GCSE
STATISTICS
8382/1H

Higher Tier Paper 1

Mark scheme

June 2023

Version: 1.0 Final

2 3 6 G 8 3 8 2 / 1 H / M S

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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

Copyright information

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2023 AQA and its licensors. All rights reserved.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Statistics 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 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.
[a, b)	Accept values $a \leq$ value $< b$
3.14 …	Accept 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.

Continental notation

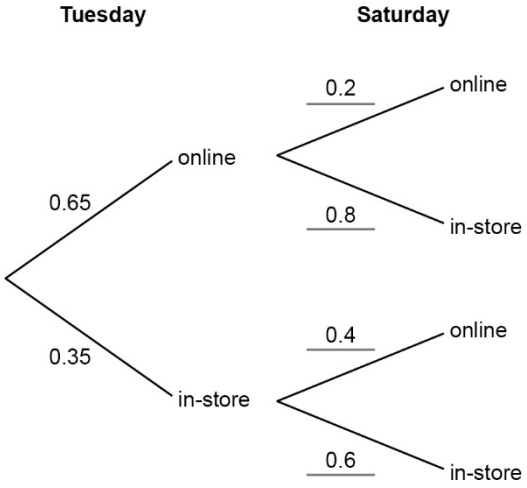
Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Marks	Comments
1	Qualitative	B1	

Q	Answer	Marks	Comments
2	40	B1	

Q	Answer	Marks	Comments
3	A	B1	

Q	Answer	Marks	Comments
4	P(A | not B) = P(not B)	B1	

Q	Answer	Marks	Comments
5(a)	Fully correct tree diagram	B2	oe fraction, decimal or percentage B1 0.2 and 0.8 or 0.4 and 0.6 in the correct places on the diagram
	Additional Guidance		
			
	Ignore any products		

Q	Answer	Marks	Comments
5(b)	0.65 × their 0.2 or 0.13 or 0.65 × their 0.8 or 0.52 or 0.35 × their 0.4 or 0.14 or 0.35 × their 0.6 or 0.21	M1	oe may be seen on diagram
	their 0.13 + their 0.52 + their 0.14 or 1 – their 0.21	M1dep	oe
	0.79	A1ft	oe ft their probabilites
	Additional Guidance		
	their probabilities must be between (0, 1)		

<table>
<tr><th>Q</th><th>Answer</th><th>Marks</th><th>Comments</th></tr>
<tr><td rowspan="8">6</td><td>One frequency:
8 or 10 or 15 or 3</td><td>B1</td><td>implied by 36
implied by 80, 300, 750 or 210
may be seen on diagram</td></tr>
<tr><td>One midpoint:
10 or 30 or 50 or 70</td><td>B1</td><td>implied by 80, 300, 750 or 210</td></tr>
<tr><td>One midpoint × frequency:
(8 × 10 =) 80
or (10 × 30 =) 300
or (15 × 50 =) 750
or (3 × 70 =) 210</td><td>M1dep</td><td>oe
implied by 1340
dep on B2</td></tr>
<tr><td>Sum of their products ÷ sum of their frequencies
or
$\frac{1340}{36}$</td><td>M1dep</td><td>oe
dep on M1</td></tr>
<tr><td>37 or 37.2(2…) (minutes)</td><td>A1</td><td>oe</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2"><table>
<tr><th>Group</th><th>mid-point</th><th>frequency</th><th>fx</th></tr>
<tr><td>$0< m \leq 20$</td><td>10</td><td>8</td><td>80</td></tr>
<tr><td>$20< m \leq 40$</td><td>30</td><td>10</td><td>300</td></tr>
<tr><td>$40< m \leq 60$</td><td>50</td><td>15</td><td>750</td></tr>
<tr><td>$60< m \leq 80$</td><td>70</td><td>3</td><td>210</td></tr>
</table></td><td></td></tr>
<tr><td colspan="2">Ignore attempts to convert 37.2 (minutes) after correct answer seen</td><td></td></tr>
<tr><td colspan="2">37 or 37.2(2…) with no working</td><td>B1B1M1M1A1</td></tr>
<tr><td colspan="2">37 minutes 12 seconds or 37 minutes 13 seconds with no working</td><td>B1B1M1M1A1</td></tr>
</table>

