



Rewarding Learning

**General Certificate of Secondary Education
2022**

Statistics

Unit 1

Higher Tier

[GST12]

TUESDAY 14 JUNE, AFTERNOON

**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)

COVID-19 Context

Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021–2022 only.

		AVAILABLE MARKS
1	(a) There is no mode in the League 1 times	A1
	(b) (i) 27	A1
	(ii) $36 - 16$	MA1
	$= 20$	A1
	(c) Advantage: the data will be reliable	A1
	Disadvantage: very time-consuming/expensive	A1
		6
2	(a) Questions can be clarified if necessary	A1
	Better response rate	A1
	(b) C	A1
	It is the largest sample	A1
	(c) It would take a long time to do 1000 interviews	A1
	(d) This is a sensitive or personal question	A1
		6

3 (a) Quantitative.

A1

Continuous

A1

(b)

Time, t (hours)	Frequency	Cumulative frequency
$0 \leq t < 2$	4	4
$2 \leq t < 4$	5	9
$4 \leq t < 6$	18	27
$6 \leq t < 8$	8	35
$8 \leq t < 10$	5	40

MA1

A1

(c) 40

A1

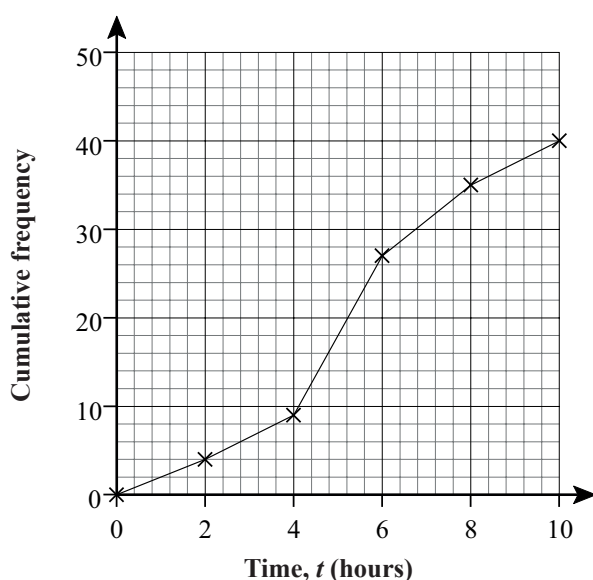
(d) (i) $4 \leq t < 6$

A1

(ii) $4 \leq t < 6$

A1

(e)



MA2

A1

(f) Easier to identify the total frequency without calculation.

A1

Median and quartiles can be found easily.

A1

(g) The distribution of times can be seen more easily OR it is easier to identify the modal class.

A1

13

4 (a) The price of one litre of diesel increased by 5.6% between 2016 and 2018

A3

(b) $\frac{122.9}{114.6} \times 100$

M1 MA1

= 107.2425...

= 107.2

A1

(c) 1.125×114.6

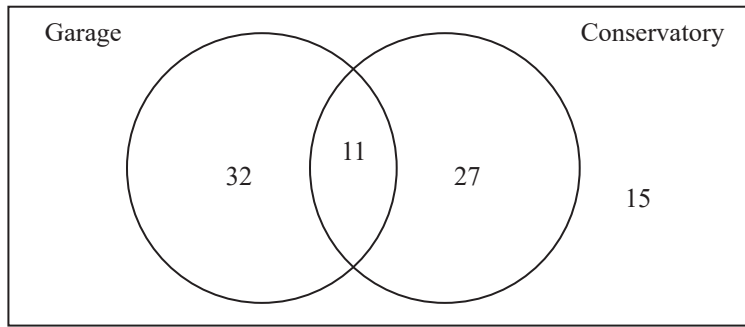
MA1

= 128.9p

A1

8

5 (a)



