Cambridge
O Level

Cambridge International Examinations
General Certificate of Education Ordinary Level

STATISTICS **4040/01**

Paper 1 **For Examination from 2018**

SPECIMEN MARK SCHEME

2 hours 15 minutes

MAXIMUM MARK: 100

This document consists of **6** printed pages.

CAMBRIDGE
International Examinations

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 notation '**ft**' 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
1(a)	mode	**B1**
1(b)	range	**B1**
1(c)	median	**B1**
1(d)	standard deviation	**B1**

Question	Answer	Marks
2(a)(i)	quota	**B1**
2(a)(ii)	systematic	**B1**
2(b)	employment status	**B1**
	because working women may need to be at work in the afternoon *[any other reasonable data item/reason B1/B1, e.g. whether or not a woman has any children/because a woman with children may prefer to attend in the afternoon when the children are at school]*	**B1**

Question	Answer	Marks
3(a)	25	**B1**
3(b)	actors who have worked in LA and R but not M	**B1**
3(c)	correct method for number of actors (13 + 5 + 3 + 4 + 9 + 6)	**M1**
	40/48 **oe**	**A1**
3(d)	4/9	**B1**

Question	Answer	Marks
4(a)	6	**B1**
4(b)	(6 + 0 + 8 + 2 + 1 + 6 + 0 + 9 + 6 + 4 + 1)/11 (= 43/11)	**M1**
	3.9	**A1**
4(c)	ordering of data	**M1**
	4	**A1**
4(d)	3 **ft**	**B1**

Question	Answer	Marks
5(a)	as the value of one of the variables increases, the value of the other also increases	**B1**
5(b)	positive and strong	**B1**
	negative and weak	**B1**
5(c)	any diagram with positive correlation	**B1**
	diagram with less than perfect positive correlation	**B1**
5(d)	appropriate use of positive/negative and strong/weak for their diagram in **(c)** **ft**	**B1**

[Turn over

Question	Answer	Marks
6(a)	(70 – 55)/100 × 80	**M1**
	$12 million	**A1**
6(b)	(35/100) × 360	**M1**
	126°	**A1**
6(c)	any use of squares of radii	**M1**
	correct use of squares of radii	**M1**
	3.5 cm	**A1**

Question	Answer	Marks
7(a)	at least two of 15, 22 and 17	**B1**
	54	**B1**
7(b)	any appreciation of area being proportional to frequency *(can be earned here or in **(c)**)*	**M1**
	6	**A1**
7(c)	rectangle in correct position with height 5	**A1**
7(d)	modal class	**B1**
7(e)	product of two probabilities with denominators 70 and 69	**B1**
	3540/4830 **oe**	**B1**

Question	Answer	Marks
8(a)	attempted use of class mid-points (3.0 3.3 3.5 3.7 3.9 4.1 4.4) *	**M1**
	correct method for mean **dep**	**M1**
	accurate expression for mean (Σfx = 139.1 Σf = 38)	**A1**
	3.66	**A1**
	finding values of f × variable squared	**M1**
	correct method for SD or variance **dep**	**M1**
	correct expression for SD or variance (Σfx^2 = 513.65 mean = 3.66 or better or 3.6 or 3.7)	**A1**
	0.343	**A1**
8(b)(i)	Q	**B1**
8(b)(ii)	T	**B1**
8(c)	38 × 3.70 (= 140.6)	**M1**
	180 – *their* 140.6 (= 39.4)	**M1**
	their 39.4/180	**M1**
	0.219 or 0.22	**A1**

Question	Answer	Marks
9(a)	any one age group rate multiplied by standard population figure	**M1**
	sum of four such products	**M1**
	$(50 \times 0.18) + (184 \times 0.22) + (136 \times 0.25) + (15 \times 0.35)$	**A1**
	88.7	**A1**
9(b)	correct method for any age group	**M1**
	145 828 714 87	**A1**
9(c)	*their* values from **(b)** added (= 1774)	**M1**
	2900 + 4500 + 5250 + 5800 (= 18450)	**M1**
	(*their* 1774/*their* 18450) × 1000	**M1**
	96.2	**A1**
9(d)	7.8 used anywhere and 8.5 not used	**M1**
	their 18450 × 2	**M1**
	× 7.8/1000 or × 8.5/1000	**M1**
	their births – *their* deaths (= 1774 – 288)	**M1**
	1486	**A1**

Question	Answer	Marks
10(a)	8 33 85 166 245 313 350 365 *(allow B1 follow through for one error)*	**B2**
10(b)	correct horizontal plots *	**M1**
	correct vertical plots *	**M1**
	suitable curve **dep** *(earned provided at least one M scored)*	**A1**
10(c)(i)	21 °C	**B1**
10(c)(ii)	Q1 = 15.1 °C – 15.5 °C	**B1**
	Q3 = 26.5 °C – 27.0 °C	**B1**
	use of IQR = Q3 reading – Q1 reading	**M1**
	11 °C – 11.9 °C	**A1**
10(d)(i)	2 °C	**B1**
	their **(c)(i)** + 2 °C **ft**	**B1**
10(d)(ii)	*their* **(c)(ii)** **ft**	**B1**
10(e)	attempt to read cf value for T = 34 °C (≈ 345) and subtract from 365	**M1**
	20 **ft**	**A1**

Question	Answer	Marks
11(a)	correctly plotted points *(allow B1 for 6 or 7 correct)*	**B2**
11(b)	indication of need to order *x* values	**M1**
	(927 + 1085 + 1219 + 1361)/4	**A1**
11(c)	correct method for LSA	**M1**
	(559.75, 25.75)	**A1**
11(d)	correct method for gradient using any pair of averages	**M1**
	m = 0.0280 or 0.028	**A1**
	c = 10.0 to 10.1	**B1**
11(e)	it indicates the number of teachers required for a school with zero pupils	**B1**
11(f)	reasonable line through seven points with a clear outlier above their line	**B1**
11(g)	correct method for gradient using points chosen from line	**M1**
	m = 0.035 to 0.038	**A1**
	their intercept correct to nearest integer **ft**	**B1**
11(h)	any indication of recognition that *m* is related to pupil-teacher or teacher-pupil ratio	**M1**
	Belport because there are more teachers per pupil **oe** so pupils receive more individual attention **ft** (or possibly Astra because there are fewer teachers per pupil **oe** so more opportunities for individual learning **ft**) *choice consistent with reason*	**A1**