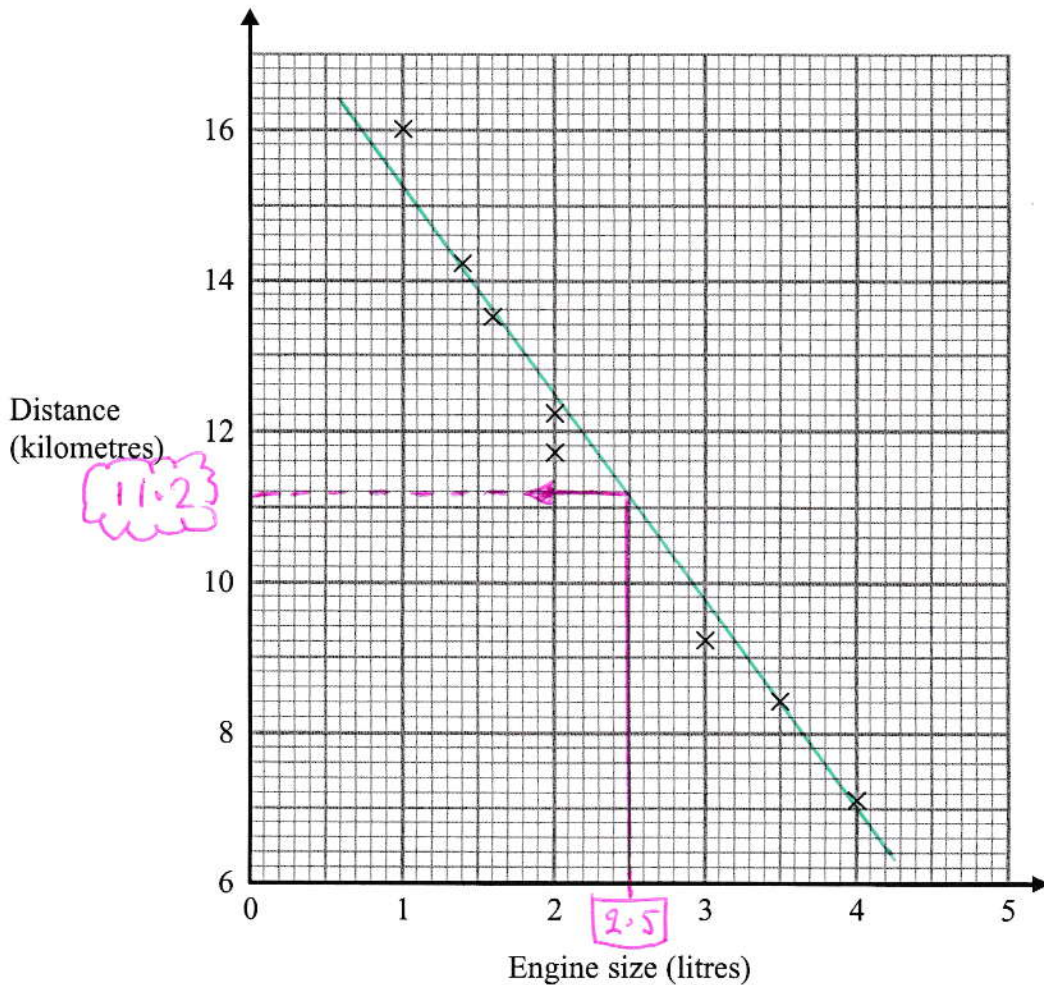
GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1 [EdExcel, 2012]

Scatter Diagrams [3 Marks]

The scatter graph shows some information about 8 cars.

For each car it shows the engine size, in litres, and the distance, in kilometres, the car travels on one litre of petrol.



(a) What type of correlation does this scatter graph show?

NEGATIVE CORRELATION

(B1)

(1)

A different car of the same type has an engine size of 2.5 litres.

(b) Estimate the distance travelled on one litre of petrol by this car.

