Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

STATISTICS **4040/22**

Paper 2 **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.

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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.

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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

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Question	Answer	Marks	Partial Marks
1(a)	10 and 14	**1**	B1
1(b)	discrete, quantitative	**3**	B1 B1
	[discrete], qualitative		B1

Question	Answer	Marks	Partial Marks
2(a)	Use of P(X) + P(Y) = P($X \cup Y$), q + $3/5$ = $7/10$	**2**	M1
	1/10 **oe**		A1
2(b)	Understanding of independent events, use of P(X) × P(Y) = P($X \cap Y$), P($X \cap Y$) = q × $3/5$	**3**	M1*
	Use of P($X \cup Y$) = P(X) + P(Y) – P($X \cap Y$) $7/10 = q + 3/5 - ‘q \times 3/5’$		M1dep
	¼ **oe**		A1

Question	Answer	Marks	Partial Marks
3	$3/10 \times 2/9 \times 1/8 + 3 \times 3/10 \times 2/9 \times 7/8$ Consideration of 3 men/0 women and 2 men/1 woman **soi**	**5**	B1
	10 × 9 × 8 seen in denominator		M1
	3 × product of 3 probabilities **oe**		M1
	Correct unsimplified expression		A1
	11/60 oe		A1

Question	Answer	Marks	Partial Marks
4(a)	2 (from 00 – 29) and 4 (from 30 – 89) **soi**	**4**	B1
	78 06 47 13 64 51 *(**B2** for 5 correct, **B1** for 4 correct)*		B3

Question	Answer	Marks	Partial Marks
4(b)	[To be representative] 15/90 × 6 from A, 30/90 × 6 from B, and 45/90 × 6 from C	**3**	M1
	Sample has 2 from A, 2 from B and 2 from C/equal numbers from each department		M1
	So the sample is not representative **or** so sample over represents A, [accurately represents B] and under represents C		A1
4(c)	Either of the two suggestions if link made to care received or satisfaction. E.g. Patients in the same department likely to receive similar care, so a sample stratified by department would be representative in terms of care received.	**1**	B1

Question	Answer	Marks	Partial Marks
5(a)	[±] (46 – 58)/9 [=1.33] **or** [±] (a – 40)/12	**2**	M1
	24		A1
5(b)	Two standardised quantities in the same unknown (b – 37.5)/10 = (b – 40)/12	**2**	M1
	25		A1
5(c)	(38 – c)/8 = (31 – 40)/12 **oe**	**2**	M1
	44		A1
5(d)	Dancing because this is the subject in which he has the highest standardised score	**1**	B1
5(e)	50 and 12	**1**	B1

Question	Answer	Marks	Partial Marks
6(a)	3/5 **oe**	**1**	B1

Question	Answer	Marks	Partial Marks
6(b)	0.6 × 0.8 + 0.4 × 0.75 '0.6' × 0.8 or (1 – '0.6') × 0.75	**3**	M1
	'0.6' × 0.8 + (1 – '0.6') × 0.75		M1
	0.78 **oe**		A1
	OR		
	30 × 0.8 + 20 × 0.75 [= 39]		(M1
	'39'/50		M1
	0.78 **oe**		A1)
6(c)	'0.78' × 50	**2**	M1
	39		A1√
6(d)	35 × 0.8 + *y* × 0.75 = 40	**2**	M1
	16		A1

Question	Answer	Marks	Partial Marks
7(a)	*n* = 3	**4**	B1
	n = 4		B1
	two correct decisions about centring (not necessary for *n* = 3, and necessary for *n* = 4)		B1√*
	two correct reasons (*n* is odd, and *n* is even)		B1√dep
7(b)	36 100	**2**	B1
	12 030 **awrt**		B1√
7(c)	[±] 7800 – 9033 **or** 8300 – 9933 **or** 9800 – '12 030'	**3**	M1
	[±] (sum of 3 profit – moving averages)/3		M1
	– 1700 **awrt**		A1
7(d)	Correct plots vertically	**3**	B1√
	Correct plots horizontally		B1
	Straight trend line		B1
7(e)	Profits increasing	**1**	B1

