Cambridge O Level

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Cambridge Ordinary Level

STATISTICS **4040/13**

Paper 1 **October/November 2017**

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.

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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)(i)	quota	**1**	B1
1(a)(ii)	[simple] random/stratified random	**1**	B1
1(a)(iii)	systematic	**1**	B1
1(b)	bias, representative	**1**	B1

Question	Answer	Marks	Partial Marks
2(i)(a)	ordering of data	**2**	M1
	27		A1
2(i)(b)	28	**1**	B1
2(i)(c)	correct method	**2**	M1
	26.3		A1
2(ii)	mode: possibly no repeated value, e.g. original recordings for 3×28 may have been 28.1, 27.8, 28.3 **oe**	**1**	B1

Question	Answer	Marks	Partial Marks
3(i)	10	**1**	B1
3(ii)	5	**1**	B1
3(iii)	appropriate method	**2**	M1
	26		A1
3(iv)	9	**1**	B1
3(v)	6	**1**	B1

Question	Answer	Marks	Partial Marks
4(i)(a)	morning	**1**	B1
4(i)(b)	afternoon	**1**	B1
4(ii)	(6.33 + 5.33 + 2.50) × 6	**2**	M1
	85		A1
4(iii)	(4 × 60)/5.33 **oe**	**2**	M1
	45 (minutes)		A1

Question	Answer	Marks	Partial Marks
5(i)(a)	10	**1**	B1
5(i)(b)	9	**1**	B1
5(i)(c)	6	**1**	B1
5(ii)	(5 × 1) + (4 × 2) + (10 × 3) + (3 × 4)	**2**	M1
	55		A1
5(iii)	in 4 matches, it is only known that 5 or more goals scored, so goals scored in these matches unknown	**1**	B1

Question	Answer	Marks	Partial Marks
6(i)(a)	$(0.92)^2$	**2**	M1
	0.8464 **oe** (529/625)		A1
6(i)(b)	0.92 × 0.08	**2**	M1
	0.0736 **oe** (46/625)		A1
6(i)(c)	0.03 × 0.05 × 2	**2**	M1
	0.003 **oe** (3/1000)		A1
6(ii)	134/0.08	**2**	M1
	1675		A1

Question	Answer	Marks	Partial Marks
7(i)	any one of very good, good or modest group rate multiplied by standard population figure	**4**	M1
	sum of four such products		M1
	$(100 \times 0.20) + (87.5 \times 0.40) + (80 \times 0.30) + (50 \times 0.10)$ **oe**		A1
	84(%)		A1
7(ii)	total enrolments 6 + 8 + 5 + 4 (= 23) method for passes in any one of very good, good or modest group	**5**	M1
	0.875×8 or 0.8×5 or 0.5×4		M1
	$(1 \times 6) + (0.875 \times 8) + (0.8 \times 5) + (0.5 \times 4)$ (= 19)		M1
	((*their* 19)/(*their* 23)) $\times$ 100		M1
	82.6(%)		A1
7(iii)	Japanese	**2**	B1
	SPR largest		B1
7(iv)	Chemistry	**2**	B1
	CPR largest and largest number of enrolments		B1
7(v)	total languages passes found using CPR	**3**	
	$(0.800 \times 25) + (0.667 \times 12) + (0.765 \times 17)$ (= 41)		M1*
	((*their* 41)/(25 + 12 + 17)) $\times$ 100		M1dep
	75.9(%)		A1

Question	Answer	Marks	Partial Marks
8(i)	attempted use of class mid-points	**3**	
	(85, 92.5, 97.5, 110, 132.5)		M1*
	correct method for mean (Σfx = 2610)		M1dep
	104.4 (m)		A1

