CAMBRIDGE
International Education

Cambridge O Level

STATISTICS **4040/13**

Paper 1 **October/November 2024**

MARK SCHEME

Maximum Mark: 100

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **10** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

NOTES FOR MARKERS

Awarding marks

M marks are for method and are not lost for purely numerical errors.
A marks are for accuracy and depend on a correct method.
B marks are independent of method.

Once an acceptable answer is seen, ignore subsequent working, except where such working illustrates a conceptual misunderstanding.

No response

If there is any attempt at a solution award 0 marks not NR. '-' or '?' constitute no attempt at a solution.

Abbreviations

AG answer given (on question paper)
awrt answer which rounds to
cao correct answer only
dep mark depends on earlier, asterisked (*), mark
ft follow through (from earlier error)
oe or equivalent
SC special case
soi seen or implied
nfww not from wrong working

Annotations

Where a candidate's correct final answer is both clear and clearly identified (given on the answer line, encircled, underlined etc.), it is not necessary to annotate that item; nor is it necessary to annotate when there is No Response.

Where there is a response that scores 0, either SEEN should be used, or some other annotation(s) to indicate why no marks can be awarded.

Partial credit should be indicated with an annotation at the point at which that mark has been earned.

The highlighter should be used anywhere it is helpful to clarify the marking.

	Correct item
	Incorrect item
M1	M0, M1, M2 Method marks awarded
A1	A0, A1, A2 Accuracy marks awarded
B1	B0, B1, B2 Independent marks awarded
SC	Special case
FT	Correct follow through
ISW	Ignore subsequent working
BOD	Benefit of doubt
MR	Misread
TE	Transcription error
^	Essential element of answer/working missing
XP	Incorrect process
SEEN	Working seen but no credit awarded; blank page checked
Highlight	Use anywhere it is helpful to clarify the marking

Question	Answer	Marks	Partial Marks
1(a)	15	**1**	B1
1(b)	21	**1**	B1
1(c)	[(7 × 3) + (3 × 3)]/(25 × 3) **or** (7 + 3)/25	**2**	M1
	40[%]		A1

Question	Answer	Marks	Partial Marks
2(a)(i)	sum of data items divided by 8 ((197 + 208 + 197 + …)/8)	**2**	M1
	201.5		A1
2(a)(ii)	order data items 194, 197, 197, 199, 202 …	**2**	M1
	200.5		A1
2(b)	5	**1**	B1

Question	Answer	Marks	Partial Marks
3(a)	7	**1**	B1
3(b)	26	**1**	B1
3(c)	57.5[%]	**1**	B1
3(d)	17/40	**1**	B1
3(e)	9/14	**1**	B1

Question	Answer	Marks	Partial Marks
4(a)	as one variable increases the other also increases	**1**	B1
4(b)	A negative and C positive	**4**	B1
	A weak		B1
	C strong		B1
	B no correlation		B1

Question	Answer	Marks	Partial Marks
5(a)(i)	17	**1**	B1
5(a)(ii)	15	**1**	B1
5(a)(iii)	7	**1**	B1
5(a)(iv)	5	**1**	B1
5(b)	number of small, special and green unknown	**1**	B1

Question	Answer	Marks	Partial Marks
6(a)	product of three probabilities with denominators 9, 8, 7	**3**	M1
	(4/9) × (5/8) × (4/7)		A1
	× 3 and correct completion to 10/21		A1
6(b)	[P(0) =] 5/42	**5**	B1
	product of three probabilities with numerators 4, 3, 5 × 3		M1
	[P(2) =] 5/14		A1
	[P(3) =] 1/21 *if 0 scored, allow **SC1** on last probability found from* $\Sigma P = 1$ *if only **M1** earned, allow also **SC2** for decimal values correct to 2sf: 0.12, 0.36, 0.048*		B1
	ordered *x* values 0,1,2,3 with *their* probabilities, which must include 10/21 and total 1, presented in rows and columns		B1

Question	Answer	Marks	Partial Marks
7(a)(i)	10	**1**	B1
7(a)(ii)	9	**1**	B1
7(a)(iii)	7 *if 0 scored in **(a)** allow **SC1** for three answers in correct ratio, e.g. 20, 18, 14*	**1**	B1

Question	Answer	Marks	Partial Marks
7(b)	(4/5) × 15 (= 12)	**3**	B1
	(3/10) × *their* 10 or (3/5) × 5 (=3)		M1
	15 *if 0 scored and **SC1** awarded in **(a)** allow **SC1** for same multiple as in **(a)**, e.g. 30*		A1
7(c)	numbers in **(a)** relate to complete classes/complete histogram bars with known frequencies in **(b)** to parts of two classes/histogram bars, and the parts are unknown/need to assume uniform distribution through [these two] classes.	**1**	B1

