GCSE
STATISTICS
8382/1F

Foundation Tier Paper 1

Mark scheme

June 2020

Version: 1.0 Final

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

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 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 $\leqslant$ 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.

1	Discrete	B1	

2	+1.2	B1	

3	Sample	B1	

4	0.24	B1	

5	Any one measure correct: Mode (now) = 5 or Mode (three years ago) = 3 or Mean (now) = 5.08 or Mean (three years ago) = 2.67 or Median (now) = 5 or Median (three years ago) = 3 or Range (now) = 5 or Range (three years ago) = 4	M1	
	Both comparable averages correct	A1	
	Both ranges correct	A1	
	On average there are more (internet-enabled) devices now	A1ft	oe ft their measure of average
	There is more variation in the number of devices now	A1ft	oe ft their ranges
	Additional Guidance		
	Do not accept incorrect naming of measures		
	Accept inter-quartile range instead of range ie LQ now = 4, UQ now = 6, IQR now = 2 LQ three years ago = 2, UQ three years ago = 3, IQR three years ago = 1		
	Accept all calculations to 3sf or better		

6(a)(i)	Random starting point between 1 and 10	B1	oe
	Then take every 10th	B1	oe

6(a)(ii)	Any two from: Not all/many will be having a bacon sandwich Only one source/venue Only one day/meal	B2	oe B1 for one correct reason
	Additional Guidance		
	Any reference to the sample size is B0 eg He should do a census		B0
	Any reference to representation must be explained further eg (It's not representative as) it's just one morning eg They could all have the same sauce so not representative		B1 B0
	People may have different things each day		B0

6(b)(i)	Mode or modal	B1	
	Brown (sauce)	B1	
	Additional Guidance		
	Accept B for Brown		

6(b)(ii)	Vertical axis scaled appropriately	B1	Reaches 24 or more with even scale (eg up in 2s or 5s)
	Horizontal axis labelled appropriately and Vertical axis labelled appropriately	B1	Brown (sauce), Red (sauce) No(ne) (sauce) No need for Type of sauce overall label Frequency or Number of people
	Intended straight bars / vertical lines to correct heights	B1	24, 21 and 5 (in any order)
	Fully correct diagram that is suitable for qualitative data eg Equal gaps between bars/lines and bars/lines are all equal in width (if a bar chart / vertical line graph)	B1	
	Additional Guidance		
	Do not penalise size of graph if it meets the individual independent marks		
	Gaps only need to be consistent between bars/lines, ignore the space before the first bar/line and the last bar/line		
	The horizontal axis must be labelled with Brown (sauce), Red (sauce) and No(ne) (sauce), or the overall label Type of sauce with Brown (sauce), Red (sauce) and No(ne) (sauce) indicated on / or above the bars/lines		

6(c)	The hypothesis is incorrect or (The data is very close between red and brown so) it is unclear whether the hypothesis is correct or incorrect	B1	oe
	Additional Guidance		
	The hypothesis is incorrect as less than half had red sauce	B1	
	The hypothesis is wrong, 3 more people had brown sauce than red The hypothesis is wrong, 2 more people had brown sauce than red	B1 B0	
	Similar numbers have brown and red sauce so the hypothesis is wrong	B1	
	More people have brown sauce than red so the hypothesis is wrong Most people have brown sauce so the hypothesis is wrong The majority of people have brown sauce so the hypothesis is wrong	B1 B0 B0	

7(a)	12 088	B1	

7(b)(i)	144 361 ÷ 3609 (= [40, 40.0003]) or 144 361 ÷ 40 = 3609(…) or 3609 × 40 = 144360	B1	Accept evaluation

7(b)(ii)	21 164 ÷ 960 (for cars)	M1	
	[22, 22.05] (times bigger)	A1	
	Houses increased by the greatest (number of times) and Groceries increased by the least (number of times)	A1ft	oe ft their [22, 22.05] SC1 for 140 752 and 20 204 and 12.58
	Additional Guidance		
	For the second A1 accept: House prices have changed the most, groceries have changed the least		