(M1) [FOR A REASONABLE LINE OF BEST FIT ON GRAPH]

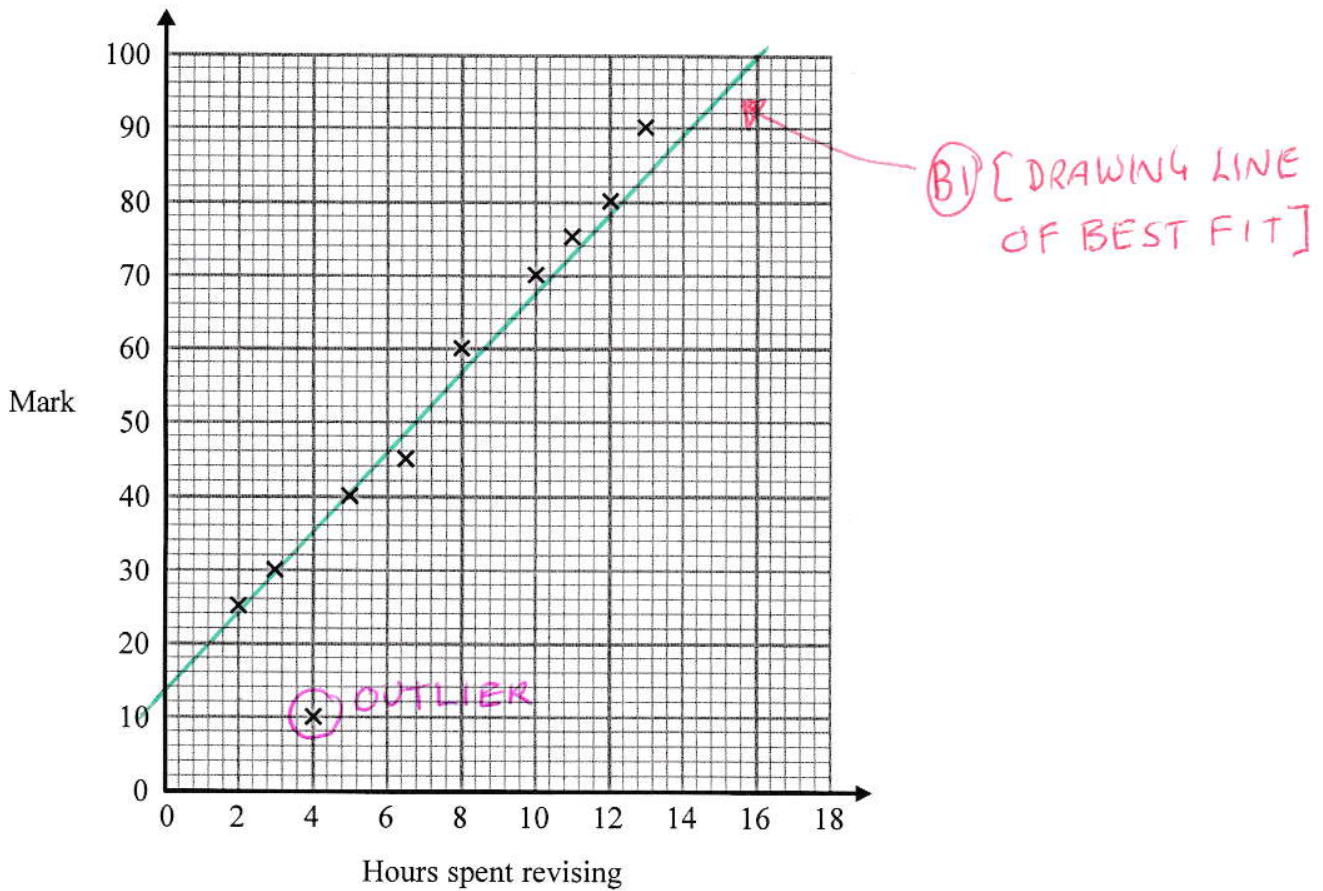
11.2 (A1) kilometres

(2)

[10.3-11.7]

The scatter diagram shows information about 10 students.

For each student, it shows the number of hours spent revising and the mark the student achieved in a Spanish test.



One of the points is an outlier.

(a) (i) Write down the coordinates of the outlier.

(..... 4 ....., ..... 10 .....)

(ii) For all the **other** points, draw the line of best fit.

(2)

The Spanish test was marked out of 100

Lucia says,

*"I can see from the graph that had I revised for 18 hours I would have got full marks."*

(b) Comment on what Lucia says.

