



Rewarding Learning

General Certificate of Secondary Education

Statistics

Unit 2

Foundation Tier

[GST21]

Assessment

**MARK
SCHEME**

General Marking Instructions

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are illustrated in the Supplementary Marking Guidance (see page 3).

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

- (a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;
- (b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

GCSE Statistics Supplementary Marking Guidance
GST21 Unit 2 (Foundation Tier)

Introduction

This guidance supplements the Mark Scheme (see page 6) and gives additional detail on the awarding of all marks and, where appropriate, acceptable alternative solutions. When the professional judgement of the marker is required to award a mark, the rationale for the mark is given. Please note that this guidance is designed to indicate how marks are awarded rather than to supply model solutions.

Detailed Marking Instructions

Question	Marks	Instructions
1	(a)	A1 Choropleth map.
	(b)	A1 0.7%
	(c)	A1 Lisburn & Castlereagh
	(d)	A1 Summative statement, e.g. ‘it is not possible to say’. A1 Supporting reason, e.g. percentage figures are given and not actual changes in population. Special case: if a candidate says ‘no’ rather than ‘not possible’, allow first A1.
	(e)	One mark for a suggestion and another mark for a supporting reason for each one. A1 Local Government Districts should be labelled . . . A1 . . . as it is not possible to say which is which on the existing map. A1 Percentage increase/decrease should be shown . . . A1 . . . as ‘change’ could mean either one.
2	(a)	A1 9%
	(b)	A1 10 – 19
	(c)	(i) A1 Yes. (ii) A1 At least one percentage must be stated. A1 Correct supporting reason, e.g. 52% of the population are female compared to 48% male.
3	(a)	MA1 First row correct. MA1 Second row correct. MA1 Third row correct. Note: fractions do not need to be simplified. Decimal equivalents acceptable.
	(b)	A1 Concluding statement, e.g. Sean is likely to be correct. A1 Justification for statement, e.g. letters in BANANA appear in the same proportions as the letters in the table.
4	(a)	A1 Discrete. A1 Categorical.
	(b)	A1 Primary data.
	(c)	MA1 First row all correct.

- MA1 Second row all correct.
 MA1 Third row all correct.
 MA1 Fourth row all correct.
 Note: mistakes in each row are penalised once.
- (d) MA1 All four bars for girls' shoe sizes correct.
 MA1 All four bars for boys' shoe sizes correct.
 MA1 Multiple (dual) bar chart structured correctly, i.e. pairs of bars centred on the shoe size and gaps between each bar.
 MA1 Appropriate key included.
 Note: allow full follow through for errors in part (c). If there are errors in part (c) but part (d) is fully correct, allow full marks in (d).
- 5 (a) MA1 Arranging the values in ascending order (or equivalent).
 M1 Knowing and trying to find the mean of the middle two values.
 A1 £3.20
 Note: if £3.20 appears with no supporting working, allow full marks.
- (b) A1 Correct statement referring to all values appearing once, or that no value appears any more frequently than any other. A statement such as 'there is no mode' is not acceptable.
- (c) M1 Knowing that the range is the difference between £2.40 and £3.95
 A1 £1.55
 Note: if £1.55 appears with no supporting working, allow full marks.
- (d) (i) A1 No change.
 (ii) A1 Decrease.
- 6 (a) MA1 $|M \cap \bar{D}|=5$
 MA1 $|M \cap D|=19$
 MA1 $|\bar{M} \cap D|=2$
 MA1 $|\bar{M} \cap \bar{D}|=4$
- (b) (i) MA1 Identifying 19
 A1 19/30
 (ii) M1 Knowing to find $|M \cap \bar{D}| + |\bar{M} \cap D|$
 MA1 7
 A1 7/30
 Note: allow follow through from a Venn diagram containing a simple arithmetical error. If incorrect probabilities are inconsistent with an imperfect Venn diagram, award no marks in this part.
- 7 (a) A1 173
- (b) MA1 Stem correct with 0, 1, 2 and 3 included.
 MA1 All leaves correct. If any value is missing, wrongly placed or otherwise incorrect, award A0.
 MA1 Appropriate key included (any value acceptable).
- (c) (i) MA1 17 (allow follow through from the pupil's stem-and-leaf diagram).
 (ii) M1 Knowing and trying to subtract 0 from 31
 A1 31
 Note: if 31 appears with no supporting working, allow M1 A1