Q	Answer	Marks	Comments
7(a)	$10 + 20 + 30 + 40 + 55 + 60 + 75 + 80 + 90 + 105$ or 565	M1	allow one error or omission
	56.5 or $56\frac{1}{2}$	A1	
	Additional Guidance		
	Ignore any units		
	Ignore 82.5 alongside 56.5		
	56.5 seen, followed by 56 or 57		M1A1
	56 or 57 without M1 awarded		M0A0

Q	Answer	Marks	Comments
7(b)	Double mean point plotted at (their 56.5, 82.5) and straight line of best fit passing through their double mean point	M1	$\pm\frac{1}{2}$ small square tolerance
	Double mean point plotted at (their 56.5, 82.5) and straight line of best fit passing through their double mean point and passing through (10, [92, 98]) and (105, [67, 73])	A1ft	ft their double mean point ignore anything beyond gates $\pm\frac{1}{2}$ small square tolerance
	Additional Guidance		
	No double mean point plotted		M0

Q	Answer	Mark	Comments
7(c)	**Alternative method 1 – interpolation**		
	Yes ticked and it is interpolation	B2	oe B1 it is interpolation and none of the boxes ticked
	Alternative method 2 – different types of batteries		
	Cannot tell ticked and we do not know if all the batteries are of the same type	B2	oe B1 we do not know if all the batteries are of the same type and none of the boxes ticked
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Interpolation statements		
	Yes ticked and he is predicting within/inside the range (of the data/graph)		B2
	Yes ticked and the points lie close to the line (of best fit)		B2
	Yes ticked and there is a line (of best fit at 70)		B2
	Yes ticked and it will follow the trend (at 70)		B2
	Yes ticked and the correlation should not change		B0
	Yes ticked and there's negative correlation		B0
	Different types of batteries statements		
	Cannot tell and the batteries might be different sizes		B2
	Cannot tell and the batteries might be different voltages		B2
	Cannot tell and the sample size is too small		B0

Q	Answer	Marks	Comments
8(a)	Take a greater number of samples or increase the area (in which he counts weeds)	B1	oe
	Take samples for a variety of places on the pitch or choose places to sample randomly	B1	oe eg spread his samples out more
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Do more than one side and choose more (than 5) places		B2
	Do more squares		B1
	Do the other side of the field		B1
	Do a different place / Do different places Do a different location on the field Do a different location / Do different locations (ambiguous)		B1 B1 B0
	Take another sample at a later date (does not make his sample more representative)		B0
	Do more fields		B0
	Count the number of weeds on the entire pitch		B0
	Take a census		B0

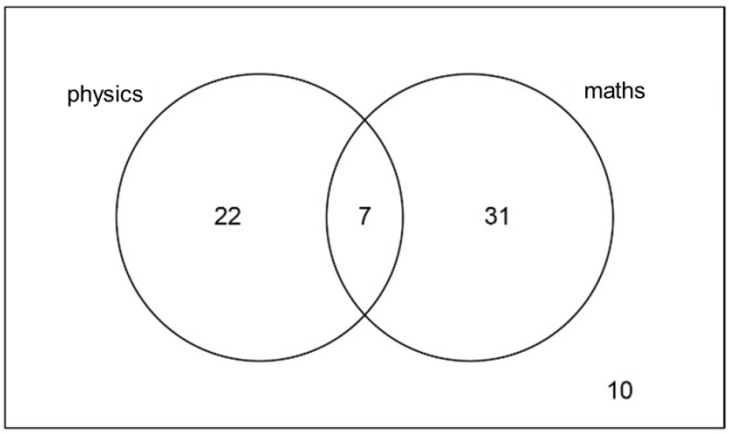
Q	Answer	Marks	Comments
8(b)	Chris should have checked the same places (as the first sample) or Chris shouldn't have chosen at random or Chris needs to allow the treatment time to take effect	B1	oe
	Additional Guidance		
	He shouldn't have done it the next day		B1
	He should do more than just several places Check in lots of places		B0 B0