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Question	Answer	Marks	Partial Marks
7(f)	Reading from *their* graph at Jan–Apr 2019 + 'c'	**2**	M1
	13 200 – 1700 = 11 500 (answer in range 11 000 to 12 000)		A1
7(g)	Points appear to lie on curve [rather than straight line]	**1**	B1

Question	Answer	Marks	Partial Marks
8(a)	Original data is not lost/clearly shows the shape of the distribution **oe**	**1**	B1
8(b)	<table><tr><td>0.3</td><td>1.7</td><td>3.3</td><td>5[.0]</td><td>7.1</td></tr><tr><td>2.8</td><td>4.3</td><td>5.2</td><td>6.1</td><td>7.3</td></tr></table> (***B4*** *for 8 or 9 correct,* ***B3*** *for 6 or 7 correct,* ***B2*** *for 4 or 5 correct,* ***B1*** *for 2 or 3 correct*)	**5**	B5 all correct
8(c)	Suitable linear scale with at least one box plot	**4**	B1
	Labelling of axis (hrs [of sunshine]) and box plots (E and W)		B1
	Two fully correct box and whisker diagrams (***B1*** *for 1 plotting error or omission*)		B2
8(d)	More [sunshine] in Westsea **oe**	**2**	B1
	More varied [amounts of sunshine] in Eastpool **oe**		B1
8(e)(i)	Range	**1**	B1
8(e)(ii)	Interquartile range	**1**	B1

Question	Answer	Marks	Partial Marks
9(a)	121/107 [× 100]	**2**	M1
	113 **awrt**		A1
9(b)	a = 104	**4**	B1
	b = 1.33/1.23 [× 100] **oe**		M1
	108 [.1…]		A1
	c = 97		B1

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Question	Answer	Marks	Partial Marks
9(c)	20 : 25 : 35 : 20 **oe**, **soi**	**4**	B1
	'20' × 121 + '25' × 109 + '35' × 111 + '20' × 105		M1
	÷ ('20' + '25' + '35' + '20') (or M2 for 0.2 × 121 + 0.25 × 109 + 0.35 × 111 + 0.2 × 105)		M1
	111.3 **cao**		A1
9(d)	[The gardener's] costs/prices have 'increased' by '11.3%' between 2015 and 2017 (***B1ft*** *for 2 correct from:* *[The gardener's] costs/prices have 'increased'* *by '11.3%'* *between 2015 and 2017*)	**2**	B2
9(e)	352 × '111.3' [÷ 100]	**2**	M1
	390 **awrt**		A1
9(f)	Gouta – not correct because, although this statement is true, it has been accounted for in the calculation/price relative	**2**	B1
	Suma – correct as change [in quantities] not accounted for/this would indicate that the weights have changed		B1

Question	Answer	Marks	Partial Marks
10(a)	9 × 0.72 [= 6.48]	**5**	M1
	7.49 – '6.48' [= 1.01]		M1
	'1.01'/(14 – 9)		M1
	0.20[2]		A1
	[Comparison of 0.72 with '0.202']. Fish sold in morning have greater mass than fish sold in afternoon **oe**		B1
10(b)	Use of formula for variance or standard deviation [√](28.29/84 – $(39.96/84)^2$)	**2**	M1
	0.332 **awrt**		A1
10(c)	Not affected by extreme values	**1**	B1

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Question	Answer	Marks	Partial Marks
10(d)	¾ × 84 [=63]	**5**	M1
	0.5 + ('63' – 53)/17 × 0.25 **oe**		M1
	0.647[05…]		A1
	'0.647' – 0.207		M1
	0.44[0…]		A1
10(e)	(0.2 – 0.1)/(0.25 – 0.1) × 21 [= 14] **oe**	**3**	M1*
	'14' + 6		M1dep
	20		A1
	OR		
	(0.25 – 0.2)/(0.25 – 0.1) × 21 [= 7] **oe**		(M1*
	27 – '7'		M1dep
	20		A1)

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