- (d) A1 Concluding statement, e.g. yes, the app has been effective.
A1 Justification, e.g. the median (or average) has reduced from 17 to 10 missed appointments.
- (e) A1 No option for 0 times.
A1 Overlap at 4
- (f) A1 Any suitable improvement, e.g. collect the data over a greater number of months or from a greater number of people.
- 8 (a) A1 Suitable question, e.g. How has the age and gender distribution of the population of Northern Ireland changed between June 2008 and June 2018?
Note: if expressed as a hypothesis, award A0. Accept mid-2008 for June 2008, etc here and throughout.
- (b) A1 Age.
A1 Gender.
A1 For both mid-2008 and mid-2018
- (c) A1 Any suitable secondary source, e.g. NISRA website.
Note: the source must be named. Do not accept descriptions of how primary data could be obtained or any reference to sampling.
- (d) A1 Population pyramid (accept histogram).
A1 . . . for each year.
Note: for the second A1, there must be an understanding that the diagrams will be used for comparison, so a superimposed line graph over a population pyramid, as in the pre-release materials, is acceptable.
- (e) A1 A suitable calculation, e.g. median age.
A1 Reference to comparing values for June 2008 and June 2018
A1 Suitable interpretation, e.g. longer median indicates older population.
- 9 (a) A1 1.714 million (must be in millions – do not accept 1 714 000).
- (b) A1 Concluding statement, i.e. yes.
A1 Justification, e.g. reference to the gradual increase in proportion of the population aged 85+ between mid-2001 and mid-2017
- (c) A1 Any reference to double counting.
A1 Specific reference to 23,000
A1 Mention of affected number 224 100
- (d) A1 Suitable graph, e.g. line graph or time series graph.
- (e) A1 100
- (f) A1 Mid-2017
A1 10.8%
A1 Mid-2001

- 1 (a) Choropleth map A1
- (b) 0.7% A1
- (c) Lisburn & Castlereagh A1
- (d) It is not possible to say since only percentage figures are given, not actual changes in population. A2
- (e) The Local Government Districts should be labelled since it is not possible to say which is which on the existing map. A2
The chart should indicate if the change is an increase or a decrease since 'change' could mean either one. A2

- 2 (a) 9% A1
- (b) 10–19 A1
- (c) (i) Yes A1
- (ii) 52% of the population are female compared to 48% male. A2

3 (a)

Letter	Frequency	Fraction of cards
A	9	$\frac{1}{2}$
B	3	$\frac{1}{6}$
N	6	$\frac{1}{3}$

MA3

- (b) Yes, Sean is likely to be correct as the letters in the word BANANA appear in the same proportion as those in the table. A2

- 4 (a) Discrete A1
- Categorical A1
- (b) Primary data A1

(c)

Shoe size	Boys		Girls	
	Tally	Frequency	Tally	Frequency
2		3		2
3		5		10
4		8		7
5		4		1

MA4

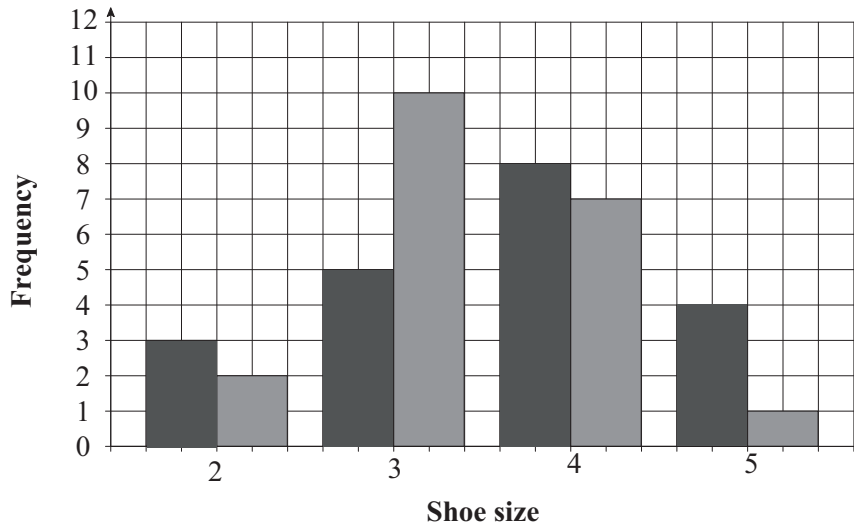
AVAILABLE
MARKS

9

5

5

(d)