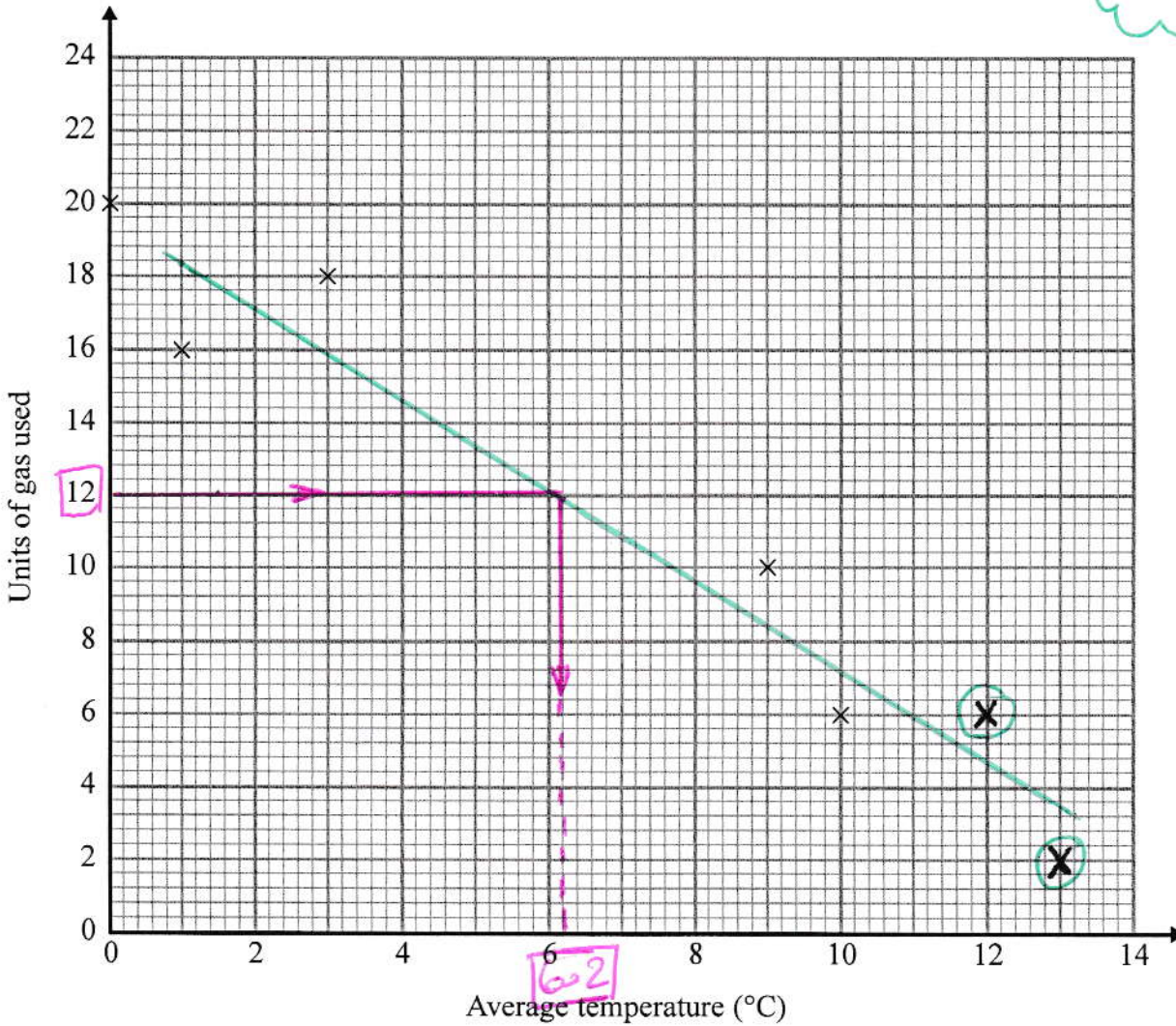
18 HOURS IS OUTSIDE THE RANGE OF THE DATA USED FOR THE SCATTERGRAPH,  
 DATA MAY NOT BE CORRELATED OUTSIDE OF THE RANGE,  
 SO LUCIA'S PREDICTION WILL NOT BE RELIABLE.



The table shows the average temperature on each of seven days and the number of units of gas used to heat a house on these days.

Average temperature (°C)	0	1	3	9	10	12	13
Units of gas used	20	16	18	10	6	6	2

PLOT THESE



(a) Complete the scatter graph to show the information in the table. The first 5 points have been plotted for you.

