GCSE
STATISTICS
8382/2F

Foundation Tier Paper 2

Mark scheme

June 2019

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I9A8382IF/MS

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.

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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 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.

Question	Answer	Mark	Comments
1	Laboratory experiment	B1	
2	0	B1	
3(a)	Which farm the sprouts were from	B1	
3(b)	How well the sample was cooked	B1	
4(a)	60	B1	accept sixty
	Additional Guidance		
	Ignore any mention of teachers		
4(b)	$(\frac{36}{60} =) \frac{3}{5}$	B2ft	ft denominator from (a) B1 $\frac{36}{60}$ or $\frac{18}{30}$ or $\frac{12}{20}$ or $\frac{9}{15}$ or $\frac{6}{10}$ (these denominators may be different if they had a different total in (a)) or 60% or 0.6 or B1ft any correctly simplified fraction
	Additional Guidance		
	Do not accept incorrect 'simplification' or change of form after $\frac{3}{5}$		
	Allow follow through if (a) indicates they've chosen the wrong school for up to B2ft; assume start again if correct answer seen, even if (a) was incorrect eg $\frac{2}{14} = \frac{1}{7}$ with 14 in (a) or $\frac{20}{26} = \frac{10}{13}$ with 26 in (a) eg $\frac{2}{14} = \frac{1}{12}$ with 14 in (a)	 B2ft B1ft
	eg $\frac{20}{40} = \frac{1}{2}$ (this is any correctly simplified fraction regardless of answer given in (a))	B1ft

Question	Answer	Mark	Comments
4(c)	14 or 2 + 12 and 60 or 36 + 24 (ft their 60 from (a)) and 26 or 20 + 6 or correct partial comparison	M1	allow one error in totals for Lindsey and Bushfield eg Ridge High has the most teachers
	Ridge High has the most teachers, followed by Lindsey College with Bushfield Primary School having the least	A1ft	oe ft only their 60 from (a)
	Additional Guidance		
	Correct position of two schools is the minimally acceptable answer		
	Numbers need not be seen if correct comparison given		
	Ignore reference to male/female numbers		
	eg Ridge High has more than the other two together eg Ridge High has the most and Bushfield is next (This is not a correct partial comparison as Bushfield is in the wrong position)		M1A0 M0A0

Question	Answer	Mark	Comments
4(d)	(Bushfield males) 0.14 or 0.143 or better and (Ridge males) 0.6 and (Lindsey males) 0.77 or 0.769 or better or (Bushfield females) 0.86 or 0.857 or better and (Ridge females) 0.4 and (Lindsey females) 0.23 or 0.231 or better	B2ft	ft their answers to (a) and (c) accept percentage equivalents for decimal answers B2ft for all three correct fraction proportions with the same denominator; or three correct ratios in the form 1 : n or n : 1 B1ft for all three correct fraction proportions not in comparable form; or all three correct m : f or f : m ratios stated B1ft correct proportions for males or females for two of the places in comparable form; or two correct ratios in the form 1 : n or n : 1
	(Males) Lindsey College has the highest proportion of males followed by Ridge High with Bushfield Primary the least or (Females) Bushfield Primary has the highest proportion of females followed by Ridge High with Lindsey College the least	B1ft	ft if at least B1ft awarded above
	Additional Guidance		
	Accept any clear indication of schools and male/female eg BM for Bushfield Males		
	Ignore reference to numbers rather than proportions		
	Correct position of two schools in minimally acceptable answer for final B1		
	Mixed comparisons of male/female cannot score the comparison mark		
	Either a full comparison of male proportions **or** a full comparison of female proportions is acceptable for full marks. If both attempted award marks to the better attempt		