Q	Answer	Marks	Comments
9	The person with number one will never be chosen (as you cannot get a total of one on two dice) or not all persons have the same probability of being chosen	B1	oe eg more than one way to score 7
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	You cannot get a 1		B1
	It is not fully random as not all numbers can be scored		B1
	Some people can be chosen multiple times / ways		B1
	The same person eg 7, can be chosen multiple times / ways		B1
	The same person can be chosen multiple times / ways		B0
	It is not (fully) random / representative		B0
	Unlikely to score 12		B0
	It is not valid		B0
	Two people can get the same outcome (people are assigned different numbers)		B0

Q	Answer	Marks	Comments
10(a)	Comment based on fact that it shows prices linked to location/ distance from centre	B1	eg shows house prices in different regions of London so she can easily compare prices at the centre and edge of the city
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	It shows location and price		B1
	It shows the distribution of house prices in London		B1
	It shows clear prices for each region (no mention of location)		B0
	It shows the change in prices (no mention of region / distance from centre)		B0
	Easy to read		B0

Q	Answer	Marks	Comments
10(b)	Ticks No and gives a correct reason showing they have considered the map and used the key	B1	eg the regions with the highest average price are closer to the centre of the map or the regions around the edge of the map have cheaper house prices (than in the middle)
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Any values stated must be correct but condone missing thousands		

Q	Answer	Marks	Comments
10(c)	Any valid reason why the median is the better average to use for this data	B1	oe gives valid reason why the mode is inappropriate to use for this data eg it is highly unlikely that there is a single mode for each area or it may have multiple modes (meaning it would be unclear how to shade an area)
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	There is only one median (per region) (implies more than one mode)	B1	
	Median is better because the mode could be the highest or lowest value	B0	
	Median is not affected by extreme values / outliers	B0	

Q	Answer	Marks	Comments
11(a)	Value of 7 correctly entered in the intersection	B1	
	10 correctly entered outside of all other sets	B1ft	ft for their 7
	Additional Guidance		
	17 in intersection with 0 written outside the circles		B0B1ft
	17 in intersection with nothing written outside the circles		B0B0
	All values must be positive		
	Correctly completed diagram – 		

Q	Answer	Marks	Comments
11(b)	$\frac{\text{their } 7}{22+\text{their } 7}$ or $\frac{7}{29}$ or [0.2, 0.2414]	M1	oe ft their value from 11(a) for their 7 if less than or equal to 17
	$\frac{31 + \text{their } 7}{70}$ or $\frac{38}{70}$ or [0.5, 0.543]	M1	oe ft their value from 11(a) for their 7 if less than or equal to 17
	Correct proportions in a comparable form eg. $\frac{490}{2030}$ and $\frac{1102}{2030}$ or [0.2, 0.2414] and [0.5, 0.543]	A1ft	ft their 7 if M1M1 awarded
	Additional Guidance		
	Do not accept $\frac{7}{29} < \frac{38}{70}$ without conversion to a comparable form		
	$\frac{7}{29}$ and $\frac{38}{70}$ seen with $\frac{7}{29}$ is less than a half and $\frac{38}{70}$ is more than a half	M1M1A1	

Q	Answer	Marks	Comments
11(c)	$\frac{31}{70} \times 20$ or [8.8, 8.9]	M1	oe
	9	A1	

Q	Answer	Marks	Comments
12(a)	**Alternative 1 – percentage of the total population**		
	5.4 (+) 5.0 (+) 4.4 or 14.8(%)	M1	oe 14.8 may be seen as part of calculation below
	their $\frac{14.8}{100} \times 16\,486\,542$ or 2 440 008.216	M1dep	oe 2 440 008.216 implies M2
	2 440 008	A1	accept 2 440 000 and 2 440 010 SC2 2 374 062
	Alternative 2 – percentages of individual age groups		
	$\frac{5.4}{100} \times 16\,486\,542$ or [890 000, 890 300] or $\frac{5(.0)}{100} \times 16\,486\,542$ or [824 000, 824 330] or $\frac{4.4}{100} \times 16\,486\,542$ or [725 000, 725 410]	M1	oe
	their $\frac{5.4}{100} \times 16\,486\,542 +$ their $\frac{5(.0)}{100} \times 16\,486\,542 +$ their $\frac{4.4}{100} \times 16\,486\,542$ or 2 440 008.216	M1dep	
	2 440 008	A1	accept 2 440 000 and 2 440 010 SC2 2 374 062