(AI) [BOTH POINTS - X] (1)

(b) Describe the relationship between the average temperature and the number of units of gas used.

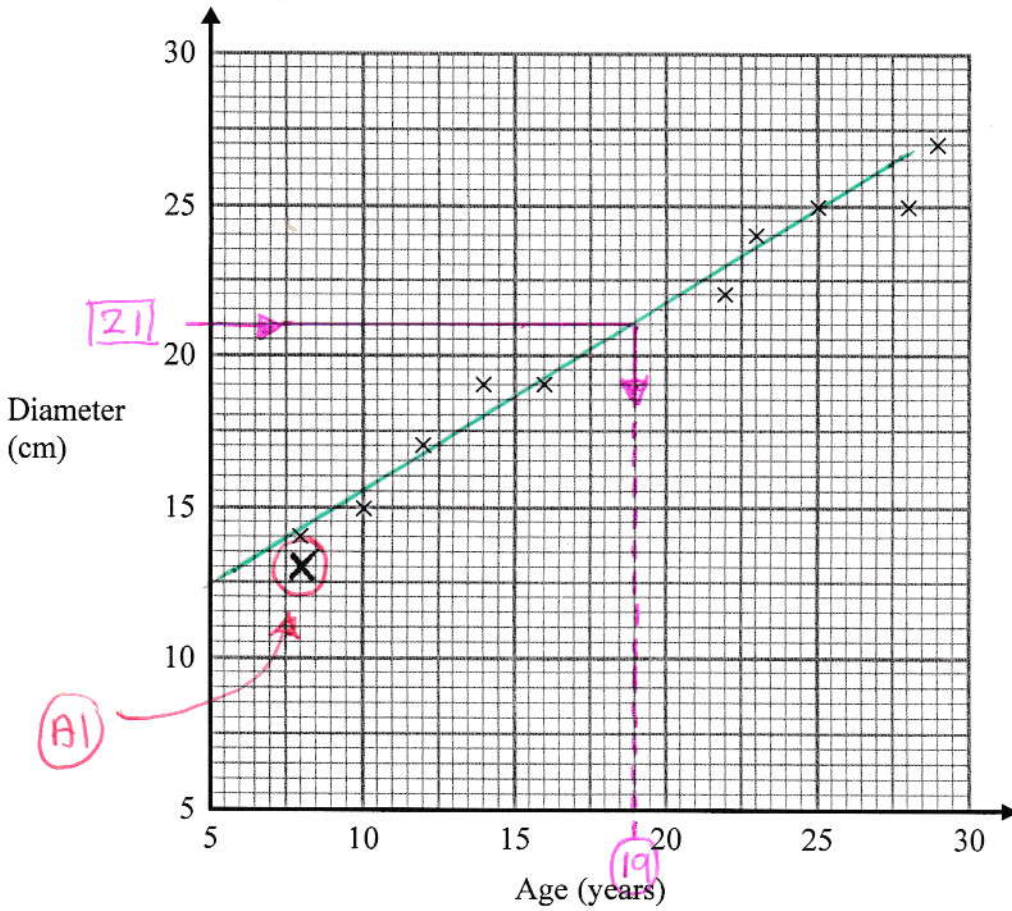
AS THE AVERAGE TEMPERATURE INCREASES, THE UNITS OF GAS USED DECREASES. [OR] NEGATIVE CORRELATION [EITHER]

(1)

(c) Estimate the average temperature on a day when 12 units of gas are used.

(M) [LINE OF BEST FIT IS DRAWN ON THE GRAPH] 6.2 (AI) °C [5-7]

The scatter graph shows information about ten trees of the same type. It shows the age and the diameter of the trunk of each tree.



Another tree, which is 6 years old, has a diameter of 13 cm.

(a) Plot this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

POSITIVE CORRELATION  
(A1) (1)

Another tree of the same type has a trunk with diameter 21 cm.

(c) Estimate the age of this tree.

