SPECIMEN MATERIAL

GCSE
STATISTICS
8382/2H

HIGHER TIER PAPER 2

Mark scheme

2019

v1.0

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

Principal Examiners have prepared these mark schemes for specimen papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

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Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments
1	Systematic	B1	Any indication
2	3	B1	Any indication
3	Frequency polygon	B1	Any indication
4	2	B1	Any indication
5(a)	Two different reasons from: • easier / quicker / less data to work • cheaper • ever changing population	B2	oe B1 one valid reason
	Additional Guidance		
5(b)(i)	Rental amount or age or gender or income	B1	oe
	Additional Guidance		
	Accept any possible variable that could impact on complaints and could be used to stratify		
5(b)(ii)	Want opinions of people from different rental values or Amount paid in rent may affect the number of complaints made	B1ft	oe (for their choice or correct general statement)
	Additional Guidance		

Q	Answer	Mark	Comments
5(c)	In the last year….	B1	oe any specific time frame mentioned
	….how many complaints have you made?	B1	oe
	Closed response section with no overlaps or omissions	B2	B1 open response space or one error for option boxes. Possible errors for option boxes would be overlapping intervals or intervals that do not cover all possible responses
	Additional Guidance		
	Having two or more overlapping intervals would count as one error		

5(d)	Advantage to suit their choice	B1ft	ft their choice eg telephone and it's quick to do eg door to door and to get better response rate eg internet survey and can be done in participant's own time
	Additional Guidance		

Q	Answer	Mark	Comments
6(a)	$\frac{8}{15}$ and $\frac{12}{22}$ seen	B1	oe
	$\frac{1}{2} \times$ their $\frac{8}{15} + \frac{1}{2} \times$ their $\frac{12}{22}$	M1	oe
	$\frac{89}{165}$	A1	oe
	Additional Guidance		

6(b)	Sight of $\frac{1}{4}$ or 24 or 28	M1	
	6 **or** 7	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
7(a)	**Alternative 1** 19 × 84.9 or 1613.1 or 4 × 93.5 or 374 or 2 × 81.2 or 162.4	M1	
	$\frac{(19\times84.9)+(4\times93.5)+(2\times81.2)}{19+4+2}$	M1	
	[85.95, 86]	A1	
	Alternative 2 $\frac{19}{19+4+2}$ × 84.9 or 64.5… or $\frac{4}{19+4+2}$ × 93.5 or 14.9(6) or $\frac{2}{19+4+2}$ × 81.2 or 6.4(96)	M1	
	$\frac{19}{19+4+2}$ × 84.9 + $\frac{4}{19+4+2}$ × 93.5 + $\frac{2}{19+4+2}$ × 81.2	M1	
	[85.95, 86.0]	A1	
	Additional Guidance		

7(b)	Ticks No and gives a correct explanation, eg • the weighted index number would have to be smaller than 85 • the decrease is only 14%	B1ft	oe Follow through from the answer to 8(a) provided their answer is between 80 and 100 exclusive

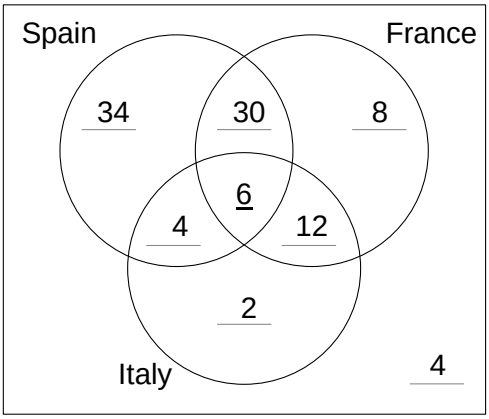
Q	Answer	Mark	Comments
8(a)	All remaining bars added correctly	B2	B1 for at least 3 of the remaining bars added correctly
	Additional Guidance		
8(b)	6.8 + 6.6 or 13.4 (%) or 2 × 6.8 or 13.6(%) or 2 × 6.6 or 13.2(%)	M1	
	26.8%	A1	Accept 27%
	Additional Guidance		
8(c)	6.2 and 1.2 or 5.16 (6…) seen	M1	
	[3926600 – 3926700]	A1	Must be an integer
	Additional Guidance		
	3926666.6(…) or 3926666.7(…) is M1AO		
9(a)	Convenience (sample)	B1	
	Additional Guidance		
9(b)	(As list is in order) only samples / includes the cheapest / highest house prices	B1	
	Additional Guidance		

Q	Answer	Mark	Comments
9(c)	A fully described sampling method that would be likely to produce a more representative sample	B2	eg a full description of (simple) random sampling, systematic sampling B1 A partially described sampling method that would be likely to produce a more representative sample
	Correctly named	B1	
	A reason why their chosen method would be likely to give a more representative sample	B1	eg random sample - all house prices have an (equal) chance of being included
	Additional Guidance		