Q	Answer	Marks	Comments
12(b)	Low population aged 40 - 44 or profile of population pyramid changes at/from 40 - 44 or lower population in older age groups or from 30 - 34 / 40 - 44 percentage of women is higher than the males	B1	oe
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Fewer people alive from 40 years ago (because 40 - 44 bars are short)		B1
	The population pyramid goes in for the middle scores		B1
	Fewer people born in the 1970s		B1

Q	Answer	Marks	Comments
13(a)	A suitable explanation relating to there being different total populations or votes	B1	eg the area is proportional to the population size / votes so they would need to be different sizes or the pie chart for Moor View should be smaller as fewer people voted there
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		

Q	Answer	Marks	Comments
13(b)(i)	$\left(\frac{(\pi) \times r^2}{(\pi) \times 5^2} = \right) \frac{44\ 239}{53\ 176}$ or [0.8319, 0.832]	M1	oe eg $r : 5 = \sqrt{44\ 239} : \sqrt{53\ 176}$ $r^2 : 5^2 = 44\ 239 : 53\ 176$ accept reciprocal
	$r = 5 \times \sqrt{\frac{44239}{53176}}$ or $r^2 = 20.798$ or better or $r = 4.56(0\ldots)$ leading to $r = 4.6$	A1	do not award A1 if any incorrect working or premature rounding to less than 3 significant figures seen $r^2 = 20.8$ (to 3 significant figures)
	Additional Guidance		
	$5 \times \sqrt{\frac{44\ 239}{53\ 176}} = 4.6$ or $5 \div \sqrt{\frac{53\ 176}{44\ 239}} = 4.6$ or $5 \times \sqrt{0.832} = 4.6$ or $\sqrt{20.8} = 4.6$		M1A1
	$\frac{r^2}{5^2} = \frac{44\ 239}{53\ 176}$ $r^2 = 20.75$ $r = 4.6$		M1A0
	$\frac{(\pi) \times r^2}{(\pi) \times 5^2} = \frac{44\ 239}{53\ 176}$ $r = 4.6$ (no correct value of r^2 or expression for r or r^2 seen before answer of r)		M1A0
	$5 \times \sqrt{\frac{53\ 176}{44\ 239}} = 4.6$ (incorrect calculation)		M0A0
	$r = 5 \times \sqrt{0.83}$ (M1 not earned as 0.83 is rounded to 2 significant figures)		M0A0

Q	Answer	Marks	Comments
13(b)(ii)	Conservative: $\frac{26\,831}{44\,239} \times 360 = [218, 218.4]$ or Labour: $\frac{13\,934}{44\,239} \times 360 = [113, 113.4]$ or Lib Dem: $\frac{2301}{44\,239} \times 360 = [18.7, 19]$ or Other: $\frac{1173}{44\,239} \times 360 = [9.5, 10]$	M1	a single correctly drawn sector on the pie charts implies M1 a correct unlabelled pie chart implies M1M1 may be seen on diagram or in table
	Three angles correctly calculated or three angles drawn correctly	M1	may be seen on diagram or in table
	Pie chart with all sectors correctly drawn within tolerance and labelled	A1	tolerance $\pm$ 2 degrees ignore angles or frequencies seen on diagram condone unambiguous and distinct abbreviations for party names

Q	Answer	Marks	Comments
13(b)(iii)	A greater proportion of people voted Liberal Democrat in Moor View or the proportion of people that voted Liberal Democrat was similar in both (parts of Plymouth)	B1ft	oe ft their pie chart must refer to proportion or percentage not number of votes must be a comparison
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Any values stated must be correct		
	Condone comparison of proportion calculated from table (Sutton and Devonport = 4.8% and Moor View = 5.2%)		
	Sutton and Devonport = 18°, Moor View = 19° (no comparison)		B0
	Angle for Moor View is larger		B0