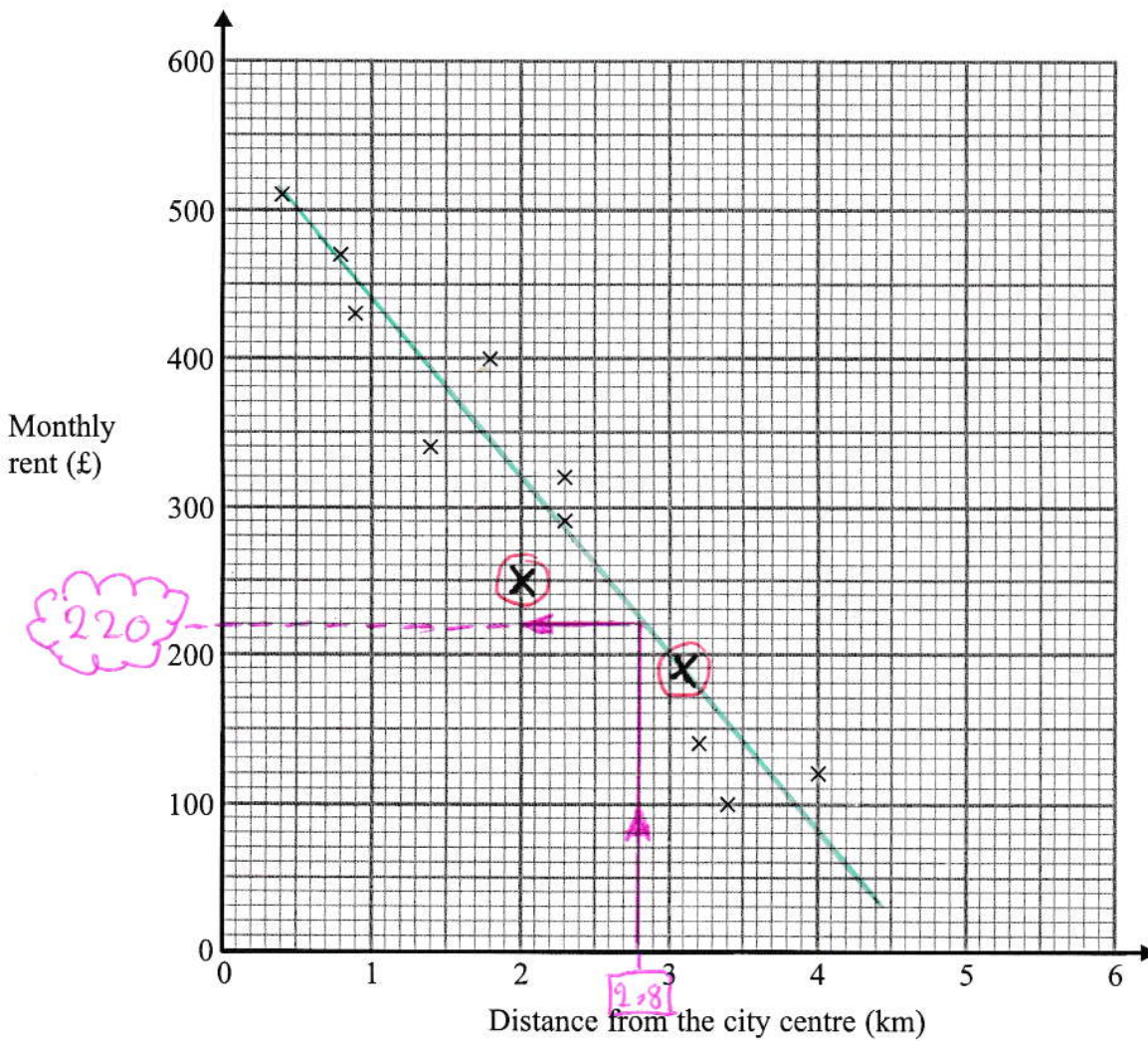
(M1) [LINE ON GRAPH!]

..... 19 (A1) years  
[17 - 21 ÷ 5]



The scatter graph shows information about 10 apartments in a city.

The graph shows the distance from the city centre and the monthly rent of each apartment.



The table shows the distance from the city centre and the monthly rent for two other apartments.

Distance from the city centre (km)	2	3.1
Monthly rent (£)	250	190

(A1) [BOTH POINTS ON GRAPH]

(a) On the scatter graph, plot the information from the table. (1)

(b) Describe the relationship between the distance from the city centre and the monthly rent.

AS THE DISTANCE INCREASES, THE MONTHLY RENT DECREASES OR NEGATIVE CORRELATION (A1) [EITHER] (1)

An apartment is 2.8 km from the city centre.

(c) Find an estimate for the monthly rent for this apartment.