7(c)(i)	(If London houses have increased by same factor) 10 000 × 40 (= 400 000)	B1	oe
	Additional Guidance		
	400 000 ÷ 40 (= 10 000)		B0
	400 000 ÷ 10 000 (= 40)		B0

7(c)(ii)	Increase in house prices are probably different in London than in Yorkshire	B1	oe
	Additional Guidance		
	Accept that the rates are only an average and specific houses can change by more or fewer times		
	A comment about location, eg: As London is the capital It's two different parts of the country It's two different places (too vague) London could be more expensive (not enough)		 B1 B1 B0 B0
	A comment about average, eg: It's (just) an average for Yorkshire, not London It's only an average It's just an estimate		 B1 B1 B0
	A comment about the house Dilip sold, eg: The house could have just been done up The building could be very old The house could be in a poor state The house could have different features (too vague)		 B1 B1 B1 B0
	There are lots of other things that could change the price		B0

7(d)	$\frac{9600}{960}$ (× 100) or 10 (× 100)	M1	oe
	1000	A1	

8	(12 ÷ 6 =) 2 in completed key	B1	
	79 – 17 – 12 – 11 – 10 – 18 or 79 – (34 × 2)	M1	oe
	11	A1	
	Appropriate number of symbols for their 11	B1ft	ft their 11 5.5 symbols if correct
	Additional Guidance		
	Condone one error or omission in the subtraction for M1		
	Mark intention for their symbols		

9(a)	195	B1	

9(b)(i)	20 × 0.1	M1	oe
	2	A1	SC1 for 18

9(b)(ii)	(20 – their 2) × 16 or 288	M1	
	their 288 – 240	M1dep	
	48	A1ft	ft their part (b)(i) SC2 for 80
	Additional Guidance		
	SC2 for 80 (didn't realise that Poppy was going to miss 2 games)		
	ft their part (b)(i) but do not allow negative answers, eg: 3 in part (b)(i), 20 – 3 = 17, 17 × 16 = 272, 272 – 240 = 32, answer 32 18 in part (b)(i), 20 – 18 = 2, 2 × 16 = 32, 32 – 240 = –208, answer –208		M1M1A1ft M1M1A0ft

9(c)	Tickets (at my club) cost more than at other clubs (in the (same) league)	B1	oe
	Additional Guidance		
	Tickets at other clubs cost less		B1

9(d)	All the clubs (in the (same) league)	B1	oe
	Additional Guidance		
	Condone omitting her club, eg: Every other team (in the (same) league)		B1
	Every club (in the (same) league)		B1
	The clubs		B0
	Other clubs		B0

9(e)	She finds out the cost of the (season) tickets at all the clubs (in the (same) league)	B1	oe
	Additional Guidance		
	Must mention cost and clubs		

9(f)(i)	C circled	B1	Any clear indication

9(f)(ii)	(For A) too time consuming or may be ignored or poor response rate or (For B) too time consuming or no-one might be available or (For C) might not have a club website (with the ticket prices on) or (For D) too time consuming or may not be able to find the people needed	B2ft	oe ft their part 9(f)(i) B2 for any two different correct reasons B1 for any one correct reason
	Additional Guidance		
	Any reference to people not knowing		B0
	Any reference to unreliability		B0

9(f)(iii)	(For C) Problems with club websites make it (so) hard to compare or (For A, B, C and D) Problems with lots of different prices for different parts of the ground make it (so) hard to compare	B1ft	oe ft their part 9(f)(i)
	Additional Guidance		
	(For A, B, C and D) Any reference to season ticket holders getting a reduced price due to loyalty / sale prices / discounts for age etc		B1
	(For C) Any reference to not having the internet or problems with the internet		B0
	(For C) Too time consuming to find the price on the website		B0