A2

(b) (i) $P(G \text{ and } \bar{C}) = \frac{32}{85}$

A1

(ii) $27 + 15 = 42$ properties don't have a garage

MA1

$$P(\bar{G}) = \frac{42}{85}$$

A1

(c) $27 + 11 = 38$ properties with a conservatory

MA1

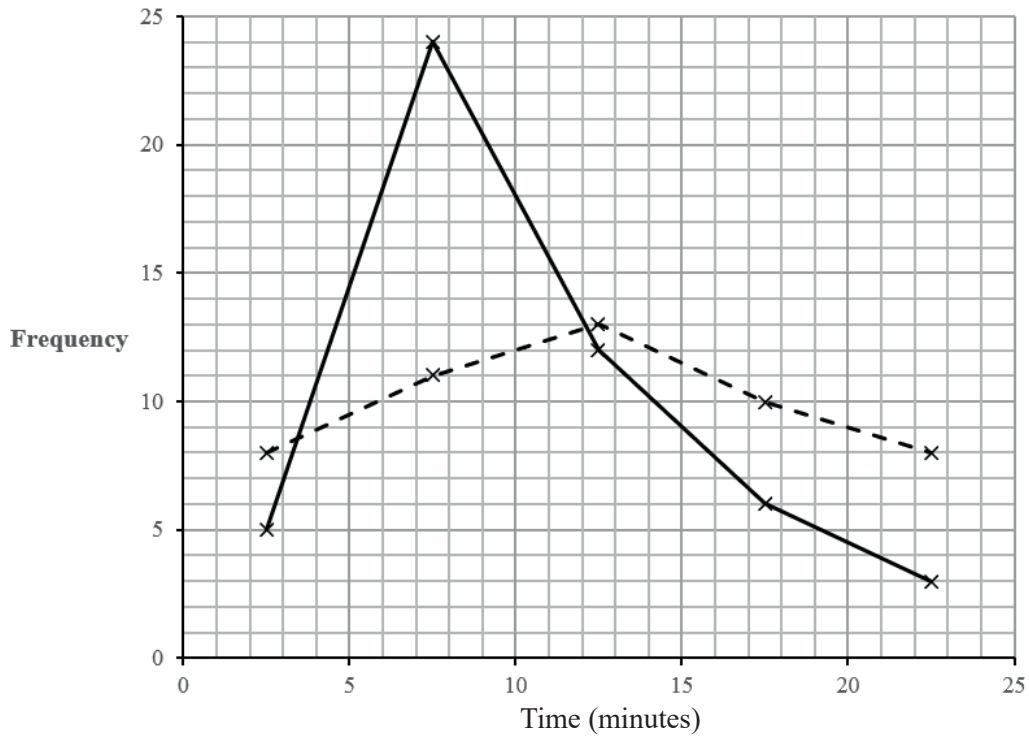
$$P(G|C) = \frac{11}{38}$$

A1

AVAILABLE
MARKS

7

6 (a)



A3

(b)

	Home insurance	Car insurance
Modal class	$5 < x \leq 10$	$10 < x \leq 15$
Median class	$5 < x \leq 10$	$10 < x \leq 15$

A3

(c) The median/modal time to arrange home insurance is lower. A1

On average, it is quicker to arrange home insurance than car insurance. A1

(d) Yes. A1

The frequency polygon for the car insurance times is flatter indicating more varied results. A1

