General Certificate of Secondary Education

Statistics

Higher Tier

Specimen Mark Scheme

The following abbreviations are used on the mark scheme:

M   Method marks awarded for a correct method.

A   Accuracy marks awarded when following on from a correct method.
It is not necessary always to see the method. This can be implied.

B   Marks awarded independent of method.

M dep   A method mark which is dependent on a previous method mark being
awarded.

ft   Follow through marks. Marks awarded for correct working following a
mistake in an earlier step.

SC   Special Case. Marks awarded for a common misinterpretation which
has some mathematical worth.

oe   Or equivalent.

eeoo   Each error or omission.

Q	Answer	Mark	Comments
1(a)	A3	B1	
(b)	A1 B11	B1, B1	
(c)	B3, B6	B1	
	B23	B1	
	B16	B1	
(d)(i)	**QWC question**		
	A clear, concise and comprehensive answer that addresses all the major issues (listing and numbering the 5 wards, using random numbers, repeat method). The answer should be fully coherent and contain statistical terminology.	3	
	The answer displays some understanding of the factors to be considered with an appreciation of the issues involved. The structure of the answer does not clearly connect the points, but displays some comprehension of the issue at hand. Some limited reference to statistical terminology.	1-2	
	No relevant content	0	
(d)(ii)	Cost, time	B1	
	Low response rate	B1	
(e)	58%	B1	

2(a)	Mixed	B1	Accept Other Black
(b)	35 − 30	M1	Accept 30 − 35
	5	A1	
(c)	*Similarity* – Under 16 or 35 − 64 no justification needed OR first 3 groups increase OR 65 and over smallest %	B1	beware incorrect statements about numbers not %, penalise once
	Difference – 65 and over with qualification e.g higher % whites or 16 − 34 with qualification e.g lower % whites	B1	do not allow 'young' or 'old'

Q	Answer	Mark	Comments
3(a)	Symmetric diagram Left side finishing at approx. 74	B1	
(b)	Line of symmetry at 92 or maximum	B1	
	Correct use of standard deviation	B1	
	Higher peak than other diagram	B1	
(c)	0.5	B1	
(d)	0 or very small	B1	

Q	Answer	Mark	Comments
4(a)	V^2 , 100, 400 etc	B1	
	Correct plots	B2	One error B1, 2 or more errors B0 Follow through their values (Omission is an error)
(b)	Through double mean point	M1	
	and between (4900, 220) and (4900, 230)	A1	
(c)	Their intercept (approx '30')	B1	
(d)	Correct values on triangle	B1	
	Attempt at gradient	M1	
	approx 0.038 to 0.04	A1	If outside this range, check working
(e)	R= '30' + '0.039' v^2	B1	
(f)	Sub in their formula	M1	
	Accept 335 to 360	A1	If outside this range, check working
(g)	No. extrapolation	B1	

Q	Answer	Mark	Comments
5(a)	$\sum d^2 = 154.5$ formula rank coefficient = $-.839(3)$	M1, M1 M1 A1	dep dep accept -0.84
(b)	Negative correlation – rankings reversed – disagrees with expert	B1	Strict ft from (a) in context
(c)	0.05 :- 0.02	B1, B1	-1 for each extra
(d)	used for interval not ordinal data	B1	

6(a)	Range = 0.074	B1	
(b)	Correct plots	B1 B1 √	
(c)	Range OK	B1	
	Mean increasing	B1	

7(a)	Allocation of a number on a dice to a doctor	B1	
(b)	QWC Question		

A clear, concise and comprehensive answer that addresses all the major issues (a sensible attempt at allocation of random numbers, clearer defined allocation of numbers, random selection). The answer should be fully coherent and contain statistical terminology.	3
The answer displays some understanding of the factors to be considered with an appreciation of the issues involved. The structure of the answer does not clearly connect the points, but displays some comprehension of the issue at hand. Some limited reference to statistical terminology.	1-2
No relevant content	0

Q	Answer	Mark	Comments
8(a)	QWC Question		
	A clear, concise and comprehensive answer that addresses all the major issues (listing, random start, ever 9th after that). The answer should be fully coherent and contain statistical terminology.	3	
	The answer displays some understanding of the factors to be considered with an appreciation of the issues involved. The structure of the answer does not clearly connect the points, but displays some comprehension of the issue at hand. Some limited reference to statistical terminology.	1-2	
	No relevant content	0	
(b)	Only production	B1	Only one section of the factory
	Only male	B1	
(c)(i)	$\frac{16}{400} \times 50 = 2$	M1 A1 cao	SC1 for one male and one female
(c)(ii)	$\frac{24}{400} \times 50 = 3$	M1 A1	
(d)	Continuous linear scale Labels	B1 B1	not yes/no
	Discrete scale (boxes) Labels	B1 B1	accept good/bad and agree/disagree

9 (a)	Mean = 31.5	B1	
	$\frac{10829}{10} - 31.5^2$	M1	
	$= \sqrt{90.65}$	M1 dep	
	$= 9.52$	A1	Accept 9.5
(b)(i)	23 has been replaced by a larger number	B1	Total mark gone up
(ii)	32 is nearer to the mean	B1	

Q	Answer	Mark	Comments
10(a)(i)	300	B1	Or 310 if n + 1 used
(a)(ii)	470 – 230	M1	230 – 235 LQ
	240	A1 ft	235 – 240 for M1A1
(a)(iii)	63/120	M1	62 – 64 inclusive
	× 100	M1	
	52.5	A1 ft	accept 51.6% - 53.33…% from their calculations
(a)(iv)	Read off at 108 = £540	M1	
		A1	
(b)(i)	their median is lower	B1	or reference lower maximum (must define what they are comparing)
	their IQR is smaller	B1	or reference the reduced range (must define what they are comparing)
(b)(ii)	Data from the non-manual sector	B1	oe e.g obtain data on part-time / full-time / hours worked
(c)(i)	0.42, 0	M1	M1 for sub, either
	0.4167 or 0.447 acceptable	A1	ft for males
		A1	females cao
(c)(ii)	Positive skew, symmetrical	B1 ft	Allow normal
		B1	

Q	Answer	Mark	Comments
11(a)	124　　　　1820　　　1944 341　　　　239　　　　580 155　　　　21　　　　(176) (620)　　　2080　　　(2700)	B4	−1 each error or omission
(b)(i)	$\dfrac{239}{2700}$	B1ft	or .0885　　2dp or better follow through on numerator
(b)(ii)	$\dfrac{A+B-AB}{2700} = \dfrac{859}{2700}$	M1 A1ft	or .318
(b)(iii)	$\dfrac{1820}{2080} = \dfrac{7}{8}$	M1 A1	or .875 follow through on numerator and denominator
(c)	$\dfrac{155}{2700} \times 200 = 11$	M1 A1ft	(11.48 accept) allow 11.5 ft on numerator only