9(d)	A clear statement linking one aspect of the diagram (eg position of median, position of box) with the stated hypothesis	B2	eg the median house price for Cumbria shown in the box plots is lower than the median house price for Cornwall so his hypothesis is correct. B1 for an incomplete but correct statement eg the median house price for Cumbria shown in the box plots is lower than the median house price for Cornwall so houses are cheaper in Cumbria. (no reference to the hypothesis)
	Additional Guidance		

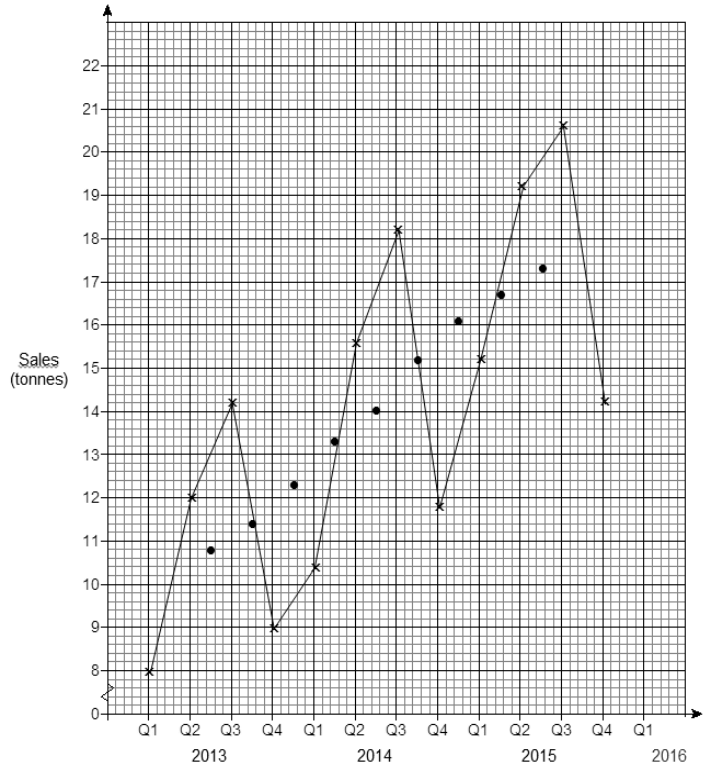
Q	Answer	Mark	Comments
9(e)	Yes, as the box is larger for Cornwall	B1	oe
	Additional Guidance		
9(f)	Full interpretation of the mean in context	B2	eg House prices are higher in Cumbria, as the mean is higher B1 Observation based on the mean eg The mean house price is higher in Cumbria
	Full interpretation of the range in context	B2	eg House prices are more consistent in Cumbria, as the range is lower B1 An observation based on the range eg The range of the house prices is smaller in Cumbria
	Additional Guidance		
9(g)	Any other appropriate value	B1	eg size of garden, number of bathrooms, whether the house has or does not have any one of the following: central heating, double glazing, a garage, etc
	Additional Guidance		

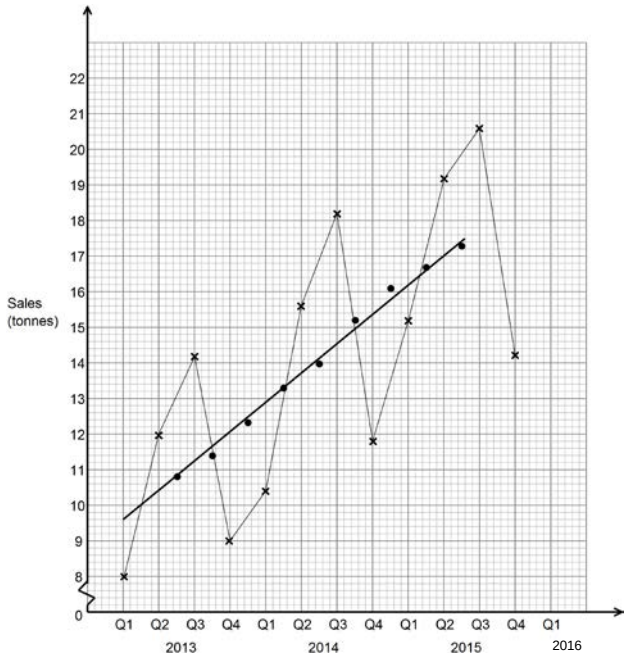
Q	Answer	Mark	Comments
10(a)	E	B1	Any indication
	Additional Guidance		
10(b)	B	B1	Any indication
	Additional Guidance		
10(c)(i)	To provide a comparison of the number of tomatoes for plants not given 'Growfast' with those that were	B1	oe
	Additional Guidance		
10(c)(ii)	A and give measured amounts of water to both groups (all plants) or C and ensure all plants receive equal amounts of sunlight	B1	oe
	Additional Guidance		
11(a)	All 8 missing entries correct	B4	B3 5 - 7 correct B2 3 - 4 correct B1 2 correct
	Sets labelled	B1	