Q	Answer	Marks	Comments
14(a)	1.05 × 1.07 × 1.01 × 1.02 × 1.09 or [1.26, 1.262]	M1	oe
	[1.04, 1.05] or 1.0	A1	
	Additional Guidance		
	Use of arithmetic mean eg 5.24 ÷ 5 = 1.048		M0A0
	Answer of 1 without M1 scored		M0A0

Q	Answer	Marks	Comments
14(b)	[4.7, 4.8]	B1ft	ft their answer from part (a) provided that $1.01 <$ their $(a) < 1.09$
	Additional Guidance		
	Ignore attempts at rounding after correct answer seen Condone rounding of their answer from (a) to nearest integer		

Q	Answer	Marks	Comments
15(a)	27	B1	accept [26, 28]

Q	Answer	Marks	Comments
15(b)	1st decile = 8 or 9th decile = 37	M1	accept [7.5, 8.5] accept [36.5, 37.5]
	29	A1	SC1 40
	Additional Guidance		
	SC1 is from candidate reading 1st and 9th deciles from graph for class A. Deciles are at 5 and 45 on vertical axis.		

<table>
<tr><th>Q</th><th>Answer</th><th>Marks</th><th>Comments</th></tr>
<tr><td rowspan="6">15(c)</td><td>Candidate compares two median values in context, eg
Students at Britstone got higher marks (on average) (because their median mark was higher)</td><td>B1ft</td><td>oe
ft their median from 15(a)</td></tr>
<tr><td>Candidate compares two interdecile ranges in context, eg
Students at Britstone were more consistent (because their interdecile range is lower)</td><td>B1ft</td><td>oe
ft their interdecile range from 15(b)</td></tr>
<tr><td>Britstone chosen and reason given
eg
Students at Britstone performed better as they scored higher marks (on average) and were more consistent (than Crockwood)
or
students at Crockwood performed worse as they scored lower marks and were less consistent</td><td>B1depft</td><td>oe
dep on B1B1
if due to error candidates cannot draw the correct conclusion (eg one school has a better median but also the worse interdecile range) award final B1 mark for a sensible statement based on their result
this can include stating it is unclear as one school is more consistent but the other school has a higher median
there must be some evidence of comparison of both measures to award this mark</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Ignore any non-contradictory or irrelevant statements</td><td></td></tr>
<tr><td colspan="2">Condone range for interdecile range</td><td></td></tr>
<tr><td colspan="2">Britstone scored higher (on average) (because their median score was higher). Britstone’s results were more consistent (because their interdecile range was smaller). The teacher would choose Britstone.</td><td>B1B1B1</td></tr>
<tr><td colspan="2">Britstone scored higher (on average) (because their median score was higher). Britstone’s results were more consistent (because their interdecile range was smaller) (no comparison)</td><td>B1B1B0</td></tr>
<tr><td colspan="2">Median for Britstone is 31 and Crockwood is lower (27)
Median for Britstone is higher (than for Crockwood)</td><td>B1
B1</td></tr>
<tr><td colspan="2">Median for Britstone is 31 and Crockwood is 27 (no comparison)</td><td>B0</td></tr>
</table>

Q	Answer	Marks	Comments
16(a)	Any two correct reasons eg the probability (of getting a diamond) will not change or he opens a fixed number of boxes or the contents of any box are independent (from the contents of the other boxes) or each box either has a diamond or does not or there are only two (possible) outcomes	B2	oe B1 for one correct reason
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		

Q	Answer	Marks	Comments
16(b)(i)	Sight of 0.99 or p^5 for any $0 < p < 1$	M1	oe
	$0.99^5 = 0.9509(9\ldots)$ (which rounds to 0.951 to 3 sf)	A1	
	Additional Guidance		
	Answer is given in question 0.951 with no evidence or incorrect method		M0A0

Q	Answer	Marks	Comments
16(b)(ii)	Correct reason given based on these not being the only outcomes eg these are not the only outcomes so will not sum to one or correctly finds probability of getting one diamond as 0.048(0…) or getting exactly one diamond and exactly zero diamonds are not mutually exclusive or states this is the probability of getting at least one diamond	B1	oe
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	This is the probability of not getting zero diamonds		B1
	0.951 is P(zero diamonds)		B0
	This is P(5 diamonds)		B0

