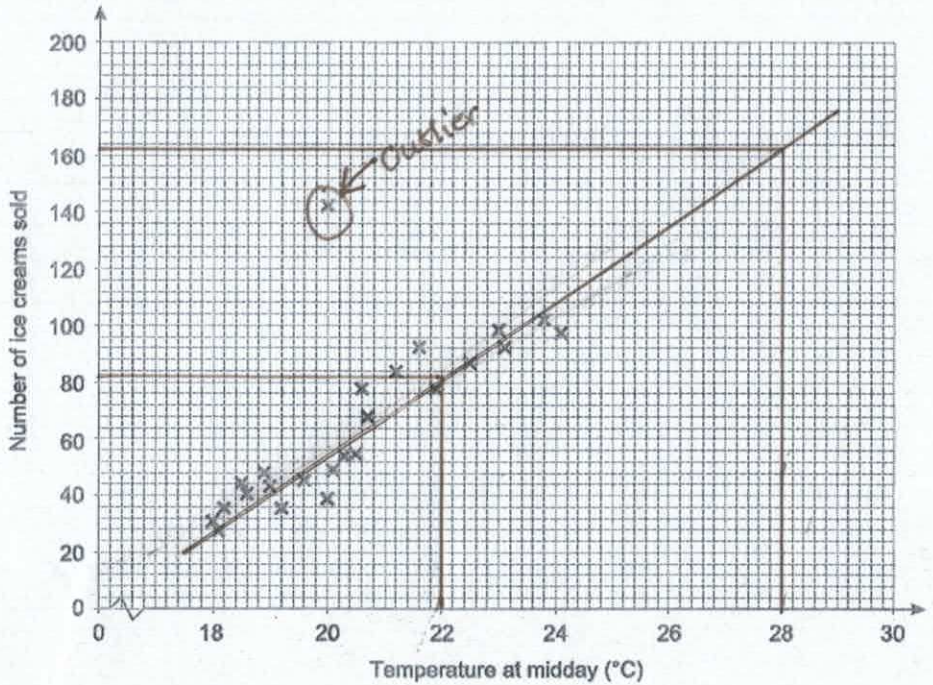
JustMaths

Scatter Graphs (F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	Solutions
Total Marks:	

1. The graph shows the number of ice creams sold in a shop each day against the temperature at midday that day.



(a) (i) Describe the relationship between the temperature at midday and the number of ice creams sold.

(Strong) positive correlation [1]

(ii) One data point is an outlier.

Give a reason why this does not fit the rest of the data.

Far more ice creams sold than any other day, although temperature not very high. [1]

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(b) Use the scatter graph to predict the number of ice creams sold on a day when the temperature at midday was → Draw LOBF! 1 small sqr on ice cream axis → 4 ice creams

(i) 22°C

(i) 82 (70-90) [1]

(ii) 28°C.

(ii) 162 (140-180) [1]

(iii) Explain which of these two predictions is more reliable.

22°C (because it's near the middle of the observed values) [2]

(c) A newspaper headline reads

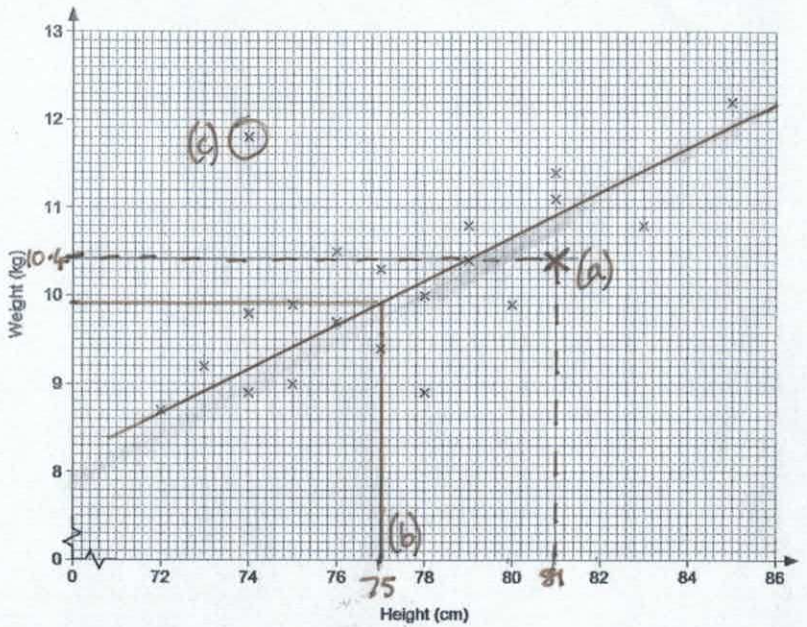
High temperatures make more people buy ice cream!

