



Rewarding Learning

General Certificate of Secondary Education

Statistics

Unit 1

Foundation Tier

[GST11]

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
GST11 Unit 1 (Foundation Tier)**

Introduction

This guidance supplements the Mark Scheme (see page 7) 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

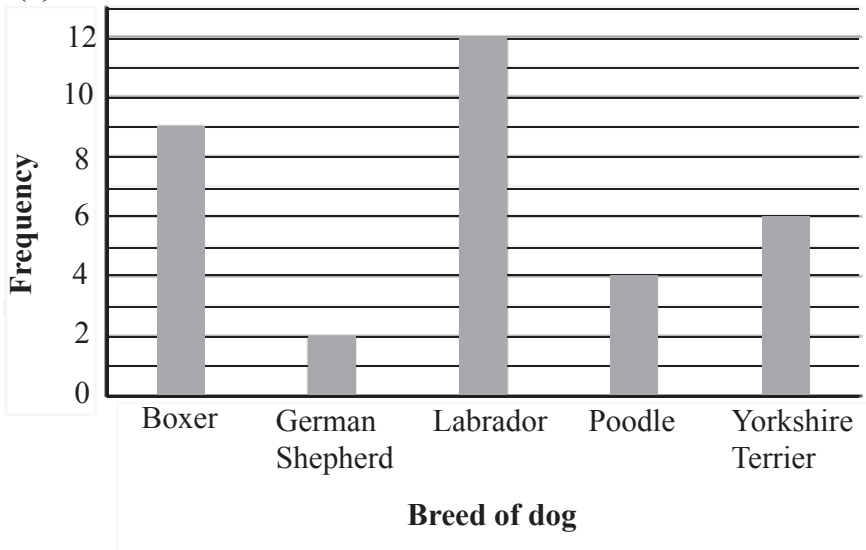
Question	Marks	Instructions
1	(a)	A1 Bar drawn (shading not required).
	(b)	M1 Attempt to add together five frequencies.
		A1 33 (correct answer only).
	(c)	MA1 2
	(d)	(i) A1 Labrador
(ii) A1 Must refer to the type of data, i.e. categorical. Reference to data being non-numerical is also acceptable.		
(e)	A1 Acknowledgement that February’s figures may not be typical.	
2	(a)	A1 Any suitable advantage.
	(b)	A1 Any suitable advantage. Note: responses to (a) and (b) must be advantages of one method over the other, so generic responses like ‘easy to do’ with no reference to the other method are not acceptable.
		A1 Correct definition.
	(c)	A1 Suitable reason.
	(d)	A1 Opportunity sampling (accept convenience sampling).
	(f)	(i) A1 Suitable advantage, likely to refer to simplicity or convenience.
		(ii) A1 Sample may be unrepresentative of the population.
3	(a)	A1 Tuesday.
	(b)	MA1 Wednesday.
	(c)	MA2 All frequencies correct. Each error incurs a one-mark penalty, to a maximum of two marks.
	(d)	MA2 All 5 angles correct. Each error incurs a one-mark penalty, to a maximum of two marks.
		MA1 Pie chart correctly drawn (follow through pupil’s angles, provided the total is 360 and the any error is arithmetical.)
MA1 Sectors labelled correctly.		

