New Specification

**cea**

*Rewarding Learning*

**General Certificate of Secondary Education**
**2018**

# Statistics

## Unit 1

## Foundation Tier

### [GST11]

**THURSDAY 21 JUNE, MORNING**

# 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 not usually illustrated in the published mark scheme.

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.
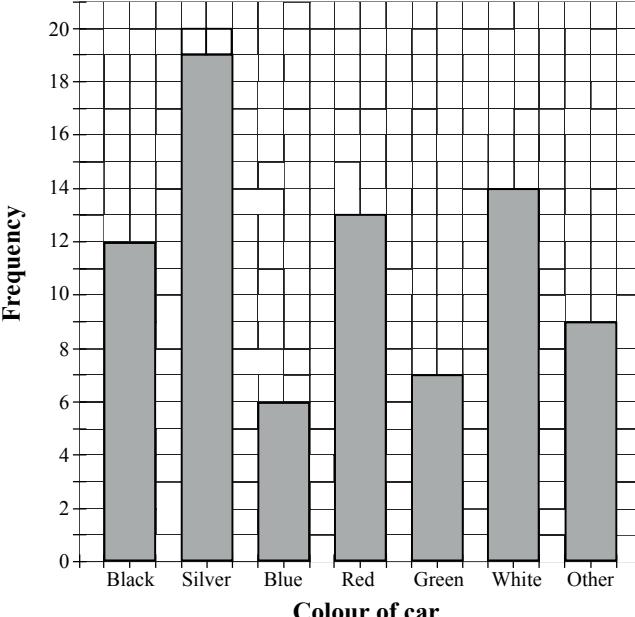
### Positive marking
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question 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)

|  |  |  |  |  |
|---|---|---|---|---|
| **1** | **(a)** | 7 | A1 | **AVAILABLE MARKS** |

**(b)** Dungannon: 🌢 🌢 🌢     MA1

**(c)** Disagree     A1
Any valid reason
- Raindrop symbol is symmetrical so can be easily adjusted to represent one day     A1    4

**2** **(a)** $80 - (12 + 19 + 6 + 13 + 14 + 9)$     M1
$= 80 - 73$
$= 7$     A1

**(b)** Tally   𝍷𝍷𝍷𝍷𝍷 𝍷𝍷     MA1

Frequency 7     A1

**(c)** Silver     A1

**(d)** Black     A1

**(e)**



MA1

**(f)** Primary data     A1    8

**3 (a)**

| | Biology | Chemistry | Physics | TOTAL |
|---|---|---|---|---|
| **Boys** | 35 | 39 | 48 | **122** |
| **Girls** | 43 | 23 | 52 | **118** |
| **TOTAL** | **78** | **62** | **100** | **240** |

MA3

**(b)** P(Bio) = $\frac{78}{240} = \frac{13}{40} = 0.325$                MA1

**(c)** P(Not Chem | Girl) = $\frac{95}{118}$ = 0.805                MA1 A1

**(d)** Expected No. of Pupils $= 24 \times \frac{100}{240}$                MA1

$= 10$                A1                8

**4 (a)** The residents of the town                A1

**(b)** 'Recently' not specific enough/open to interpretation as no time frame                A1

No box for not visiting the library at all.                A1

**(c)** Any valid advantage, e.g.
• Easy to analyse                A1                4

**5 (a)**

| 0 | 3 | 5 | | | | |
|---|---|---|---|---|---|---|
| **1** | 1 | 2 | 4 | 6 | 7 | 7 |
| **2** | 1 | 5 | 7 | 8 | | |
| **3** | 0 | 2 | 3 | | | |
| **4** | 1 | | | | | |

MA3

**Key:** 0|3 represents 3 text messages                A1

**(b) (i)** Median = $\frac{1}{2}(17 + 21)$                M1

$= 19$ text messages                A1

**(ii)** Range = 41 – 3                MA1
$= 38$ text messages

**(c)** Any valid comparison involving the medians
• Boys receive more messages than girls
• Girls receive fewer texts than boys                A1