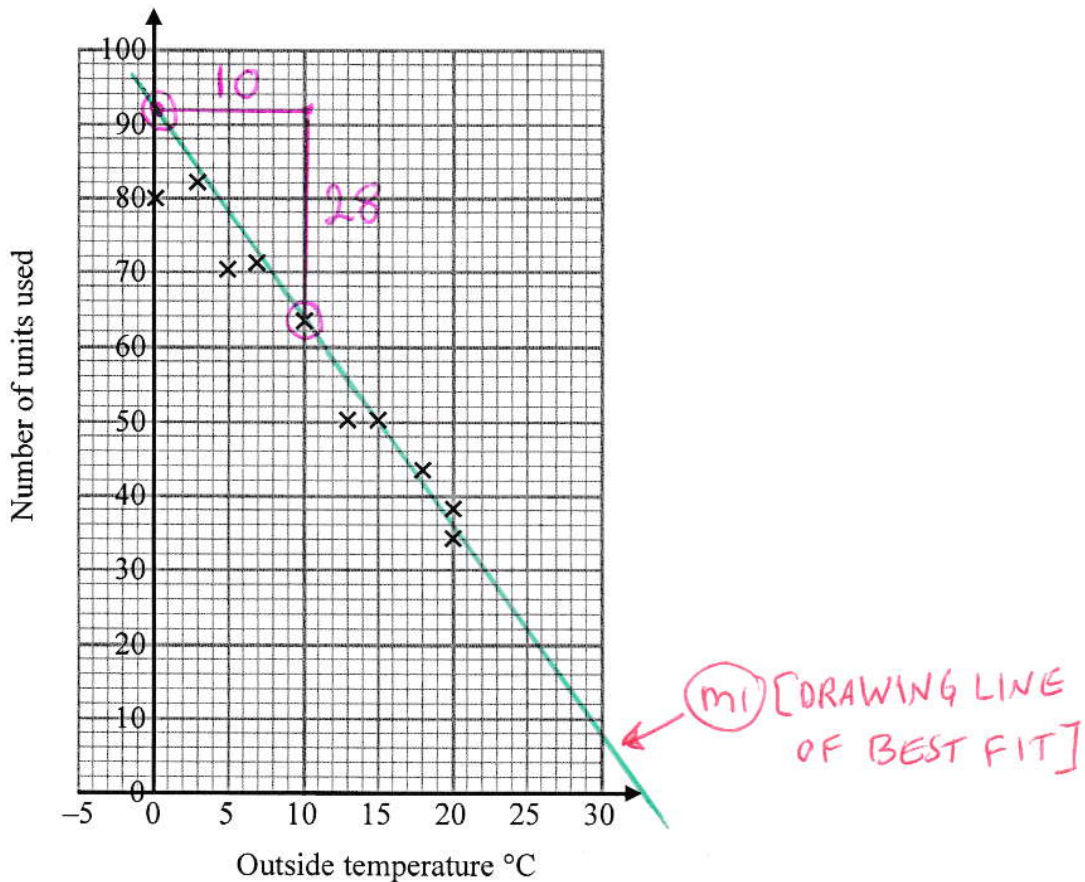
£ 220

[200 - 260]

(M1) [LINE OF BEST FIT DRAWN ON GRAPH]

In a survey, the outside temperature and the number of units of electricity used for heating were recorded for ten homes.

The scatter diagram shows this information.



Molly says,

“On average the number of units of electricity used for heating decreases by 4 units for each °C increase in outside temperature.”

(a) Is Molly right?

Show how you get your answer.

$$\text{GRADIENT OF LINE OF BEST FIT} = -\frac{28}{10} = -2.8$$

SO MOLLY IS WRONG

(m1) [GRADIENT CALCULATION]

(3) [GRADIENT BETWEEN -2 AND -3]