MA3

KEY



Boys



Girls

MA1

11

5 (a) £2.40 £2.75 £2.85 £3.00 £3.10 £3.30 £3.50 £3.70 £3.75 £3.95 MA1

$$\text{Median} = \frac{\pounds 3.10 + \pounds 3.30}{2}$$

M1

$$= \pounds 3.20$$

A1

(b) All amounts appear the same number of times in the list so there is no mode.

A1

(c) Range = £3.95 – £2.40
= £1.55

M1

A1

(d) (i) No change

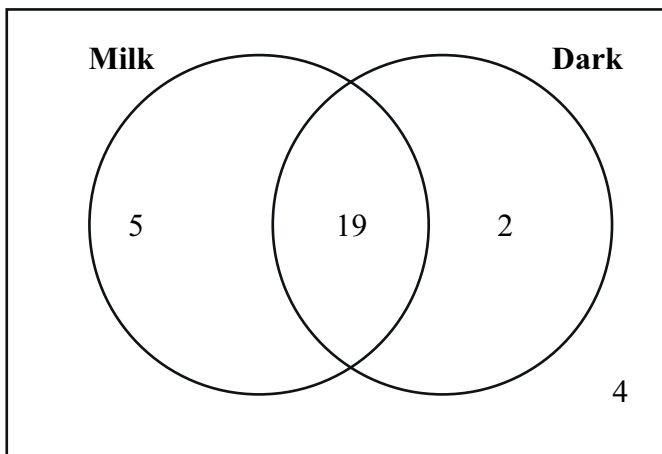
A1

(ii) Decrease

A1

8

6 (a)



MA4

(b) (i) $\frac{19}{30}$

MA1
A1

(ii) $\frac{5+2}{30}$
 $= \frac{7}{30}$

M1 MA1
A1

AVAILABLE
MARKS

9

7 (a) 173

A1

(b)

0	0	2	3	4	5		
1	0	1	3	6	7	8	9
2	0	1	2	4	5	6	
3	1						

KEY 3 | 1 means 31 appointments

MA3

(c) (i) 17

MA1

(ii) $31 - 0 = 31$

M1 A1

(d) Yes, there is some evidence that allowing patients to cancel appointments via the app has been effective since the median had reduced from 17 to 10 appointments.

A2

(e) There is no option to choose 0 times.
A person using the app 4 times could select two different boxes.

A1
A1

(f) He could collect data over a greater number of months.

A1

12

8 (a) How has the age and gender distribution of the population of Northern Ireland changed between June 2008 and June 2018?

A1

(b) Age and gender of the population in mid-2008 and mid-2018

A3

(c) NISRA website

A1

(d) Comparative population pyramid

A2

(e) She could calculate the median age of the population by gender for both years. The larger median age would indicate that the population was, on average, older at that time.

A3

10

9	(a) 1.714 million	A1	<table border="1"> <thead> <tr> <th data-bbox="1295 103 1481 181">AVAILABLE MARKS</th> </tr> </thead> <tbody> <tr> <td data-bbox="1295 181 1481 600"></td> </tr> <tr> <td data-bbox="1295 600 1481 678">11</td> </tr> <tr> <td data-bbox="1295 678 1481 757">80</td> </tr> <tr> <td data-bbox="1295 757 1481 2119"></td> </tr> </tbody> </table>	AVAILABLE MARKS		11	80	
AVAILABLE MARKS								
11								
80								
	(b) Yes because there has been a gradual increase in the proportion of the population aged 85+ between mid-2001 and mid-2017	A2						
	(c) The final figure (23 500) is included in the previous one (224 100) so Teresa's total includes the 23 500 twice.	A3						
	(d) Line graph.	A1						
	(e) 100	A1						
	(f) The population in <u>mid-2017</u> is <u>10.8%</u> more than it was in <u>mid-2001</u>	A3						
	Total	11						
		80						