- (e) A1 Reference to frequencies over proportions.
- (f) A1 Any suitable, practical reason, e.g. the same pupil may have been absent on more than one day.
- 4 (a) A1 Missing data from cell A4
 A1 Inappropriate value in cell A9
 A1 Incorrect value in cell B11
 Note: pupils must identify the error and not just the location of it, so a response such as ‘there are errors in A4, A9 and B11’ would score A0 A0 A0
- (b) A1 Obtain a list of the names of all 120 pupils in Year 8
 A1 Assign a number to each name on the list.
 A1 Use a random number generator (or table) to generate 25 numbers and select the corresponding names.
- (c) A1 Suitable problem, e.g. pupil unavailable or unwilling to participate.
- 5 (a) (i) MA1 $\frac{1}{4}$ or $\frac{5}{20}$ or 0.25 or 25%
 (ii) MA1 Adding together the frequencies for non-strawberry sweets
 OR
 Knowing to subtract $\frac{4}{20}$ from 1
 A1 $\frac{4}{5}$
- (b) MA1 $\frac{13}{20}$ or 0.65
 MA1 Arrow at 0.65
 Note: correctly placed arrow with no supporting working gets MA2.
- (c) A1 Yes.
 A1 Reason, i.e. there are more lemon sweets than any other flavour.
- (d) MA1 $\frac{3}{20}$
 MA1 15%
 Note: if 15% is seen with no supporting work, award MA2.
- 6 (a) A1 Cluster sampling.
- (b) A1 6.2 cm
- (c) A1 Statement in context, e.g. the leaves on plant B are shorter on average than the leaves on plant A.
 A1 Supporting evidence, i.e. smaller median for leaves on plant B.
- (d) MA1 7.8 – 5.0
 A1 2.8 cm
- (e) A1 Plant A.
 A1 Reason, i.e. larger IQR (or smaller IQR for B).
- (f) A1 Suitable improvement.

- 7 (a) A1 (30, 50) plotted.
- (b) A1 (12, 82) circled.
- (c) A1 Positive correlation. (Must say ‘positive’; no need for contextual interpretation as only description is required by the question).
- (d) A1 0.939 circled (or identified in any way).
- (e) M1 Trying to add together eight marks and divide by 8
A1 64
Note: if 9 values are used (including the outlier), award M0 A0.
- (f) A1 Double mean point plotted at (58, 64) – follow through pupil’s mean for paper 2 provided it is plausible.
A1 Line of best fit drawn through the double mean point.
- (g) MA1 Follow pupil’s line. If no line of best fit is drawn, award A0.
- 8 (a) A1 The mean takes account of outliers.
A1 . . . but the median does not.
- (b) A1 Any suitable, practical consequence, e.g. financial impact.
- (c) A1 Any suitable, practical consequence, e.g. customer dissatisfaction.
- (d) A1 510 g
- (e) A1 Lower action line correctly drawn and labelled.
A1 Upper action correctly drawn and labelled.
Special case: if a candidate has correctly drawn both lines but not labelled either one, they can get A1 A0.
If a candidate labels two incorrect lines, A0 A0.
- (f) MA1 511 g. No credit for correct working followed by incorrect answer.
A1 Mean correctly plotted on the control chart. If MA0 has been awarded, follow through candidate’s answer if possible.
Special case: if a candidate plots (11, 511) on the control chart with no supporting working, allow MA1 A1. If they plot (11, x) where $x \neq 511$ with no supporting working, then award MA0 A0.
- (g) A1 Observation, i.e. the tenth sample mean is within the warning lines
A1 . . . so no action is required by Evelyn.
- 9 (a) A1 Histogram (do not accept bar chart).
- (b) A1 Must mention “positive”. Award A0 for a description such as ‘skewed to the right’.
- (c) A1 Any reference to the unavailability of specific data points because of grouping.
- (d) M1 Clear attempt to find the total heights of the bars.
A1 57
Special case: if 57 is seen and nothing else, M1 A1.
If a pupil tries to use frequency density, award M0 A0.

- (e) MA1 Correct midpoints seen (may be within working).
M1 Trying to find Σfx and divide it by Σf . This can be implied if totals are correct.
MA1 Calculation for previous mark uses all correct values.
A1 45.3 minutes.
- (f) A1 Conclusion, i.e. runners took longer to complete the previous race.
A1 Justification, e.g. since the mean time taken was greater.

1 (a)



A1

(b) $9 + 2 + 12 + 4 + 6 = 33$

M1

A1

(c) $4 - 2 = 2$

MA1

(d) (i) Labrador

A1

(ii) The mode is an appropriate average since breed of dog is a categorical variable

A1

(e) The frequencies for February may not be typical.

A1

7

2 (a) Any advantage, e.g. respondents can seek clarification on questions, high response rate, etc.

A1

(b) Any advantage, e.g. efficient as researcher does not need to be present, respondents likely to answer all questions honestly.