Does the graph above prove this claim?

Give a reason for your decision.

It supports the claim in the observed range, but we don't know whether the relationship is causal, ie. whether high temps are the reason for high sales. [2]

2. The scatter diagram shows the height and weight of twenty babies aged 12 months.



(a) Leila is 12 months old. Her height is 81 cm and she weighs 10.4 kg.

Put a cross on the diagram to represent this. [1]

(b) Archie is 12 months old. His height is 75 cm.

Draw a line of best fit and use it to estimate Archie's weight.

9.9 kg [2]

(c) The height and weight of one of the babies is not typical for babies aged 12 months.

Circle the point on the diagram representing this baby.

[1]

(d) Josie has a baby who is 15 months old.

Her baby has a height of 82 cm.

Josie is going to use the line of best fit to estimate what her baby's weight should be.

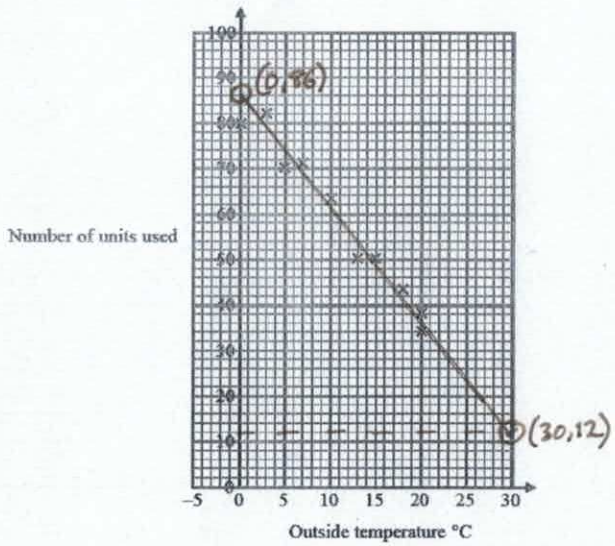
Explain why it may not be sensible for Josie to do this.

Baby is not the same age as those on the graph
– can't assume same relationship between height & weight

[1]

3. In a survey, the outside temperature and the number of units of electricity used for heating were recorded for ten homes. (Also in Higher)

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.

LOBF & gradient triangle

$\text{Grad.} = \frac{\text{Diff. in } y}{\text{Diff. in } x} = \frac{12-86}{30-0} = \frac{-74}{30} \approx -2.5$

– no, Molly is wrong (2.5 not 4)

[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.

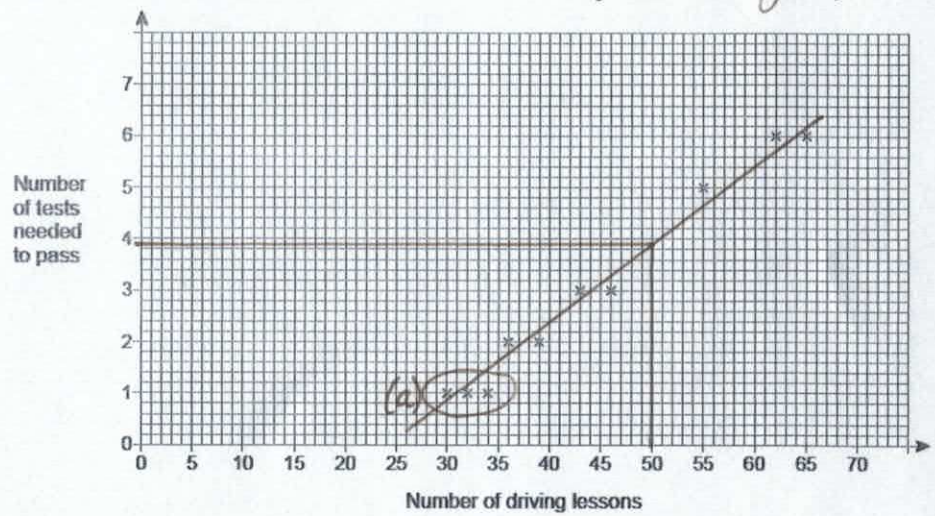
Give one reason why.