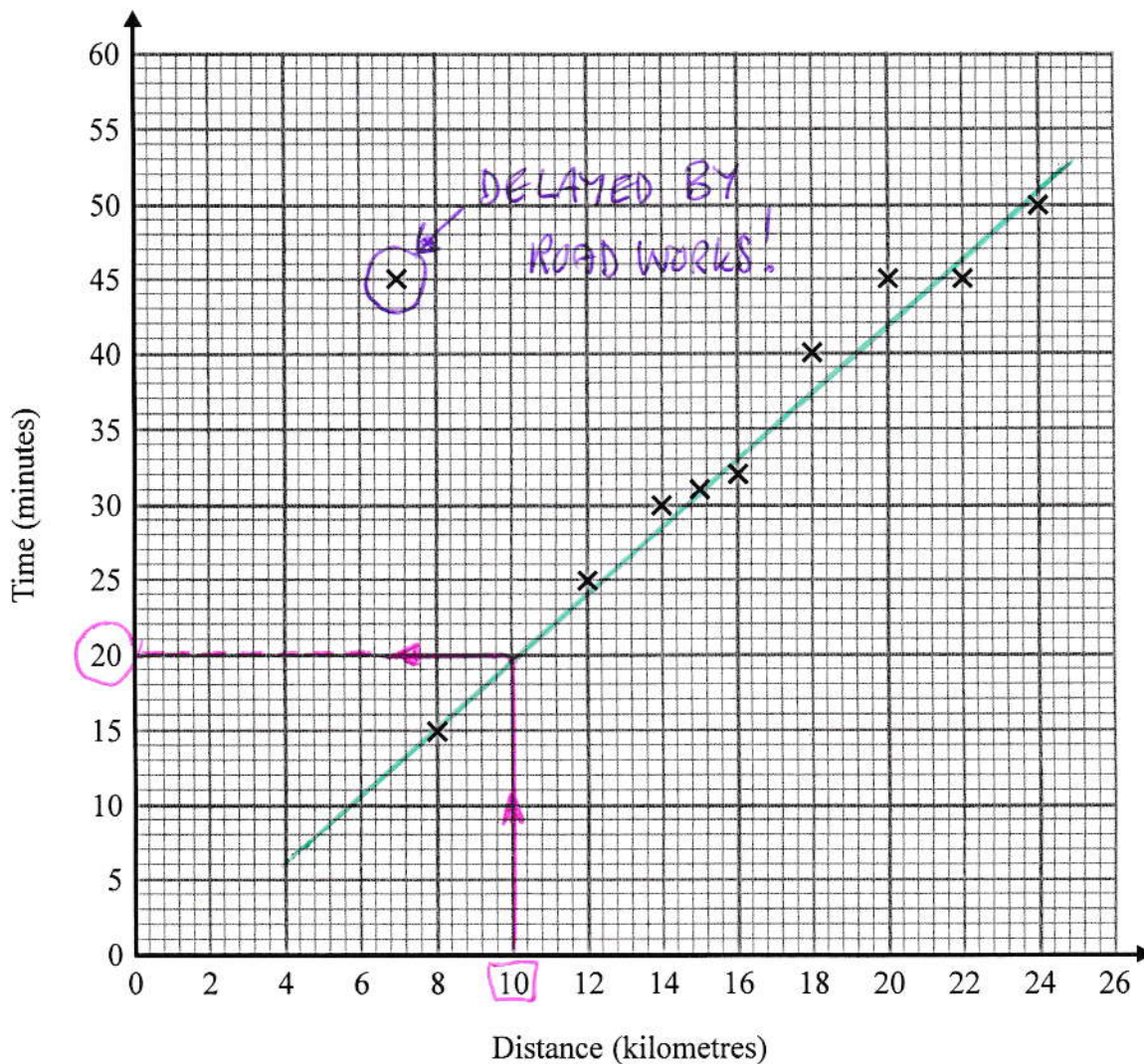
(b) You should **not** use a line of best fit to predict the number of units of electricity used for heating when the outside temperature is 30°C.

Give one reason why.

THIS IS OUTSIDE THE RANGE OF THE DATA COLLECTED,  
SO TEMPERATURE AND UNITS MIGHT NOT BE CORRELATED,  
WHICH MEANS THE PREDICTION WILL BE UNRELIABLE.



A delivery driver records for each delivery the distance she drives and the time taken. The scatter graph shows this information.



(a) What type of correlation does the scatter graph show?

..... POSITIVE ..... (A1)

(1)

The driver has to drive a distance of 10 km for her next delivery.

(b) Estimate the time taken for this delivery.