Question	Answer	Marks	Partial Marks
8(ii)	indication of area being proportional to class frequency	**4**	M1
	3 or 4 correct heights drawn *(allow A1 for two correct)*		A2
	fully correct histogram		A1
8(iii)	(*their* Σfx from **(i)**) + (165) – (1 × 85) **oe** (= 2690)	**2**	M1
	107.6 (m)		A1
8(iv)	(7/20) × (6/19) × (5/18)	**2**	M1
	7/228 **oe** (0.0307)		A1
8(v)	(4/20) × (3/19) × (9/18)	**3**	M1
	× 3		M1
	9/190 **oe** (0.0474)		A1
8(vi)	(4/20) × (9/19) × (7/18) × 6	**2**	M1
	21/95 **oe** (0.221)		A1

Question	Answer	Marks	Partial Marks
9(i)(a)	1.16	**1**	B1
9(i)(b)	Q1 find salt content for cf = 16 (1.07)	**4**	M1
	Q3 find salt content for cf = 48 (1.24)		M1
	use of IQR = Q3 – Q1		M1
	0.17		A1
9(i)(c)	attempt to read cf for salt content 1.35 (= 60) and express as percentage of 64	**2**	M1
	awrt 94		A1
9(ii)(a)	8	**1**	B1
9(ii)(b)	attempt to read salt content for cf = *their* 8 + 0.5 × (64 – *their* 8) (= 36)	**2**	M1
	1.18		A1

Question	Answer	Marks	Partial Marks
9(iii)	product of four decreasing fractions, denominators 64, 63, 62, 61	**3**	M1*
	first numerator 64 – *their* 8		M1dep
	0.578 or 0.58 (8745/15128)		A1
9(iv)	1 – *their* 0.578	**2**	M1
	0.422 or 0.42 **ft** (6383/15128)		A1✓
9(v)	IQR dispersion unchanged by same change in all population elements/Q1, Q3 both decrease by same amount so difference unchanged.	**1**	B1

Question	Answer	Marks	Partial Marks
10(i)	correctly plotted points *(allow B1 for 6 or 7 correctly plotted)*	**2**	B2
10(ii)	method for calculating LSA	**3**	M1
	plot of (21.25, 15)		A1
	plot of (40.625, 29.375) and (60, 43.75)		B1
10(iii)	straight line through at least two of *their* plotted points in **(ii)**	**4**	B1
	correct method for gradient of *their* line		M1
	correct method for intercept of *their* line		M1
	m = 0.74 to 0.75 and c = 0 to – 1 inclusive		A1
10(iv)(a)	find y from equation or graph using x = 55	**2**	M1
	$40		A1✓
10(iv)(b)	find x from equation or graph using y = 50	**2**	M1
	$70		A1✓
10(v)	as $c \approx 0$, LOBF is $y \approx 0.74x$ or $y \approx 74\%$ of x or use equation or line to find y for chosen value of x and calculate $((x - y)/x) \times 100$	**2**	M1
	25(%) – 30(%)		A1

Question	Answer	Marks	Partial Marks
10(vi)	choice consistent with reason offered e.g. C because customer paid asking price/ graph shows plot to deviate most from LOBF on upper side	**1**	B1

Question	Answer	Marks	Partial Marks
11(i)	33	**1**	B1
11(ii)	8	**1**	B1
11(iii)	17 + 15 + 16 + 8 (= 56)	**3**	M1
	((*their* 56)/(*their* 56 + 8 + 6)) × 100		M1
	80(%)		A1
11(iv)	use of r^2 to find radius	**5**	M1
	$r = \sqrt{[(30/40) \times 3.5^2]}$		M1
	chart drawn with r = 2.9 cm to 3.1 cm		A1
	correct method of angle calculation		M1
	correct angles: in favour 192°, against 96°, undecided 72°, all ±2°, and chart complete with labelling		A1
11(v)	in favour: smaller proportion of males/greater proportion of females	**3**	B1
	against: greater proportion of males/smaller proportion of females		B1
	undecided: proportion of males and females same/approx same		B1
11(vi)(a)	clear visual representation of (relative) total/number(s) in categories	**1**	B1
11(vi)(b)	clear visual representation of relative proportions in categories	**1**	B1
11(vii)	closed apparently customers were restricted to only three possible responses	**1**	B1