(e) (i) Positively skewed. A1

(ii) There is a longer tail in the direction of the higher values. A1

AVAILABLE
MARKS

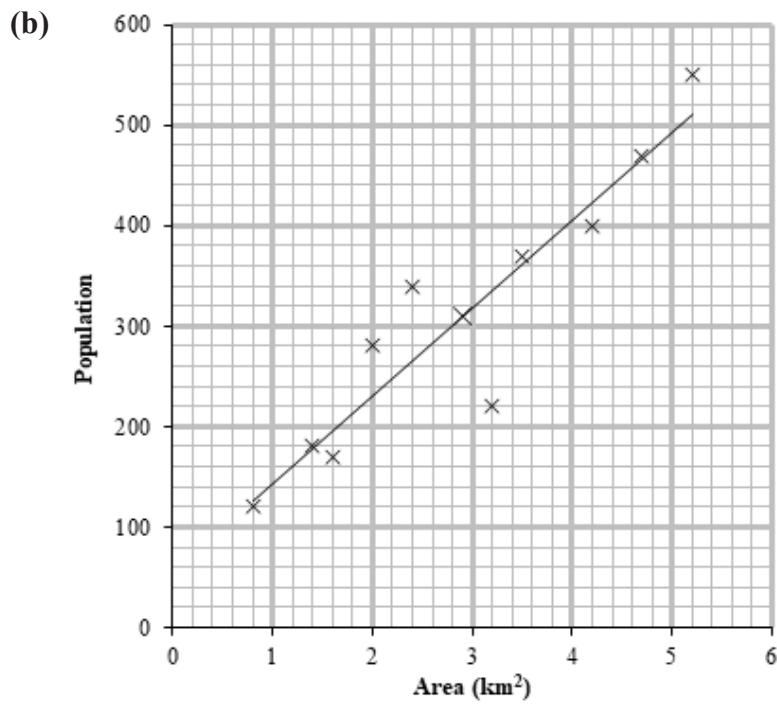
12

7 (a) (i) Population.

A1

(ii) The population of a village is influenced by its land area.

A1



A2

(c) Positive correlation.

A1

Villages with larger land areas have greater populations.

A1

(d) For every 1 km² increase in the land area of a small village...

A1

...the population increases by 87 people

A1

(e) $y = 57 + 87 \times 4.4 = 439.8$

MA1

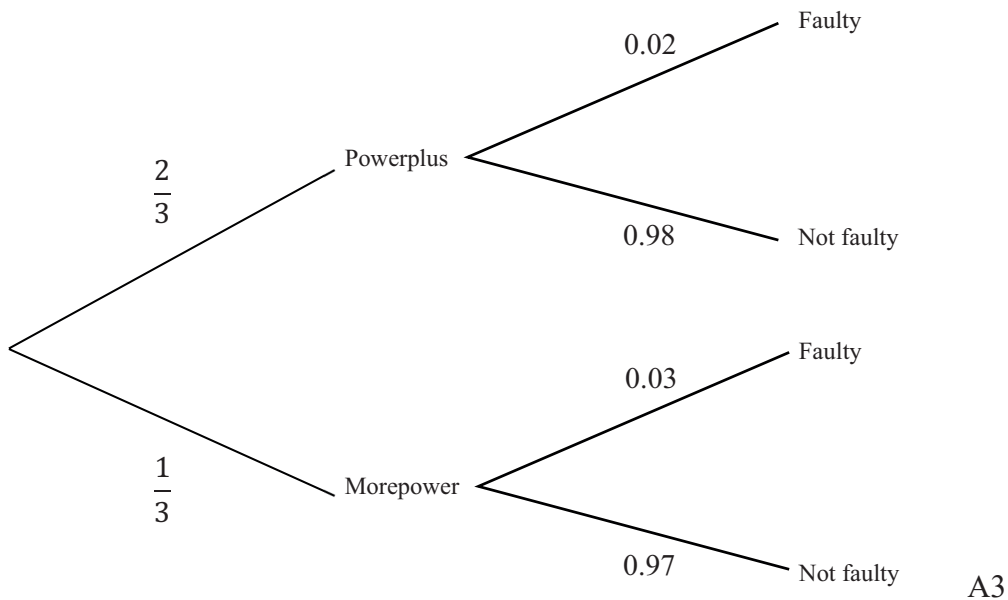
Population is 440

A1

AVAILABLE
MARKS

10

8 (a)



(b) Relative Risk = $\frac{\frac{2}{3} \times 0.02}{\frac{1}{3} \times 0.03}$ MA2

= 1.33 A1

(c) Anthony is approximately 33% more likely to select a faulty Powerplus battery than a faulty Morepower battery. A2