9(f)(iv)	Strategy to overcome their problem raised	B1ft	oe ft their problem raised in part 9(f)(iii) eg lots of different prices – make a decision to compare the cheapest price
	Additional Guidance		
	Their problem raised in part (iii) cannot be solved by using an option (or something similar) not chosen in part (i)		
	Their problem raised in part (iii) must be a problem with the process of collecting the data, if it's not a problem then there's no issue to overcome: Answer in part (iii): different prices for different categories Answer in part (iv): use the adult price Answer in part (iii): can't find the price on the club website Answer in part (iv): use a search engine Answer in part (iii): too time consuming to find the price on the website Answer in part (iv): use a search engine (time is not an issue with C) Answer in part (iii): phone battery dies Answer in part (iv): have a spare battery		 B1 part (iii) B1 part (iv) B1 part (iii) B1 part (iv) B0 part (iii) B0 part (iv) B0 part (iii) B0 part (iv)
	Any reference to being able to connect to the internet		B0

10(a)	Are people who are paid more happier at work?	B1	oe eg are people who are paid less happier at work?
	Additional Guidance		
	Must be a research question, not a hypothesis Must mention both pay and happiness		

10(b)	A	B1	
	Additional Guidance		
	Accept in words		

10(c)	G	B1	
	Additional Guidance		
	Accept in words		

10(d)	Any 2 from C, E or F	B2	B1 any one from C, E or F
	Additional Guidance		
	Accept in words		
	If more than two answers are given deduct one mark per incorrect answer, eg: C, E and G A, C, F and G		 B1 B0

11(a)	False False True Cannot tell	B3	B2 any three correct B1 any two correct

11(b)	1	B1	

12(a)	2 + 1 + 5 + 2 + 10 + 8 + 25 + 13 or 66	M1	oe
	66, this is about two-thirds	A1	Any indication
	Additional Guidance		
	Condone one error or omission in the addition for M1		
	If calculated two thirds must equal 0.67 or 0.66 or better or 67% or 66% or better, use of two thirds = 0.6 cannot score the A mark		
	$\frac{66}{100}$ is about $\frac{2}{3}$		M1A1
	66% = two thirds		M1A0
	Working with 101: 66 is two thirds of 101 66 and two thirds of 101 is 67 or 67.3(…) 66 is 65.3% of 101 so they are about the same		 M1A0 M1A0 M1A0
	Working with 2000: 66% of 2000 is 1320, two thirds of 2000 is 1333 or better or 1334, so they are about the same		M1A1
	Any reference to 66 being 66 adults is A0 eg 66 adults chose to work earlier		M1A0

12(b)	Ticks ‘Cannot Tell’ and Due to rounding (there could be a few who chose 11.30 but out of 2000 people this is almost zero %) or Some of the people put ‘Don’t know’ (some of them may want to start at 11.30)	B1	oe
	Additional Guidance		
	A few needs to be less than 10		
	Reference to rounding, eg: It could be due to rounding It could be 0.49% It could be due to rounding, it could be 0.9%		 B1 B1 B0
	Some may have answered, but not enough for it to become 1 percent		B0
	Ticks ‘Cannot Tell’, it may have been a really small percentage		B0

12(c)	Not all British working adults work an 8-hour day / have fixed hours	B1	oe
	Additional Guidance		
	Any mention of shift work / working nights		B1
	Some people work flexible hours		B1
	People have different work commitments People have different commitments		B1 B0
	Some people may be part-time		B0
	Some people are self employed		B0
	Reference to sample size, asking more people etc		B0
	Reference to representation, eg other workers may work differently		B0

13(a)(i)	$\frac{332}{600}$ or $\frac{83}{150}$ or 0.55 or better or 55% or better	B2	oe B1 sight of 332 or $\frac{n}{600}$; $n < 600$
	Additional Guidance		
	Ignore any attempt to convert or simplify once the correct answer is seen		
	For B2, ignore probability words unless contradictory and on the answer line		