Question	Answer	Mark	Comments
5(a)	OPPO	B1	
	Additional Guidance		
	Allow incorrect spelling if the intention is clear		
5(b)	100 – (21.7 + 10.4 + 7.6 + 6.3 + 39.3) or 100 – 85.3 or $\frac{215.8}{318.3+\cdots+577.7} \times 100$ or $\frac{215.8}{1469.1} \times 100$ or $\frac{\text{market share}}{\text{number of sales}} \times 215.8$	M1	oe oe eg $\frac{21.7}{318.3} \times 215.8$
	14.7	A1	
5(c)	**Alternative method 1 : % for top three**		
	Adds up the top three market shares (21.7 + their 14.7 + 10.4)	M1	Can be implied by their 46.8
	their 46.8 and appropriate conclusion	A1ft	ft only their (b)
	Alternative method 2 : % for bottom three		
	Adds up the 4th, 5th and 'others'	M1	Can be implied by 53.4
	53.4 and conclusion Wang is wrong	A1	
	Alternate method 3 : actual sales for top 3 versus total		
	Adds up the top three company sales (318.3 + 215.8 + 153.1)	M1	Can be implied by 687.2
	$\frac{687.2}{1469.1} = 0.47$ or better and conclusion Wang is wrong or 1469.1 ÷ 2 = 734.55 and conclusion Wang is wrong	A1	
	Alternative methods 4 and 5 & Additional Guidance continue on next page		

Question	Answer	Mark	Comments
5(c) cont	**Alternative method 4 : actual sale for bottom three versus total**		
	Adds up bottom three company sales (111.8 + 92.4 + 577.7)	M1	Can be implied by 781.9
	$\frac{781.9}{1469.1} = 0.53$ or better and conclusion Wang is wrong or 1469.1 ÷ 2 = 734.55 and conclusion Wang is wrong	A1	
	Alternative method 5 : actual sales for top 3 versus bottom three		
	Adds up the top three company sales (318.3 + 215.8 + 153.1) or Adds up the bottom three sales (111.8 + 92.4 + 577.7)	M1	Can be implied by 687.2 or 781.9
	687.2 and 781.9 and conclusion Wang is wrong	A1	
	Additional Guidance		
	A misread of the top three companies to be Samsung, Apple and Others, can score M1A0 if additions are seen for either market share or number of sales: 21.7 + 14.7 + 39.3 or 6.3 + 7.6 + 10.4 or 318.3 + 215.8 + 577.7 or 92.4 + 111.8 + 153.1 (may be implied by 75.7(%) or 24.3(%) or 1111.8 or 357.3)		

6(a)	$\frac{7}{12}$ or 0.58(33…) or 58(.33…)%	B2	oe B1 denominator 12 or numerator 7
	Additional Guidance		
	Do not accept ratios for probablility		
	Ignore incorrect attempts to simplify correct fraction		
	Ignore use of probability words unless contradictory		

Question	Answer	Mark	Comments
6(b)	$1-\frac{1}{12}$	M1	oe
	$\frac{11}{12}$ or 0.916 (or better) or 0.917 or 0.92 or 91.6% (or better) or 91.7%	A1ft	oe ft their denominator from (a)
	Additional Guidance		
	Do not accept ratios for probability		
	Ignore attempts to simplify or change form following a correct fraction		
	Ignore use of probability words unless contradictory eg $\frac{11}{12}$ and unlikely		M1A0
	eg $\frac{7}{10}$ in (a) then $1-\frac{1}{10}=\frac{9}{10}$ in (b)		M1A1ft
7(a)	More friends are logged on as the week goes by	B1	oe
	Additional Guidance		
	Minimally acceptable answer: increasing / it increases / rising (it being the trend)		
	Do not accept 'positive'		
	Ignore reference to correlation		
	More play towards the end of the week / Thursday & Friday		B1
	Positive increase (not describing the trend)		B0

Question	Answer	Mark	Comments
7(b)	$\frac{3}{36}\times 360$ or states or shows that one person is represented by 10 degrees	M1	(numerator of 3 or 5 or 6 or 10 or 12) oe method to calculate one angle Implied by one correct angle on chart
	30 or 50 or 60 or 100 or 120	A1	one correct angle may be only on diagram
	All angles drawn correctly: 30 and 50 and 60 and 100 and 120	A1	2° tolerance
	Sectors labelled appropriately	B1ft	labelling must follow size of sectors which must start with Monday as smallest up to Friday as largest
	Additional Guidance		
	Accept abbreviations or initials for labels (but need Tu and Th)		