Q	Answer	Marks	Comments
16(c)	0.05 × 7 or 37.5 or $\frac{14}{750}$ or 0.02 or [0.018, 0.019]	M1	oe for 37.5 accept 37 or 38
	No and both probabilities in a comparable format or No and suitable conclusion eg the probability of an emerald is likely to be less than 0.05	A1	oe the number of emeralds was higher

Q	Answer	Marks	Comments
	Alternative 1 – between 1 and 2 standard deviations		
17	Sight of one of the following values: $[0.\dot{6}, 0.68]$ or $[0.\dot{3}, 0.34]$ or 0.95 or 0.475 or 0.05 or 0.025	B1	oe
	$0.95 - [0.\dot{6}, 0.68]$ or [0.27, 0.284] or $\frac{0.95 - [0.\dot{6}, 0.68]}{2}$ or $0.475 - [0.\dot{3}, 0.34]$	M1	oe M1 awarded implies B1
	[0.135, 0.142]	A1	oe

Question 17 and additional guidance continues on the next page

17 cont	**Alternative 2 – whole distribution**		
	Sight of one of the following values: $[0.\dot{6}, 0.68]$ or $[0.\dot{3}, 0.34]$ or 0.95 or 0.475 or 0.05 or 0.025	B1	oe
	$1 - [0.\dot{6}, 0.68] - 0.05$ or $0.5 - [0.\dot{3}, 0.34] - 0.025$ or $1 - [0.71\dot{6}, 0.73]$ or $\frac{1 - [0.\dot{6}, 0.68] - 0.05}{2}$ or $\frac{1 - [0.71\dot{6}, 0.73]}{2}$ or $0.5 - [0.358\dot{3}, 0.365]$	M1	oe M1 awarded implies B1
	[0.135, 0.142]	A1	oe
	Additional Guidance		
	Answer of [0.135, 0.142] with no incorrect working		B1M1A1

Q	Answer	Marks	Comments
18(a)(i)	One advantage from the following: cheaper or easier or quicker or impractical to collect in person	B1	oe
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Already processed	B1	
	Reliable	B0	

Q	Answer	Marks	Comments
18(a)(ii)	One disadvantage from the following: do not know how data was gathered or countries may not report data accurately or may not be able to get the data you want	B1	oe
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	For disadvantages do not accept generic comments about the internet being less trustworthy/reliable or biased		
	The source may have collected invalid data	B1	
	We don't know if it is accurate	B0	
	Reference to primary data	B0	
	Outdated	B0	

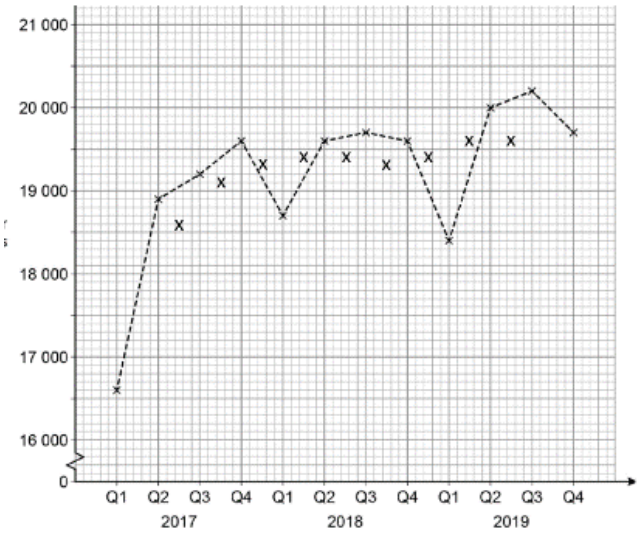
Q	Answer	Marks	Comments
18(b)(i)	One correct trend line value: [96 000, 96 200] or [98 400, 98 600] or 101 000	M1	
	Values for seasonal variation and total correct for their trend line values or [–18 000, –17 600] or [5866.6…, 6000]	M1dep	based on intervals above [–4540, –4340], [–5870, -5670] and –7590 [–18 000, –17 600] or [5866.6…, 6000] implies M1M1dep if no incorrect values seen
	[–6000, –5866.6…]	A1	