A1

(c) A question which has a fixed number of possible answers to choose from. A1

(d) To ensure that the questionnaire has been designed correctly so that the correct information is obtained.

A1

(e) Opportunity sampling.

A1

(f) (i) Any advantage, e.g. easy to conduct as there is no need for access to a sampling frame.

A1

(ii) Any disadvantage, e.g. there is no way of telling whether or not the sample is representative of the population.

A1

7

AVAILABLE MARKS

3 (a) Tuesday A1

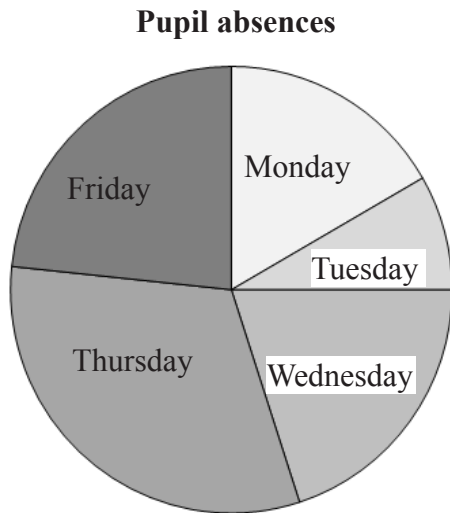
(b) Wednesday MA1

(c)

Day	Number of pupil absences
Monday	10
Tuesday	5
Wednesday	12
Thursday	19
Friday	14
Total	60

MA2

(d) Angles: 60° , 30° , 72° , 114° , 84° MA2



MA2

(e) Frequencies can be obtained from a pictogram but not a pie chart. A1

(f) The same pupil may have been absent on more than one day. A1

10

4 (a) Cell A4 has no Year Group. A1

In Cell A9, Year Group appears to be incorrect. A1

In Cell B11, the Subject is not named. A1

(b) Get a list of all 120 pupils. A1

Assign a number to each pupil on the list. A1

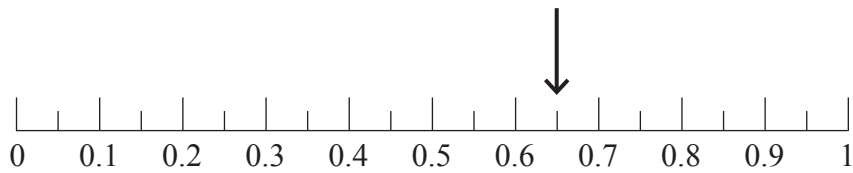
Use a random number generator to obtain the random numbers. A1

(c) Any appropriate reason, e.g. a selected pupil may be absent from school or unavailable for interview. A1

7

AVAILABLE MARKS

- 5 (a) (i) $P(\text{Lime}) = \frac{5}{20} = \frac{1}{4}$ MA1
- (ii) $P(\text{not Strawberry}) = 1 - \frac{4}{20}$ MA1
 $= \frac{16}{20} = \frac{4}{5}$ A1
- (b) $P(\text{Lemon or Lime}) = \frac{8+5}{20} = \frac{13}{20} = 0.65$ MA1