13(a)(ii)	$\frac{529}{600}$ or 0.88 or better or 88% or better	B2	oe B1 $\frac{71}{600}$ or 0.12 or 0.118 or better or 12% or 11.8% or better or sight of 529
	Additional Guidance		
	Ignore any attempt to convert or simplify once the correct answer is seen		
	For B2, ignore probability words unless on the answer line and contradictory		

13(b)	$\frac{11}{71}$ or 0.15 or better or 15% or better	B2	oe B1 sight of 71 or 11 as numerator in a probability
	Additional Guidance		
	Ignore any attempt to convert or simplify once the correct answer is seen		
	For B2, ignore probability words unless on the answer line and contradictory		

13(c)	$\frac{67}{200}$ or 0.335 or 33.5%	M1	oe
	$\frac{67}{200} \times \frac{66}{199}$ or $\frac{4422}{39800}$ or 0.11 or 0.1111… or 11.11(%) or 11.1105…(%) or 11.1106(%)	M1dep	oe
	0.111 or 11.111%	A1	SC1 for $\frac{4489}{40000}$ or 0.112 or 11.223%
	Additional Guidance		
	Ignore any attempt to convert or simplify once the correct answer is seen		
	For A1, ignore probability words unless on the answer line and contradictory		

13(d)	Statement 1: Ticks Yes and comments that over 300 (332) went on social media first that day	B1	oe eg 'over half'
	Statement 2: Ticks Cannot tell and comments that these results are just for one day (and might not be true for every day) or Ticks No and comments that fewer than 100 (88) went on social media first that day (if it's not true on the first day it cannot be true every day)	B1	oe
	Additional Guidance		
	For the first statement, do not award B1 if 332 or its calculation is wrong		

14(a)	28	B1	

14(b)	11	B1	oe

14(c)	6 + 7 + 4 + 5 or 22	M1	
	$\frac{22}{28}$ or $\frac{11}{14}$	A1ft	oe ft their answer to part (a) for the denominator Accept decimal or % to 2sf or better
	Additional Guidance		
	Ignore any attempt to convert or simplify once the correct answer is seen		
	For A1, ignore probability words unless on the answer line and contradictory		

14(d)	$\frac{9}{14}$	B2	oe Accept decimal or % to 2sf or better B1 9 as numerator in a probability B1 14 as denominator in a probability

15(a)	A comment relating to sample size / accuracy: eg 6 people is not enough eg The results will not be reliable enough with just 6 people	B1	oe
	A comment relating to ethics: eg The researcher cannot infect randomly chosen people with a deadly disease eg The people taking part in the experiment may die	B1	oe
	Additional Guidance		
	No placebo (people may have recovered without the drug) No control group		First B1 First B1
	It has to be voluntary (all 6 could have volunteered)		First B0
	Use people who already have the disease The disease could be infectious (and so people might spread it)		Second B1 Second B1
	The people could be unhealthy The people could be really old and die anyway		Second B0 Second B0
	Any reference to problems with the drug is second B0, eg: The drug might not be suitable They might be allergic to the drug The drug might be dangerous The drug might have long term effects		 Second B0 Second B0 Second B0 Second B0

<table>
<tr><td rowspan="8">15(b)</td><td>Patients should be anonymous</td><td>B1</td><td colspan="2">oe
eg She shouldn’t include the name of the patients</td></tr>
<tr><td colspan="4">Additional Guidance</td></tr>
<tr><td colspan="3">It’s confidential</td><td>B1</td></tr>
<tr><td colspan="3">The names (are given)</td><td>B1</td></tr>
<tr><td colspan="3">It’s too personal</td><td>B1</td></tr>
<tr><td colspan="3">It might be hurtful as their names have been published
It might be hurtful for those people to read it</td><td>B1
B0</td></tr>
<tr><td colspan="3">Consent is needed / Some people might not want to be included
(missed the point, publishing names should be avoided)</td><td>B0</td></tr>
<tr><td colspan="3">It’s rude/offensive</td><td>B0</td></tr>
</table>