AVAILABLE MARKS

8

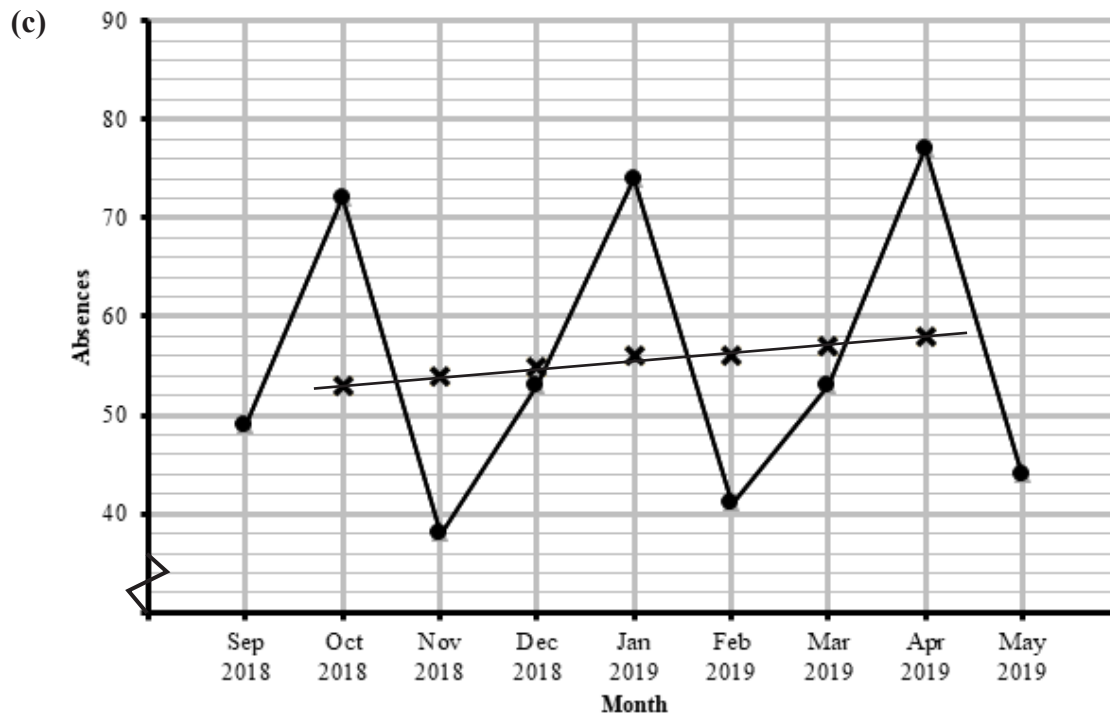
9 (a) There is a repeating pattern in the data every three months

A1

(b) $\frac{41 + 53 + 77}{3} = \frac{171}{3} = 57$
 $\frac{53 + 77 + 44}{3} = \frac{174}{3} = 58$

MA1

MA1



MA1 A2

(d) The number of absences is increasing over the nine-month period

A1

(e) $\frac{77 + 44 + x}{3} = 59.5$

MA2

$x = 57.5$

$x = 58$ (or 57)

A1

AVAILABLE
MARKS

10

10 (a)

Temperature (°C)	Frequency	fx	fx^2	F.d.
$30 < x \leq 40$	4	140	4900	0.4
$40 < x \leq 45$	7	297.5	12643.75	1.4
$45 < x \leq 50$	8	380	18050	1.6
$50 < x \leq 60$	6	330	18150	0.6
$60 < x \leq 80$	10	700	49000	0.5
Totals	35	1847.5	102743.75	

$$\bar{T} = \frac{\sum fx}{\sum f}$$

$$= \frac{1847.5}{35}$$

$$= 52.8 \text{ } ^\circ\text{C}$$

M1 MA1

A1

(b) Standard deviation = $\sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$