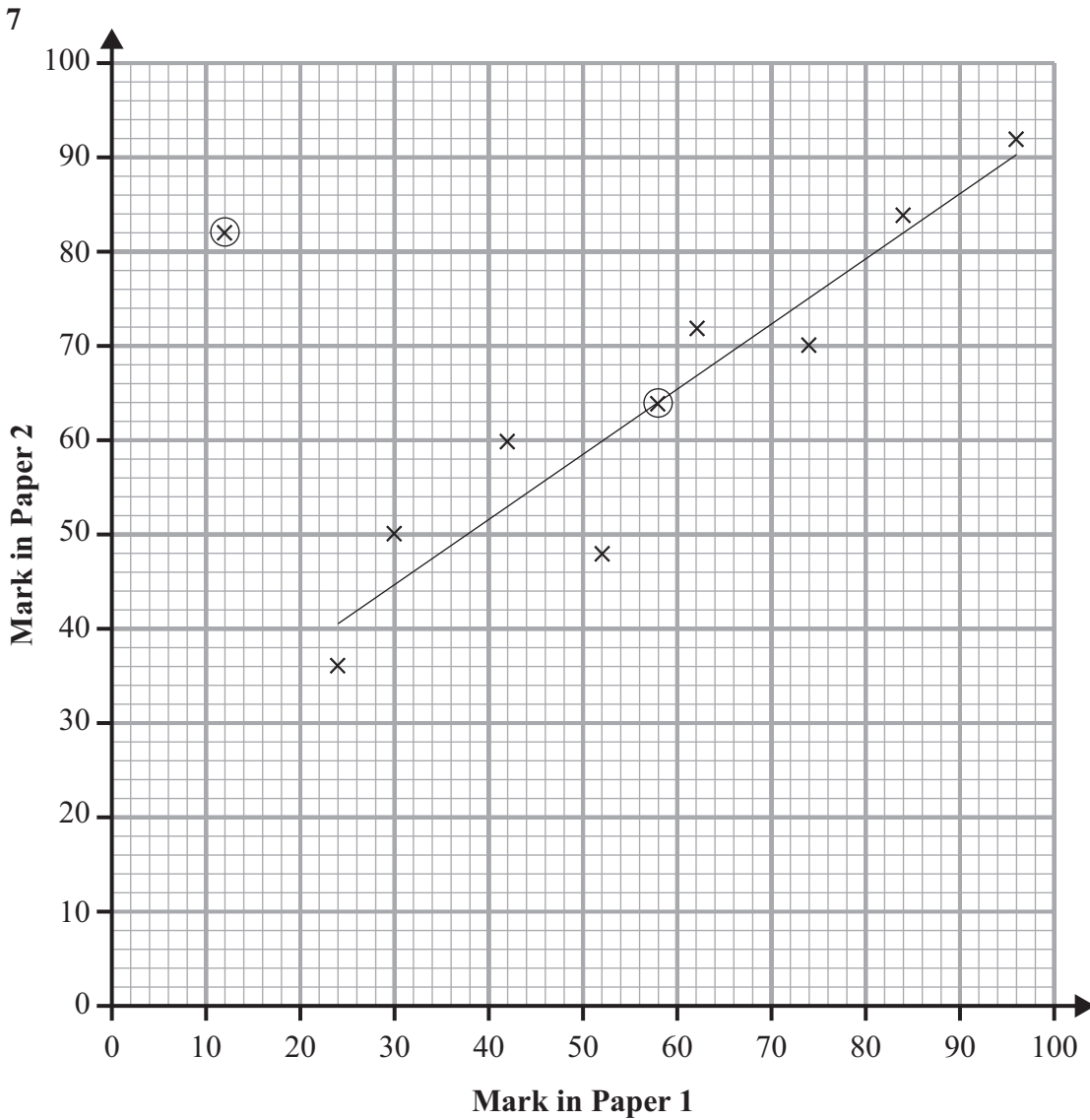
- (c) Yes, Derek is correct as there are more lemon sweets than any other flavour in a packet of Fruit Hoops. A2
- (d) $\text{Risk}(\text{Raspberry}) = \frac{3}{20}$ MA1
 $= 15\%$ MA1

- 6 (a) Cluster sampling A1
- (b) 6.2 cm A1
- (c) The leaves on plant B are shorter on average as their median is smaller. A2
- (d) $\text{IQR} = 7.8 - 5.0$ MA1
 $= 2.8 \text{ cm}$ A1
- (e) Plant A A1
The IQR was larger A1
- (f) Carol could measure the lengths of leaves from more than one branch or more than one plant. A1