<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="6">7(c)</td><td>Any attempt to create a dual bar chart, composite bar chart or percentage bar chart</td><td>B1</td><td>Accept back-to-back bar chart</td></tr>
<tr><td>One correct pair (dual)
or
correct combined bar (composite/percentage)
or
one day correctly plotted for both (time series)</td><td>M1</td><td>all to include correct vertical scale without scale break</td></tr>
<tr><td>All bars ruled and drawn accurately
or
Both sets of data correctly plotted and joined on time series (with solid or dotted line)</td><td>M1</td><td><table><tr><td></td><td>M</td><td>Tu</td><td>W</td><td>Th</td><td>F</td></tr><tr><td>TT</td><td>3</td><td>5</td><td>6</td><td>10</td><td>12</td></tr><tr><td>E</td><td>15</td><td>14</td><td>11</td><td>10</td><td>8</td></tr></table></td></tr>
<tr><td>Completely correct and fully labelled</td><td>A1</td><td>Axes ruled with minimum labels:
vertical axis – number of friends or frequency

horizontal axis – the 5 days’ names in full, abbreviated or initials

must have equal (non zero length) gaps between joined pairs of bars

key for dual/composite/percentage bar charts or labels for time series lines</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">For time series max is M1M1A1 and for the A1, points should be joined with dotted line and not extend beyond Monday and Friday</td><td></td></tr>
<tr><td colspan="2">Tolerance on plotting of half a small square</td><td></td></tr>
<tr><td colspan="2">Titles do not need to be given for the graphs (ignore any given)</td><td></td></tr>
</table>

Question	Answer	Mark	Comments
7(d)	**1.** True, 58 in Easter, 36 in term-time	B1	must make decision and quote correct values Accept True, 22 more at Easter
	2. False, they were equal on Thursday or False, Friday had more in term-time	B1	oe
	3. True, but so did Friday or False, it was also Friday or Thursday and Friday are both the same / 20	B1	oe values not needed here but must reference Friday as equal
	Additional Guidance		
	Accept general description for statement one that on Mon-Wed Easter numbers were a lot higher, the same on Thurs and only 2 less on Fri		B1

8(a)	50.4	B1	
	Additional Guidance		
	Do not accept 50.40		

Question	Answer	Mark	Comments

8(b)	Yes, none are below 50.01g	B1	oe eg Yes, line starts after 50g
	Additional Guidance		
	Yes, all are over 50 (can mention points or balls of wool here)		B1
	Yes, none are below 50		B1
	Yes, most are over 50		B0
	Yes, all are in the 50g range		B0
	Yes, starts are 50 and none had that weight (should mention scale starts at 50)		B0
	Yes, all 50 and above		B0
	Yes, none weigh 50		B0
	Yes, to 1sf, they are over 50		B0

8(c)(i)	No, the lowest is 49.98g	B1	oe
	Additional Guidance		
	No, lowest value is under 50		B1
	No, some are under 50		B1
	No, one is under 50		B0
	No, the lowest is 49.9		B0

Question	Answer	Mark	Comments
8(c)(ii)	**Alternative method 1 – Median and IQR**		
	(Yarn club) median = 50.05	B1	[50.045, 50.055]
	(Yarn club) lower quartile = 50.03 or (Yarn club) upper quartile = 50.09	B1	[50.025, 50.035] [50.085, 50.095] may be implied by IQR = 0.06
	(Yarn club) inter-quartile range = 0.06	B1ft	ft their quartiles if at least one correct
	(Lydia's Wool) inter-quartile range = 0.09	B1	
	Lydia's Wool have has a higher average (mass / size / weight)	B1ft	oe ft their median must reference average (oe)
	Lydia's Wool have more variable masses of wool or Lydia's wool is less consistent	B1ft	oe ft IQR if UQ and LQ in range must reference variability / consistency / spread in some way
	Alternative method 2 – Median and Range		
	(Yarn club) median = 50.05	B1	
	Mark not available for using the range	B0	
	(Yarn club) range = 0.39	B1ft	ft their max/min if at least one correct
	(Lydia's Wool) range = 0.59	B1	
	Lydia's Wool have has a higher average (mass / size / weight)	B1ft	oe ft their median must reference average (oe)
	Lydia's Wool have more variable masses of wool or Lydia's wool is less consistent	B1ft	oe ft their ranges must reference variability / consistency / spread in some way
	Additional Guidance		
	All values from graph have tolerance of half a small square		