Extrapolation – it's outside the range of observed vals.

[1]

(Also more likely to be using electricity for cooling (fans/aircon) when it's 30°C outside!)

4. The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people. (Also on Higher)



(a) What proportion of the 10 people passed on their first test? 3/10

[1]

(b) Describe the correlation.

Circle your answer.

[1]

strong positive weak positive weak negative strong negative

(c) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

4 (can't have 3·9 tests!) [2]

(d) Meera says,

"I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."

Comment on her statement.

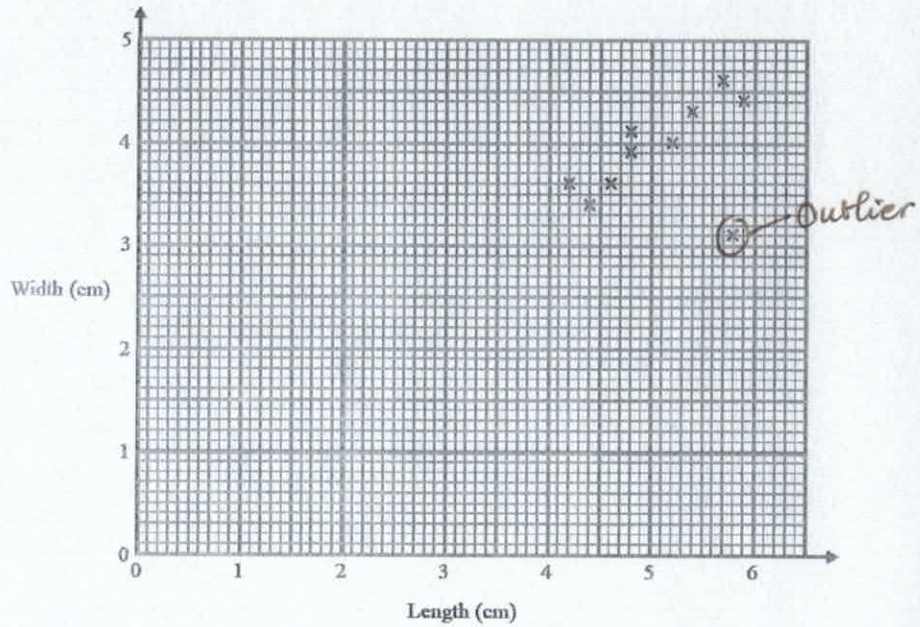
True for 30-65 lessons but we don't know whether the linear relationship continues beyond that.

Not true below 30 lessons as graph suggests that for < 28 lessons you'd pass before you'd sat the test! [1]

5. Katie measured the length and the width of each of 10 pine cones from the same tree.

(Also on Higher)

She used her results to draw this scatter graph.



(a) Describe one improvement Katie can make to her scatter graph.

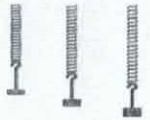
Omit 0-4 on x- and 0-3 on y-axis to magnify the area where points are plotted [1]

The point representing the results for one of the pine cones is an outlier.

(b) Explain how the results for this pine cone differ from the results for the other pine cones.

Very narrow for its length. [1]

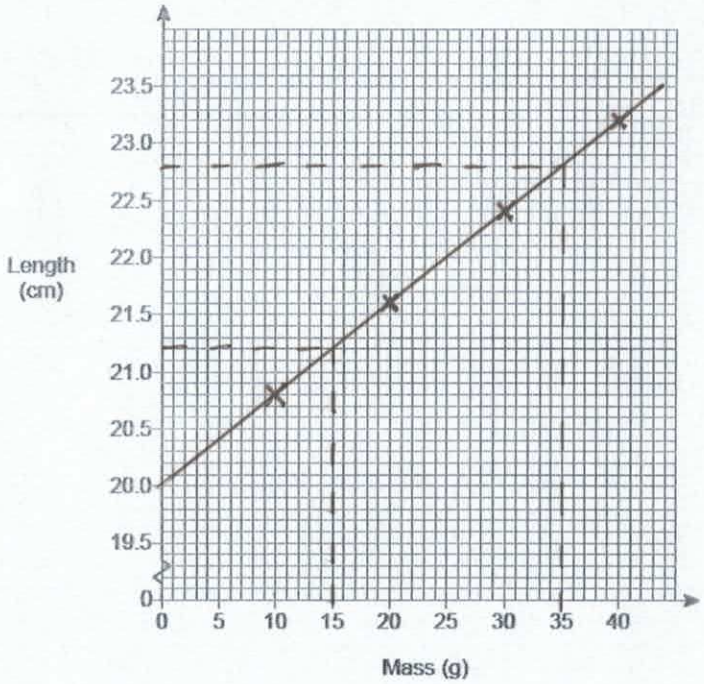
6. In an experiment, different masses are hung on a spring.