Question	Answer	Marks	Partial Marks
8(a)	find totals for births and population of females	**3**	M1
	(238 + 369 + 407 + 143 = 1157 and 6800 + 4100 + 5500 + 11 000 = 27 400) (*their* 1157/*their* 27 400) × 1000		M1
	42.2		A1
8(b)	(238/6800) × 1000 **oe** for any group	**3**	M1
	35 90 74 13 ***A1** for three correct*		A2
8(c)	any group rate multiplied by standard population figure e.g. *their* 35 × 30	**4**	M1
	sum of four such products		M1
	(*their* 35 × 0.30) + (*their* 90 × 0.20) + (*their* 74 × 0.15) + (*their* 13 × 0.35) **oe ft**		A1ft
	44.15 or 44.2		A1
8(d)	so that fair comparisons can be made between [births in] different populations/places [which have different age structures]	**1**	B1
8(e)	any population value multiplied by crude rate 26 000 × 39.5 or 28 000 × 47.0 or 24 000 × 52.5	**3**	M1
	(28 000/1000) × 47.0		A1
	[B] 1316		A1

Question	Answer	Marks	Partial Marks
9(a)	provides a concise summary of data enables patterns in distribution to be seen	**2**	B1
	original data lost measures calculated from distribution only estimates		B1
9(b)	6–under 8	**1**	B1
9(c)	attempted use of class mid-points (3 5 7 9 11 13)	**6**	M1*
	use $(\Sigma fx)/\Sigma f$, $(\Sigma fx = 382)$, $\Sigma f = 50$)		M1dep
	7.64		A1
	find values of $f \times$ variable squared		M1
	use $(\Sigma fx^2)/\Sigma f - [(\Sigma fx)/\Sigma f]^2$ with/without root (Σfx^2=3226)		M1dep
	2.48 if answers only presented with no working allow B1 only for 7.64 and 2.48		A1
9(d)	$50 \times$ \$0.25 (= \$12.50)	**4**	M1
	their $\Sigma fx \times$ \$0.18 (= \$68.76)		M1*
	addition of *their* \$12.50 and *their* \$68.76		M1dep
	\$81.26		A1
9(e)	*their* $\Sigma fx \times$ \$0.22	**2**	M1
	\$84.04 and no **ft** and **ft** conclusion		A1ft

Question	Answer	Marks	Partial Marks
10(a)(i)	121 [km/h]	**1**	B1
10(a)(ii)	Q3: find speed for cf = 54 (= 126)	**3**	M1
	use IQR = *their* Q3 – 115.5		M1
	10.5 [km/h]		A1
10(a)(iii)	find speed for cf = 0.40×72 (= $28.8 \approx 29$)	**2**	M1
	118.75–119.0 [km/h] **nfww**		A1

Question	Answer	Marks	Partial Marks
10(a)(iv)	find cf for speed = 123 km/h (= 43) and express as a percentage of 72	**2**	M1
	59.6–60.0 **nfww**		A1
10(b)(i)	find cf for speed = 125 km/h (= 51), subtract from 72 and express as a percentage of 72	**2**	M1
	29.2 [%] or 29 [%] **nfww**		A1
10(b)(ii)	find speed for cf = 0.50 × *their* 51 (= 25.5)	**2**	M1
	118 [km/h] **nfww**		A1
10(c)	find cf for speed = 130 km/h (= 64), subtract from 72 and express as a percentage of 72	**2**	M1
	11.1 [%] or 11 [%] **nfww**		A1
10(d)(i)	interquartile range	**1**	B1
10(d)(ii)	both quartiles decrease by the same amount so difference is unchanged all values of speed 5km/h smaller so amount of dispersion unchanged as a measure of dispersion it is unaffected by subtraction of the same amount from all data values	**1**	B1

Question	Answer	Marks	Partial Marks
11(a)	correctly plotted points ***B1*** *for 8 or 9 correct*	**2**	B2
11(b)	LSA [(1 + 2 + 3 + 4 + 5)/5, (4 + 8 + 6 + 9 + 11)/5] **or** (2 × 5.5 – 8, 2 × 11.6 –15.6)	**3**	M1
	plot of (3, 7.6)		A1
	plot of (5.5, 11.6) **and** (8, 15.6)		B1
11(c)	line through at least two of *their* plots in **(b)**	**4**	B1
	m use $(y_2 - y_1)/(x_2 - x_1)$ with any pair of averages or other points on *their* line		M1
	c use $y = mx + c$ with any average or point on *their* line, and *their m*		M1
	$m = 1.6$ **and** $c = 2.8$ **nfww**		A1

Question	Answer	Marks	Partial Marks
11(d)(i)	put $x = 16$ in *their* LOBF with positive m and find y (= 28.4 → 28)	**3**	M1
	(100/360) × *their* positive integer 28 (=7.77…)		M1
	8 **nfww ft**		A1ft
11(d)(ii)	[(360 – 135)/360] × *their* positive integer 28 (= 17.5) **oe**	**2**	M1
	17 or 18 **nfww ft**		A1ft
11(e)	same [linear] relationship/trend as that established applies [for the next 6 weeks]	**2**	B1
	proportions of types of fish caught [in the next 6 weeks] stays the same as that already observed		B1