Question	Answer	Mark	Comments
9(a)	Any suitable hypothesis with any reference to variables of age and time spent on the internet	B1	eg teenagers spend longer on the internet than adults
	Additional guidance		
	Must not be in the form of a question		
	(We / I think) older people spend less time on the internet than younger people		B1
	Ages 10 – 20 use the internet the most		B1
	Ages 10 – 20 use the internet more		B0
	Younger people spend time on the internet		B0
	Different age groups spend different amounts of time on the internet		B0

Question	Answer	Mark	Comments
9(b)	Two valid comments from: Any reference to improving the age groups Any reference to introducing a time frame for when/how often they go on the internet Any reference to forming intervals / groups for how long on internet	B2	B1 for one valid comment eg get rid of the overlap at 10 years old eg have more age groups eg put 'per day' on heading for time on internet eg put tick boxes for 0–59mins, 1h–1h59min, 2h–2h59mins etc (with no overlap/gaps)
	Additional guidance		
	One valid and one invalid comment will score B1 for the valid comment		
	Age Group Comments		
	Change the overlap		B1
	Have age not age group (data would be perfectly accurate although would need processing)		B1
	Have more age groups		B1
	Have more ages		B0
	10 in two groups (this is a criticism, not an improvement)		B0
	$0 < \text{Age} \leqslant 10$		B0
	Improve the age limit, put in 40 – 60		B0
	Have more accurate age groups		B0
	'How long' Comments		
	Include a time scale / frame		B1
	Put per week / month in the heading		B1
	Use 0–2h, 3–4h, 5–6h etc (Condone as not gaps - rounded nearest hour)		B1
	Have a group of times to pick from		B1
	Use groups eg 1–5h, 5–10h etc (do not accept – overlaps)		B0
	Specify the units of time		B0
	They may not record how long they spend		B0
	Must state what they mean by how long		B0

Question	Answer	Mark	Comments

9(c)(i)	Easier to work with exact data	B1	oe
	Additional guidance		
	(Data) more precise / detailed		B1
	Can be used to choose (appropriate) class intervals / groups later		B1
	More accurate / specific		B1
	Easier to compare data for the same age		B1
	Gives an exact mean, not an estimated mean		B1
	You don't get an estimate		B0
	You have the right age, not rounded ages		B0
	Using it you will get better / reliable / representative / clearer results		B0
	More information		B0

9(c)(ii)	People may not want to give their exact age / may refuse or lie about age or It will take longer to process / interpret the data	B1	oe
	Additional guidance		
	It's too personal / sensitive		B1
	It's less accurate		B0
	Harder to record the data		B0
	More time consuming		B0

Question	Answer	Mark	Comments
9(d)(i)	Not enough older people or Not a good spread of ages	B1	oe
	Additional guidance		
	Allow the implication of a poor spread by statements such as: Most under 30 or most are 10 – 30 or most are 15 – 25 etc Didn't really ask 30 – 50 year olds	B1	
	Didn't collect from a range of ages	B0	
	All are under 30 or all are roughly the same age	B0	
	Most are 10 – 20	B0	
9(d)(ii)	(12, 6.9) only circled	B1	any clear indication
	(Holly is wrong,) it is positive (correlation)	B1	oe
	Additional guidance		
	Ignore use of weak/strong to describe the correlation		
	It's not negative	B1	
	If you include the outlier, it appears to show little/no correlation	B1	
9(d)(iii)	The older the person, the more time appears to be spent on the internet	B1	oe eg teenagers / young people spend less time on the internet than adults
9(e)(i)	80 (people)	B1	accept eighty
9(e)(ii)	5 (hours)	B1	accept five

Question	Answer	Mark	Comments

9(e)(iii)