Any valid comparison involving the ranges
• Number of texts is more variable/less consistent among girls                A1                9

|  |  |  |  | AVAILABLE MARKS |
|---|---|---|---|---|
| **6** | **(a)** | **(i)** £5.80 | A1 | |
| | | **(ii)** £7.30 – £4.00 | M1 | |
| | | = £3.30 | A1 | |
| | **(b)** | Values in correct places (ft their values) | MA1 | |
| | | Correct shape (must have values marked) | MA1 | |
| | **(c)** | Negative skew | A1 | |
| | | Median closer to UQ (or equivalent) | A1 | |
| | **(d)** | Method which uses people available at a particular place/time. | A1 | 8 |
| **7** | **(a)** | 4 years | A1 | |
| | **(b)** | Negative correlation | A1 | |
| | **(c)** | £5800 | MA1 | |
| | **(d)** | **(i)** £11 000 to £11 200 | MA1 | |
| | | **(ii)** May not be reliable as straight line model may not apply in first year. | A1 | 5 |
| **8** | **(a)** | **(i)** B | A1 | |
| | | **(ii)** C | A1 | |
| | | **(iii)** A | A1 | |
| | **(b)** | Coin is possibly biased as the number of 'heads' exceeds the expected number. | A2 | |
| | **(c)** | Repeat the experiment a larger number of times. | A1 | 6 |

**9** **(a)** Any advantage, e.g.
- no need to have a column for every possible time     A1

Any disadvantage, e.g.
- accuracy is lost by grouping     A1

**(b)**

| Time | Frequency, $f$ | $t$ | $ft$ |
|---|---|---|---|
| $0 < t \leqslant 10$ | 343 | 5 | 1715 |
| $10 < t \leqslant 20$ | 214 | 15 | 3210 |
| $20 < t \leqslant 30$ | 197 | 25 | 4925 |
| $30 < t \leqslant 40$ | 145 | 35 | 5075 |
| $40 < t \leqslant 50$ | 72 | 45 | 3240 |
| $50 < t \leqslant 60$ | 29 | 55 | 1595 |
| **TOTAL** | **1000** | | **19 760** |

MA2

$$\bar{t} = \frac{19\,760}{1000}$$     M1

$$= 19.76 \text{ seconds}$$     A1

**(c)** Claim is justified because estimated mean is less than 20 seconds     A2

**(d)** **(i)** No     A1

**(ii)** Any unsatisfied property, e.g.
- distribution not symmetrical
- histogram has a positive skew     A1     10

**10** **(a)** Mean = $\dfrac{3 + 8 + 9 + 5 + 12 + 4 + 2 + 1}{8}$     M1

$$= 5.5 \text{ times}$$     A1

**(b)** All the numbers have the same frequency so there is no mode.     A1

**(c)** Decrease     A1

**(d)** People living closer to the cinema go to it more often.     A1

**(e)** Quantitative     A1

Discrete     A1

**(f)** Negative correlation, so people living closer to the cinema go more often.     A2     9

**11 (a)** Statement B    A1

**(b)** % of people who prefer Running $= \dfrac{126}{360} \times 100$    M1 MA1

$= 35\%$    A1

**(c)**

| No. of Times | No. of People | Angle |
|---|---|---|
| Never | 17 | 51° |
| Once | 72 | 216° |
| Two or more | 31 | 93° |
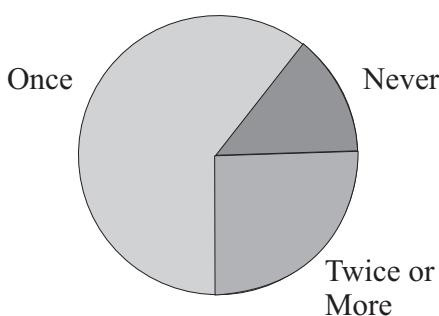


MA4

**(d)** Last row is open-ended    A1    9

**Total**    **80**