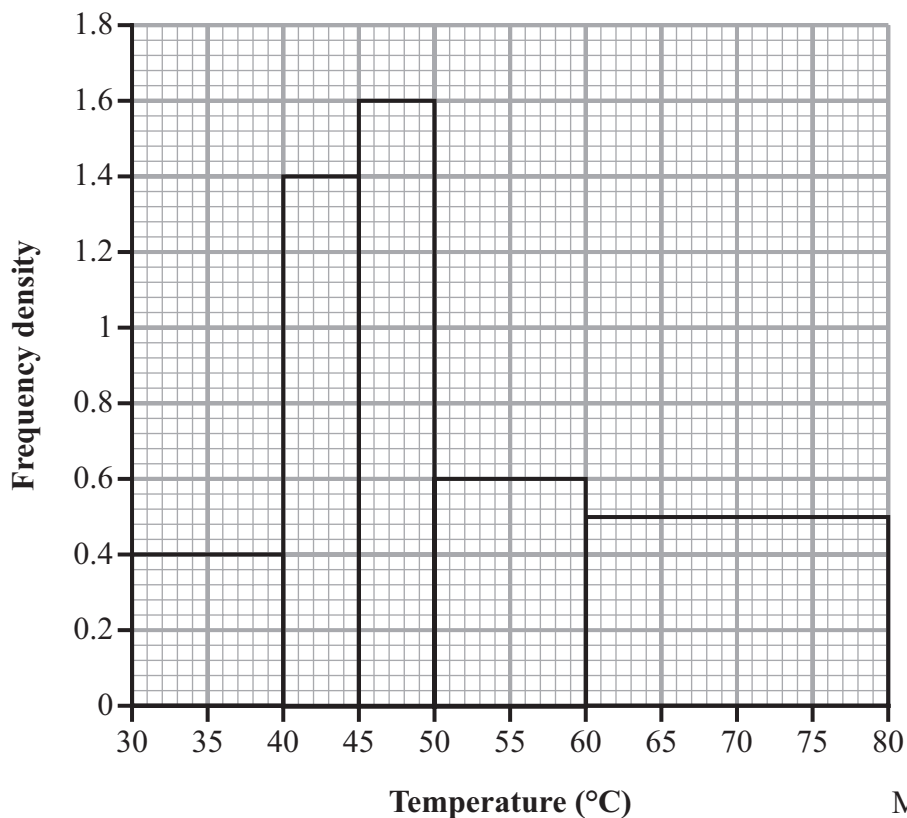
$$= \sqrt{\frac{102743.75}{35} - \left(\frac{1847.5}{35}\right)^2}$$

$$= 12.2 \text{ } ^\circ\text{C}$$

MA2

A1

(c)



MA1 A2

(d) (i) $52.8 \times 1.8 + 32 = 127.04 \text{ } ^\circ\text{F}$

MA1

(ii) $12.2 \times 1.8 = 21.96 \text{ } ^\circ\text{F}$

MA1

AVAILABLE
MARKS

11 (a) (i) $z = \frac{102 - 98}{3.2}$

$= 1.25$

MA1

A1

(ii) Kyle
Kyle's standardised score was higher

A1

A1

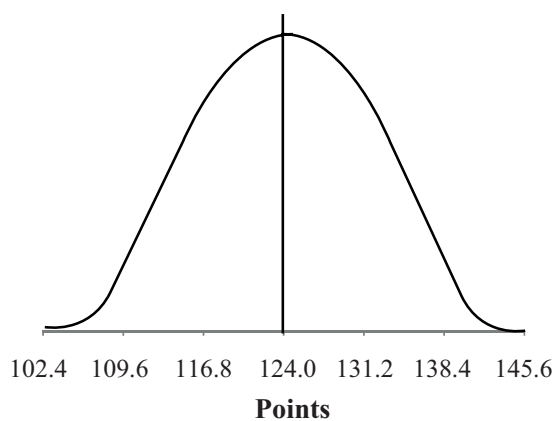
(b) $-0.31 = \frac{x - 98}{3.2}$

MA1

$x = 97$

A1

(c) (i)



MA1

(ii) Two-thirds of the competitors will have scores within 1 standard of the mean (i.e. 116.8 to 131.2)

One-sixth of the competitors will have scores below 116.8

MA1

$\frac{1}{6} \times 348 = 58$

A1

9

Total

100

AVAILABLE
MARKS