Answer	Mark	Comments
Sight of one correct midpoint	B1	0.5 or 1.5 or 2.5 or 3.5 or 4.5 May be implied by 22, 27, 25, 21 or 9
At least one midpoint multiplied by the frequency	M1	'midpoints' must be consistent but may be at class bounds eg midpoint within [0, 1] for first row multiplied by 44
104 ÷ 80 = 1.3	A1	answer given must show work for B1M1

Additional Guidance

0.5 (× 44 =)	22
1.5 (× 18 =)	27
2.5 (× 10 =)	25
3.5 (× 6 =)	21
4.5 (× 2 =)	9
	total = 104

No working on table or no indication of sums totalling
and just 104 ÷ 80 = 1.3 seen
(not shown enough working for 'show that' since 80 × 1.3 = 104)

B0M0A0

Question	Answer	Mark	Comments

9(f)	On average 15 year-olds spend longer on the internet (than 50 year-olds)	B1	
	50 year-olds have a smaller variation in time spent on the internet (than 15 year-olds)	B1ft	ft their (e)(ii)
	Additional Guidance		
	Average Comments		
	Accept younger/older in place of 15yo and 50yo eg On average, younger people use it more		B1
	The means are almost the same, so on average, they spend roughly the same amount of time online		B1
	The 15yo range is more so they spend more time on average		B0
	15yo spend longer on the internet than 50 yo (no 'on average')		B0
	The mean for 15yo is 0.3h higher		B0
	Range comments		
	The 50yo are more consistent with the amounts of time spent		B1
	The 15yo times vary by 2h more with a range of 4 seen		B1
	The ranges are very similar, so the times are fairly consistent across both groups		B1
	The 15yo times vary by 1h more (range irrelevant as could have re-started)		B1
	The 15yo times vary by 2h more (with a range of 5 seen)		B0
	50yo use it more consistently (need to mention times)		B0
	The 15yo times are more different		B0

10(a)	North West and South East and no other regions mentioned	B1	In either order Accept NW and SE
	Additional Guidance		
	Ignore any numbers given as part of the answer		

Question	Answer	Mark	Comments
10(b)	Two correct reasons eg Discusses that bars give misleading impression eg The fastest speed has the shortest bar eg Discusses that diagram is not to scale eg The bars are not drawn to scale eg The speeds are quite similar to each other but the bar lengths are quite different eg There is no scale	B2	oe B1 one correct reason
	Additional Guidance		
	Accept higher for faster and lower for slower		
	There are two bars for each region / row		B1
	The bars with the numbers on are the same length		B1
	The bars are drawn as arrows		B1
	The bars are the wrong way around		B0
	Some speeds are the same but the bar lengths are different (not true)		B0
	The difference in length between the first two bars is the same as between the second two bars, but there is not the same difference in speed		B1
	It is not clear how long each bar is		B1
	Length of arrows don't match the speed		B1
	Doesn't show units		B1
	There should be axes		B0
	The length of the bar does not correspond to the ranking (it shouldn't it should be proportional to the value)		B0
	The heading says 'How fast are you?' but the data is for regions / shoppers		B0
	The values go in descending order whereas it should be in ascending order		B0

Question	Answer	Mark	Comments

10(c)(i)	Correct diagram, with ordered leaves and numbers vertically aligned **0** | 7 7 9 **1** | 0 2 3 4 6 7 8 8 9 **2** | 1 2 2 4 5 5 6 7 **3** | 1 2 2 4 **4** | 1	B3	B2 three or four correct, ordered rows or all numbers correctly placed in rows but not ordered B1 correct numbers in at least two rows (not necessarily ordered) but does not score B2
	Additional Guidance		
	Condone lack of vertical alignment for B2 and B1		
	Marks can be scored for work in white space below question if grid blank or crossed out		

10(c)(ii)	(Walking speeds are) faster (on average) in June	B1	oe eg, (Walking speeds are) slower (on average) in December
	Additional Guidance		
	Ignore calculations or average values seen		
	Accept higher for faster pace and lower for slower pace		
	Most / more walkers are faster in June		B1
	Most / more walkers have a faster pace in June		B1
	Walkers are faster in June		B1
	Walkers are slower in December		B1
	All walkers are faster in June		B0
	Most / more walkers are higher in June		B0
	Incorrect month(s) referenced		B0