(M1) [LINE OF BEST FIT IS DRAWN]

..... 20 ..... (A1)

[18 - 22]

minutes

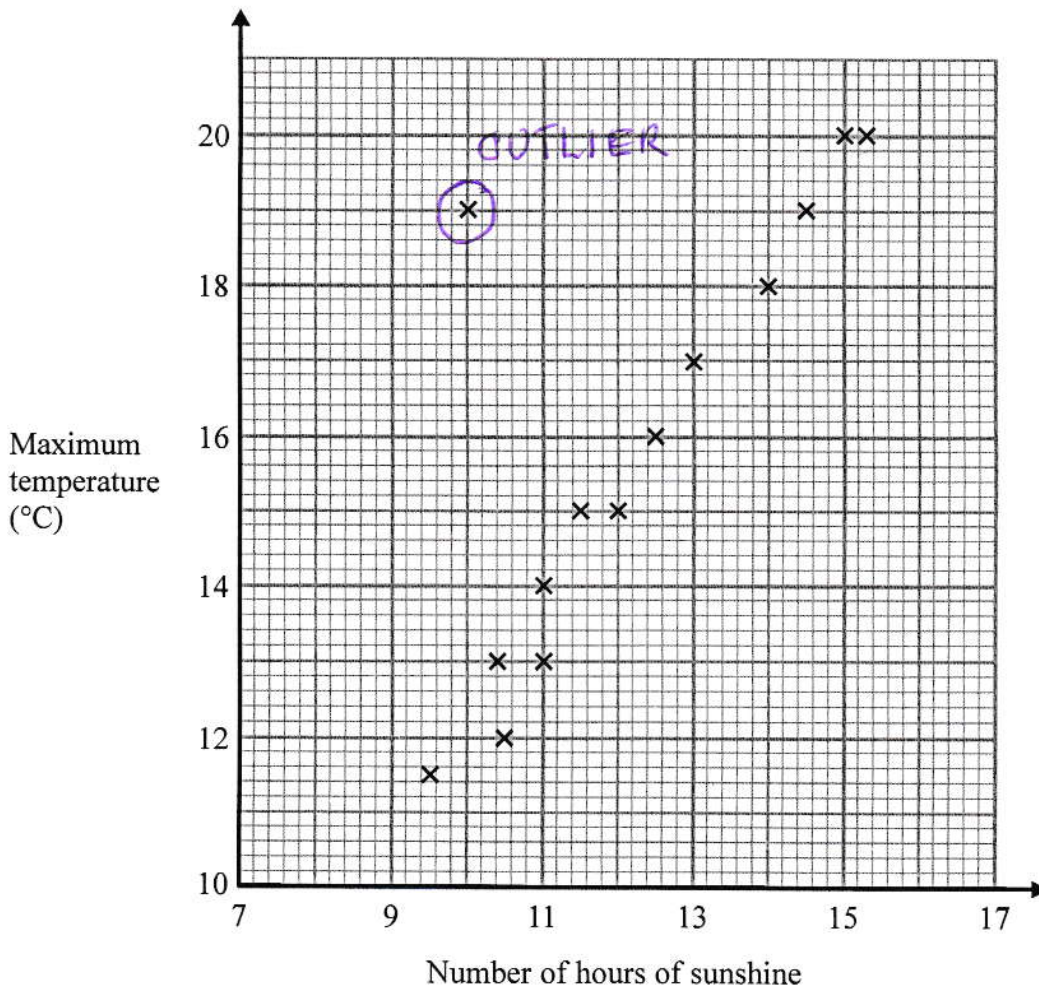
During one of the deliveries, the driver was delayed by road works.

(c) Using the graph write down the time taken for this delivery.

..... 45 ..... (B1)

minutes

The scatter graph shows the maximum temperature and the number of hours of sunshine in fourteen British towns on one day.



One of the points is an outlier.

(a) Write down the coordinates of the outlier.

(10, 19) (1)

(b) Describe **two different** possible reasons for this outlier.

1. OTHER FACTORS <sup>ALSO</sup> EFFECT THE TEMPERATURE OF THIS TOWN (E.G. A DIFFERENT ALTITUDE TO THE OTHERS) (1)
2. THE PERSON WHO RECORDED THE TEMPERATURE MADE A MISTAKE. (1)

[ANY REASONABLE EXPLANATIONS OF WHY THIS OUTLIER MIGHT HAVE OCCURED]



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The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or ‘best’ method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners’ mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners’ mark scheme.

B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

M1 - This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board’s web site.

A1 - These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words ‘show that’, ‘show your working out’, or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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