AVAILABLE
MARKS

9

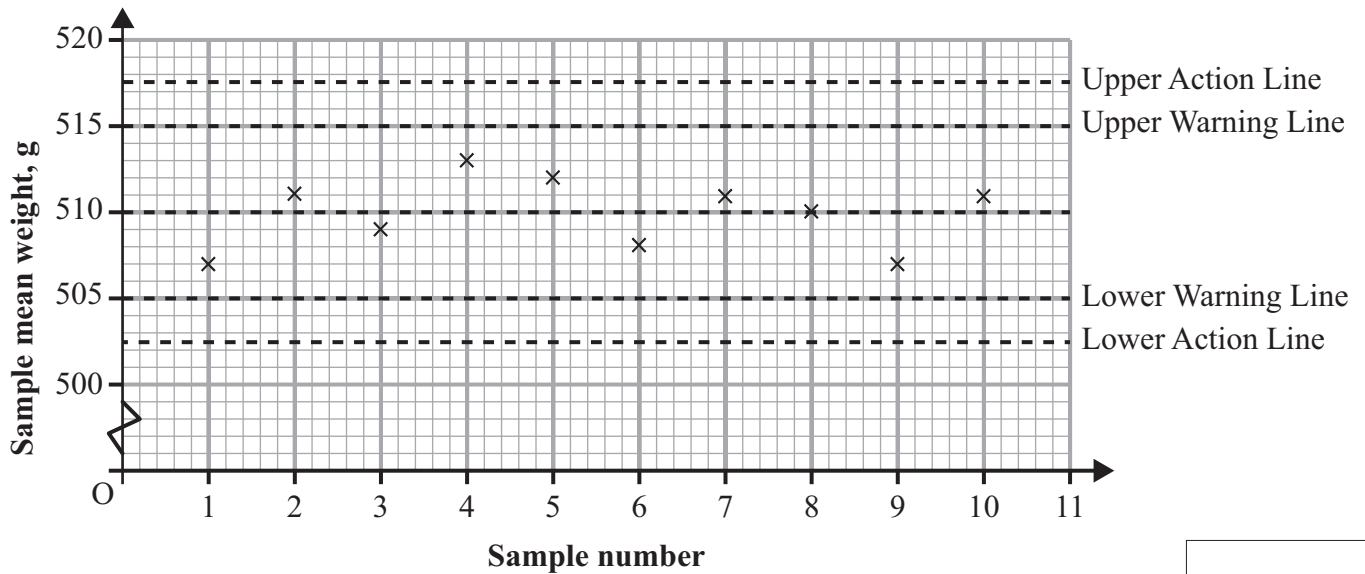
9



- (a) (30, 50) plotted on diagram. A1
- (b) (12, 82) circled. A1
- (c) Positive correlation. A1
- (d) 0.939 A1
- (e) Mean = $\frac{36 + 50 + 60 + 48 + 72 + 70 + 84 + 92}{8}$ M1
 $= 64$ A1
- (f) Mean plotted at (58, 64) and line of best fit drawn. A2
- (g) 46 MA1

- 8 (a) The mean is affected by outlying values whereas the median is not. A2
- (b) Any appropriate consequence, e.g. loss of profit due to using more flour than necessary. A1
- (c) Any appropriate consequence, e.g. complaints from customers due to the bags having less flour than expected. A1
- (d) 510 g A1
- (e) Action lines plotted at 502.5 g and 517.5 g. A2

AVAILABLE
MARKS



(f) $\bar{x}_{10} = \frac{509.7 + 511.6 + 509.3 + 512.9 + 511.5}{5} = 511 \text{ g}$ MA1

Point correctly plotted at (10, 511). A1

- (g) The tenth sample mean is within the warning lines so Evelyn needs to take no action. A2

11

9 (a) Histogram	A1	AVAILABLE MARKS
(b) Positively skewed	A1	
(c) It is not possible to identify the least and greatest times since the data appears in groups.	A1	
(d) $12 + 19 + 14 + 8 + 4$ $= 57$	M1 A1	
(e) Midpoints: 30, 40, 50, 60, 70	MA1	
Mean = $\frac{12 \times 30 + 19 \times 40 + 14 \times 50 + 8 \times 60 + 4 \times 70}{57}$	M1 MA1	
$= 45.3$ minutes	A1	
(f) Runners took longer, on average, to complete the previous race since the mean time was greater.	A2	11
	Total	80