Question	Answer	Mark	Comments
10(c)(iii)	The shopping centre is busier in December	B1	oe It is the run-up to Christmas
	Additional Guidance		
	People are Christmas shopping		B1
	References to weather can only be to state or imply underfoot conditions eg More difficult to walk in poor weather in December		B1
	It might be icy / snow / be slippery in December		B1
	You wear less in June so you will be faster		B0
	People have more time in December		B0
11(a)	2013	B1	accept twenty thirteen or two thousand and thirteen

Question	Answer	Mark	Comments
11(b)	4 remaining values correctly plotted	B1	
	Their plots joined by straight lines	B1dep	Dependent on at least one correct plot Do not accept any part of graph being curved
	'Year(s)' label on horizontal axis	B1	
	'Attendances (at all A&E hospitals) in millions' label on vertical axis	B1	oe eg (number of) people in millions 'millions' must not be omitted
	Additional Guidance		
	First B1 : Plotting to tolerance of half a small square		
	Second B1 : Mark intention, so, (for example), forgive small areas of double lines		
	Second B1 : At least one correct plot includes if some or all of the others are omitted		
	Fourth B1 : Accept # for 'number of' eg '# patients – millions' is B1		
	Fourth B1 : Accept 'mil' or (1) 000 000(s) for millions but do not accept 'per million'		
	Fourth B1 : 'frequency of patients in millions'		B1
	Fourth B1 : 'frequency in millions'		B0
	Ignore graph before 2008 and after 2016		
	Ignore any titles to the graph written		

Question	Answer	Mark	Comments
11(c)	Shows patterns in the data more clearly / Avoids a large area of empty graph / Makes plotting / drawing / reading easier	B1	oe positive reason
	Over-exaggerates differences between years / Might not be understood	B1	oe negative reason
	Additional Guidance		
	Ignore irrelevant statements alongside correct ones		
	A correct positive reason given in the negative answer space and vice versa is B0		
	For the positive reason		
	It is more accurate / precise		B1
	Allows data to be plotted without a long graph		B1
	It's not bunched at the top		B1
	Allows you to have a smaller graph		B1
	Allows you to have a bigger graph		B0
	It makes it quicker to draw		B0
	There's no data below 19.5		B0
	Shows the correlation in the graph (it's not a scatter diagram)		B0
	Only shows relevant information		B0
	For the negative reason		
	It is misleading / confusing / distorts the graph		B1
	The graph looks very steep when in fact the numbers are quite close together		B1
	What does it mean?		B1
	Makes differences appear much bigger than they are		B1
	Makes differences much bigger than they are		B0
	Allows you to start from 0		B0
	It is too steep between years		B0

Question	Answer	Mark	Comments
11(d)	There could be more doctors / nurses / hospitals or The hospital could be more efficient or Quicker treatment may be available or It will vary between hospitals / patients / emergencies / time of day / time of week (so they won't all have longer waiting times)	B1	oe
	Additional Guidance		
	Ignore irrelevant statements alongside correct ones		
	Answers which only reference their answer to a comparison between Major hospitals and All A&E hospitals score zero		
	Hospitals may not have reached capacity		B1
	It will depend upon how serious the problem is		B1
	Some people are now not going to A&E for minor conditions		B0
	They could build more A&E hospitals		B0
	Dan hasn't collected any data / there are no data about waiting times		B0

Question	Answer	Mark	Comments
12(a)	17 in top middle section	B1	
	22 in centre right section	B1	
	100 – (43 + 17 + 22) or 18 seen	M1	
	18 in top right section and 0 in all three remaining sections	A1	
12(b)	$\frac{22}{40}$ or 0.55 or 55%	B2ft	oe strictly follow through their Venn diagram B1ft for numerator (their 22 + their 0) B1ft for denominator (their 18 + their 22 + their 0)
	Additional Guidance		
	Ignore incorrect attempts to simplify or change form, once correct fraction seen		