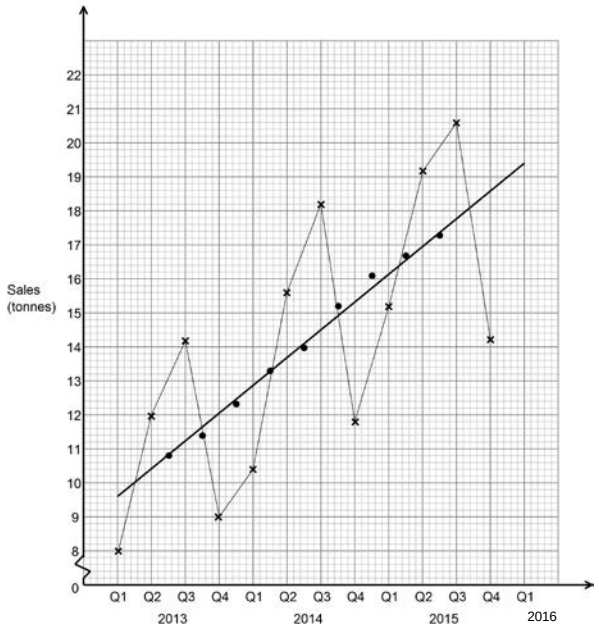
Q	Answer	Mark	Comments
			
	Additional Guidance		

Q	Answer	Mark	Comments
11(b)	4	B1ft	Follow through from their diagram
	Additional Guidance		
11(c)(i)	30 + 34 + 8 or 72	M1	Full follow through from their Venn diagram
	$\frac{72}{100}$	A1ft	oe Their answer must be between 0 and 1 for follow through to be awarded here.
	Additional Guidance		
11(c)(ii)	6 + 4 or 10	M1	Full follow through on their Venn diagram
	$\frac{10}{24}$	A1ft	oe Their answer must be between 0 and 1 for follow through to be awarded here.
	Additional Guidance		
11(c)(iii)	30 + 6 + 4 + 12 or 52	M1	Full follow through from their Venn diagram
	$\frac{6}{52}$	A1ft	oe Their answer must be between 0 and 1 for follow through to be awarded here. SC1 $\frac{6}{64}$ from counting 6 three times
	Additional Guidance		

Q	Answer	Mark	Comments
12(a)	(20 – 14) × 2.5 or 15 or (14 – 8) × 5 or 30 or (8 – 6) × 10 or 20 or (14 – 12) × 5 or 10	M1	oe
	(20 – 14) × 2.5 + (14 – 8) × 5 + (8 – 6) × 10 or 65 or (20 – 14) × 2.5 + (14 – 12) × 5 or 25	M1	oe
	25/65	A1	
	Additional Guidance		
12(b)	(positive) skew	B1	
	Additional Guidance		
13(a)	Suitable trend line	B1	Line should extend to cover the moving averages
	Additional Guidance		

Q	Answer	Mark	Comments
			

Q	Answer	Mark	Comments
13(b)	8 – (their 2013 Q1 trend value) or 10.4 – (their 2014 Q1 trend value) or 15.2 – (their 2015 Q1 trend value)	M1	One Q1 seasonal effect found Allow ± 0.5 square accuracy reading from graph A trend line must be drawn on the graph
	–1.6 and –2.5 and –1.0	A1ft	All Q1 seasonal effects found accurately ft from their trend line (which should now be extended at least to Q1 2014) Allow ± 0.5 square accuracy reading from graph
	–1.7	A1ft	Mean seasonal variation found accurately from their trend line
	Additional Guidance		
			

Q	Answer	Mark	Comments
13(c)	Read off their trend line at Q1 2016	M1	Trend line must be extended as far as Q1 2016
	17.7	A1ft	Follow through their (b) and their trend line (their trend value for Q1 2016 + their 12(b)) Allow ± 0.5 square accuracy reading from graph
	Additional Guidance		
			

Q	Answer	Mark	Comments
13(d)	Two comments from (The prediction could be accurate because) the moving averages fit the trend line well or (The prediction could be inaccurate because) the seasonal effects for Q1 are not very consistent or (The prediction could be inaccurate because) there could be a change in the trend/ seasonal pattern	B2	oe B1 for one comment
	Additional Guidance		
	Accept a reason based upon the difficulties of predicting into the future/ extrapolation		
14(a)	Constant probability of being delayed each day or fixed number of days	B1	oe
	Additional Guidance		
14(b)	0.25×0.75^4	M1	oe
	$5 \times 0.25 \times 0.75^4$ (=0.3955…)	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
15(a)	$\frac{6}{50}$ or 0.12	B1	oe
	1125 × their 0.12	M1	
	135	A1	

15(b)	One possible assumption	B1	oe eg marked fish must have been mixed with non-marked completely (Evaluation: she left one week between visits so reasonable) eg catching and marking must not affect behaviour of fish ie avoid area (Evaluation: seems unlikely problem as fish have low cognition) eg no large fluctuations in population size between visits. (Evaluation: unlikely to be a problem in just one week)
	Second possible assumption	B1	
	Appropriate evaluation of a correct assumption	B1ft	
	Additional Guidance		