The length of the spring is measured for each mass.

Mass (g)	10	20	30	40
Length (cm)	20.8	21.6	22.4	23.2

(a) Draw a graph to show the length of the spring for masses from 10 g to 40 g



[2]

(b) Estimate the length of the spring with no mass hung on it.

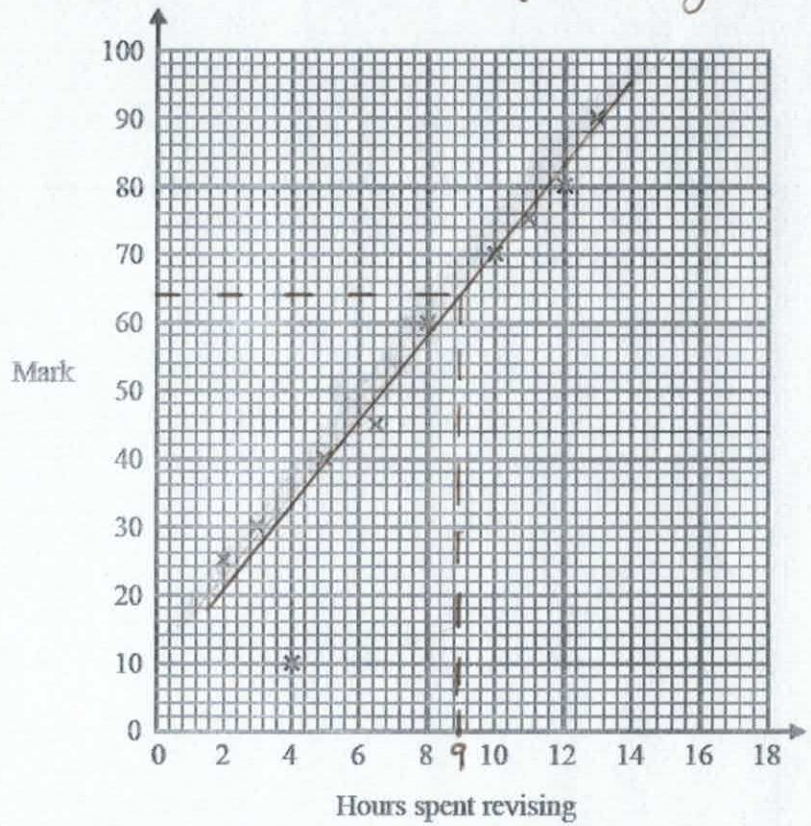
Draw LOBF → y-intercept is at 20cm [1]

(c) How much longer is the spring with a 35 g mass than with a 15 g mass?

15g → 21.3cm
35g → 22.8cm } Difference = 1.5cm [2]

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. (Also in Higher)



One of the points is an outlier.

(a) Write down the coordinates of the outlier.

(4, 10) [1]

For all the other points

(b) (i) draw the line of best fit,

(ii) describe the correlation.

Strong positive correlation [2]

A different student revised for 9 hours.

(c) Estimate the mark this student got

64 ..... [1]

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."*

(d) Comment on what Lucia says.

Not true as she(?) is extrapolating - graph only gives info for up to 13 hours. [1]

CREDITS AND NOTES

Question	Awarding Body
1	OCR
2	OCR
3	Pearson Edexcel
4	AQA
5	Pearson Edexcel
6	AQA
7	Pearson Edexcel

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:

AQA http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300

OCR http://ocr.org.uk/gcsemaths

Pearson Edexcel http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material