Q	Answer	Marks	Comments
18(b)(ii)	Correct trend line reading from graph in the interval [103 300, 103 500]	M1	
	Correct evaluation of [103 300, 103 500] + their mean seasonal variation	A1ft	ft their mean seasonal valuation
	Additional Guidance		
	Condone a positive value calculated in b(i) subtracted from [103 300, 103 500]		

Q	Answer	Marks	Comments
18(b)(iii)	Don't know if seasonal pattern continues or seasonal variation is increasing in size (so this estimate will be too high)	B1	oe eg the trend may change
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Birth rate could change / increase		B1
	Number of births has dropped		B1
	May be a war / natural disaster		B1
	It is only an estimate based on a trend		B1
	Number of births is falling		B1
	Secondary data has been used		B0
	The trend line may be inaccurate		B0
	Could be an anomaly		B0
	It is only an estimate / trend line		B0
	It's extrapolation / data doesn't go that far		B0

<table>
<tr><th>Q</th><th>Answer</th><th>Marks</th><th>Comments</th></tr>
<tr><td rowspan="4">18(c)(i)</td><td>$\frac{19\,600 + 19\,700 + 19\,600 + 18\,400}{4}$
or
19 325</td><td>M1</td><td>answer may be seen in table</td></tr>
<tr><td>19 300</td><td>A1</td><td>answer may be seen in table</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="3">Correctly filled in table
<table>
<tr><th>Year</th><th>Quarter</th><th>Number of births (nearest hundred)</th><th>Moving average (nearest hundred)</th></tr>
<tr><td rowspan="4">2017</td><td>1</td><td>16 600</td><td></td></tr>
<tr><td>2</td><td>18 900</td><td>18 600</td></tr>
<tr><td>3</td><td>19 200</td><td>19 100</td></tr>
<tr><td>4</td><td>19 600</td><td>19 300</td></tr>
<tr><td rowspan="4">2018</td><td>1</td><td>18 700</td><td>19 400</td></tr>
<tr><td>2</td><td>19 600</td><td>19 400</td></tr>
<tr><td>3</td><td>19 700</td><td>19 300</td></tr>
<tr><td>4</td><td>19 600</td><td>19 400</td></tr>
<tr><td rowspan="4">2019</td><td>1</td><td>18 400</td><td>19 600</td></tr>
<tr><td>2</td><td>20 000</td><td>19 600</td></tr>
<tr><td>3</td><td>20 200</td><td></td></tr>
<tr><td>4</td><td>19 700</td><td></td></tr>
</table></td></tr>
<tr><td colspan="2">Condone correct answer seen with no value in the table</td><td></td></tr>
</table>

Q	Answer	Marks	Comments
18(c)(ii)	The data is given in quarters / 4 quarters make up a whole year	B1	oe
	Additional Guidance		
	Shows all the seasons		B1

Q	Answer	Marks	Comments
18(d)	All moving averages plotted correctly	B2ft	ft their moving averages from 18(c)(i) $\pm\frac{1}{2}$ small square tolerance B1ft at least 4 plotted correctly or for correct vertical heights for all points with incorrect but consistent horizontal plots for all points
	Suitable trend line drawn through their moving averages	B1dep ft	dep on at least B1 must have 9 moving averages plotted
	Additional Guidance		
	Trend line must pass through or above their first point Must have a positive gradient with at least 3 points above and at least 3 points below the line Line must extend across all 9 points plotted		
			

Q	Answer	Marks	Comments
18(e)(i)	Both show an increasing trend	B1	oe eg the number of births is increasing in both countries
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		

Q	Answer	Marks	Comments
18(e)(ii)	Kazakhstan has much more variation (from one quarter to another) (compared to Mongolia) or in Kazakhstan there is a large fall in the number of births between Q4 and Q1 each year but in Mongolia the fall is much smaller or Kazakhstan always has its highest number of births in Q3 but it varies for Mongolia	B1	oe
	Additional Guidance		
	Ignore any non-contradictory or irrelevant statements		
	Condone birth rate for number of births		
	Any comments about similarities		B0