Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

STATISTICS **4040/12**

Paper 1 **October/November 2018**

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 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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 descriptors 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.

MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation 'dep' is used to indicate that a particular M or B mark is dependent on an earlier, asterisked, mark in the scheme.

The symbol √ implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise, A and B marks are given for correct work only.

Abbreviations

AG answer given on question paper
awrt answer which rounds to
cao correct answer only
dep dependent
ft follow through after error
oe or equivalent
SC special case
soi seen or implied
www without wrong working

Question	Answer	Marks	Partial Marks
1(a)	stratified	**1**	B1
1(b)	random	**1**	B1
1(c)	census	**1**	B1
1(d)	quota	**1**	B1

Question	Answer	Marks	Partial Marks
2(a)(i)	(2 + 5 + 2 + 0 + 2 + 0 + 7 + 4)/8 (= 22/8)	**2**	M1
	2.75		A1
2(a)(ii)	4.25 **or** 7 – *their* 2.75 **ft**	**1**	B1√
2(b)	34	**1**	B1

Question	Answer	Marks	Partial Marks
3(a)(i)	32	**1**	B1
3(a)(ii)	19	**1**	B1
3(a)(iii)	13	**1**	B1
3(a)(iv)	3	**1**	B1
3(b)	number of superior, smoking, mountain view rooms **or** number of non standard, smoking, non city view rooms	**1**	B1

Question	Answer	Marks	Partial Marks
4(a)(i)(a)	75[%]	**1**	B1
4(a)(i)(b)	60[%]	**1**	B1
4(a)(ii)(a)	15[%]	**1**	B1
4(a)(ii)(b)	75[%]	**1**	B1
4(b)	disagree, true if comparing means but not median/ cannot say, median unaffected by extreme values and these are unknown/ cannot say, there could be extremely large values for either person making their total larger/ disagree, high value of Q3 for B indicates some v long calls	**1**	B1

Question	Answer	Marks	Partial Marks
5(a)(i)	7	**1**	B1
5(a)(ii)	13	**1**	B1
5(b)	Σ(column total × column value) (2 + 3 + 20 + 30 + 24)	**2**	M1
	79		A1
5(c)	*x* values [2], 3, 4, [5], 6, [7], 8, 9, 10, [11], 12 not repeated	**2**	B1
	corresponding *f* values [1], 1, 2, [0], 4, [0], 3, 2, 1, [0], 1		B1
5(d)	either chosen with good justification, e.g. first, second can be obtained from first if required but not vv first, climate may make indoor courts essential first, it contains more information than second second, information in condensed form more useful to coach when comparing many different cities	**1**	B1

Question	Answer	Marks	Partial Marks
6(a)	(110/360) × 1800	**2**	M1
	550		A1
6(b)	((360 – 90)/360) × 1800 **oe**	**2**	M1
	1350		A1
6(c)	any use of squares of radii	**3**	M1
	correct use of squares of radii		M1
	5.2 [cm]		A1

Question	Answer	Marks	Partial Marks
7(a)	4/7	**1**	B1
7(b)	any product of two or more probabilities with denominators n, $n – 1$ ...	**7**	M1
	any product including two probabilities with numerators 2,1 **or** 3, 2		M1
	any product of three probabilities		M1
	any one of the five cases (1/6) × (2/5) × (1/4) [RGG] **or** (3/6) × (2/5) × (1/4) [BGG] **or** (1/6) × (3/5) × (2/4) [RBB] **or** (2/6) × (3/5) × (2/4) [GBB] **or** (3/6) × (2/5) × (1/4) [BBB]		A1
	any other two of the five cases		A1
	addition of all five correct cases		M1
	4/15 **oe** (0.267)		A1

Question	Answer	Marks	Partial Marks
8(a)(i)	2620	**1**	B1
8(a)(ii)	find energy intake for cf = 15 (2400)	**4**	M1
	find energy intake for cf = 45 (2800)		M1
	use of IQR = Q3 – Q1		M1
	400		A1
8(b)(i)	read Calories for cf = 0.85×60 (= 51)	**2**	M1
	2560		A1
8(b)(ii)	express cf reading for 2340 (= 39) as percentage of 60	**2**	M1
	65		A1
8(c)	central part of graph for women is steeper than that for men [indicating Q1, Q3 closer together] **oe**	**1**	B1
8(d)	60 – *their* 21 **or** 60 – *their* 9	**2**	M1
	men 39 **and** women 51		A1

Question	Answer	Marks	Partial Marks
8(e)	use cf for 2200 Calories for men (= 5)	**2**	M1
	55		A1

Question	Answer	Marks	Partial Marks
9(a)	0 + 3 + 91 + 7 + 8 (= 109)	**4**	M1
	12 + 50 + 260 + 70 + 25 (= 417)		M1
	(*their* 109/*their* 417) × 1000		M1
	261.4		A1
9(b)	correct method for any group other than Control	**2**	M1
	0 60 350 100 320		A1
9(c)	any group rate other than control multiplied by standard population figure	**4**	M1
	sum of four such products		M1
	[(0 × 0.03)] + (60 × 0.12) + (350 × 0.55) + (100 × 0.25) + (320 × 0.05)		A1✓
	240.7		A1
9(d)	indication of considering difference between population structure and standard population structure	**3**	B1
	specific focus on full-time **or** part-time firefighters		B1
	full-time firefighters, which have highest injury rate, constitute a higher proportion in population than in standard population		B1
9(e)	compare values of 12/91, 1/7, 1/8 (0.132, 0.143, 0.125)	**2**	M1
	part-time firefighter		A1

Question	Answer	Marks	Partial Marks
10(a)	attempted use of class mid-points (16 17.5 18.5 19.5 21 23.5)	**7**	M1*
	correct method for mean (Σfx = 960.5)		M1dep
	19.2 or 19.21		A1
	finding values of $f \times$ variable squared		M1
	correct method for SD or variance (Σfx^2 = 18604.25)		M1dep
	1.74 – 1.75		A1
	19.2 **and** 1.75		A1
10(b)	indication of area being proportional to class frequency	**4**	M1
	3 or 4 correct heights drawn 2.5 4 14 7.5 (*allow A1 for two correct*)		A2
	fully correct histogram		A1
10(c)	masses of individual turtles unknown **oe**	**1**	B1
10(d)	evidence of 19 – 20 **and** 235 – 245 classes being used	**3**	M1
	240/19.5		A1
	12		A1

Question	Answer	Marks	Partial Marks
11(a)	correctly plotted points *(allow B1 for 8 or 9 correct)*	**2**	B2
11(b)	strong	**2**	B1
	negative		B1
11(c)	method for USA	**3**	M1
	plot of (9.6, 13)		A1
	plot of (4.4, 21) and (7, 17)		B1
11(d)	straight line through at least two of *their* plots in (c)	**4**	B1
	correct method for gradient		M1
	correct method for *c*		M1
	m = –1.54 to – 1.53 **and** *c* = 27 to 28 inclusive		A1

Question	Answer	Marks	Partial Marks
11(e)	use $x = 5$ in *their* equation or to read from *their* line	**2**	M1
	20 **ft**		A1√
11(f)	use *their* answer from **(e)** **and** use 7 **and** 13 in *their* equation or to read from *their* line	**3**	M1
	(*their* 20/26) × (17/26) × (*their* 8/26)		M1
	0.155 **oe**		A1