A Level Statistics

AQA Past Exam Questions

TOPIC: Data Represen
Interpret

You are no longer required to draw or complete any statistical diagrams in the exam
Where possible the drawing or completion part of the question has been omitted but in some cases it has been necessary to leave these in

Candidates may use any calculator allowed by Pearson regulations. Calculators must not have retrievable mathematical formulae stored in them.

Instructions

• Use **black** ink or ball-point pen.

• If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.

• **Fill in the boxes** at the top of this page with your name, centre number and candidate number.

• Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.

• Answer the questions ***on paper***

• You should show sufficient working to make your methods clear. Answers without working may not gain full credit.

• Unless otherwise stated, statistical tests should be carried out at the 5% significance level.

• When a calculator is used, the answer should be given to three significant figures unless otherwise stated.

Information

• ***You may use the*** booklet 'Statistical Formulae and Tables'

• There are **8** questions in this question paper. The total mark for this paper is ***127***

• The marks for **each** question are shown in brackets – use this as a guide as to how much time to spend on each question.

Advice

• Read each question carefully before you start to answer it.

• Try to answer every question.

• Check your answers if you have time at the end.

• If you change your mind about an answer, cross it out and put your new answer and any working underneath.

• Check your answers if you have time at the end.

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AQA_JUNE_2018_2

(b)	Seasonal variation = (12 + 11 + 12) ÷ 3 = 11.7 (cm gives (4.8 + 4.4 + 4.8) ÷ 3 = 4.7) Trend value = 9.0 Estimate = 20.8	M1 A1 B1 A1	**4**	3 values (±1) added and ÷ 3 (may be cm) AWFW 11.5 to 12.0 (cm 4.6 to 4.8) AWFW 8.5 to 9.5 (cm just using graph) AWFW 20 to 21.5
(c)	2016 seems to follow the previous pattern 2017 well below estimate – the pattern has changed	E1 E1	**2**	OE OE

AQA_JUNE_2017_1

(a)	£225 million or £225 000 000	B1	**1**	Must include £ Ignore anything in brackets.
(b)	**Either** 1 922 – (233 + 973 + 9) **Or** 17 107 – (15 708 + 272 + 420) = 707	M1 A1	**2**	PI by correct answer or 707 million or 707 000 000 Allow 1 slip **NOT** 707 million or 707 000 000 Ignore any bracketed quantity
(c)	353 ÷ 1 820 × 100 = 19.4%	M1 A1	**2**	Complete method AWRT
(d)	23 935 ÷ 27 006 × 360 = 319°	M1 A1	**2**	Complete method AWRT

AQA_June_2016_1

(a)	Median for females is 165cm Median for males is 178cm On average males are (13cm) taller OE	 B1 E1dep	**2**	 For both values or 13cm. NOT "mean" For comparing medians
(b)	Range of females is 39cm Range of males is 38cm Or: IQR of females is 8cm IQR of males is 182 – 174 = 8cm So spread is similar or the same.	 B1 E1	**2**	CAO AWLW 7.5 to 8.5 AWLW 7.5 to 8.5. For either pair of values For either interpretation
(c)	Male distribution is fairly symmetric (or slight positive skew) Female distribution is more (negatively) skewed.	B1 B1	**2**	
			6	

Examples for 1(c)

Male symmetric, female not symmetric	2 marks
Male symmetric, female skew	2 marks
Male positive skew, female negative skew	2 marks
Both symmetric	1 mark
Both skewed (but type not specified)	1 mark

AQA_June_2016_3

(a)	Because the figures are rounded to the nearest thousand	E1	**1**	Accept "Rounding error"
(b)	2958000000 ÷ 10427000 (= 283.686…) = £284	M1 A1	**2**	Anything involving 2 958 ÷ 10 427 CAO
(c)	(36838 – 31694) ÷ 36838 × 100 = 14.0%	M1 A1	**2**	Complete method AWRT SC B1 only for −14%
(d)(i)	10748 ÷ 17507 × 360 = 221°	M1 A1	**2**	Complete method AWRT
(d)(ii)	Use of 58507 ÷ 17507 (= 3.34192..) Use of √(58507 ÷ 17507) (= 1.828..) Multiplied by 5 = 9.14 cm	M1 m1 A1	**3**	 Or √(3.34 × 25) - must have √ AWFW 9.1 to 9.2

AQA June_2015_1

(a)	8.5	B1		
			1	
(b)	**Similar:** Lower quartile Median **Different:** Upper quartile lower with new drug Interquartile range lower with new drug Range higher with new drug More skew with new drug Top value higher with new drug	 E1 E1 E1 E1 E1 E1 E1		 Maximum of 2 similar and 2 different and overall maximum of 3
			3	
	SC for (b). Outliers totally disregarded so 7.5 in (a) and range comment reversed and top value comment reversed. Award E1 (and another E1 may be earned)			Note: first 3 comments only marked. Comments about mean, variance, standard deviation, average all score E0

AQA_June_2015_2

(a)	2782 £million	B1		Condone omission of £
			1	
(b)	120779	B1		CAO
			1	
(c)	(868 – 375)/868 × 100 = 56.8%	M1 A1		 Condone -56.8. Accept 57%. Allow B1 for 43(.2)%
			2	
(d)	2957000000/254000 = £11641	M1 A1		For 2957…./254… AWRT £11600 Condone omission of £

AQA_June_2014_6

6(a)	1964	B1	**1**	
(b)	The trend is downwards (decreasing or negative) from 1961 to 1977 and then upwards (increasing or positive) to 2010.	M1 A1	**2**	For the downwards then upwards For details of the years.
(c)	(86746 – 40591) = 46155 ÷ 86746 × 100 (completion of method) = 53.2%	M1 m1 A1	**3**	For both correct and subtraction Or 100 – (40591 × 100/86746) Accept 53% from correct working.

AQA_June_2013_4

4(a)(i)	Three	B1	1	
(ii)	(104 + 82 + 102) ÷ 3 = 96 accurately plotted	M1 A1	2	Marked with a dot or a cross
(b)(i)	Approx +8+10+10+11	M1		Attempt to find **total** excess for Sat using graph or table
	÷ 4	m1		Total divided by 4
	= +9 or +10 NB If an incorrect answer for "seasonal effect for Saturday" is given in part **(b)(i)** the marks cannot be given retrospectively for use of the correct calculation in **(b)(ii)** although the 3 marks for **(b)(ii)** itself can be earned.	A1	3	AWRT +9 or +10
(ii)	AWFW 103 to 104	B1		Reading Saturday 1 Dec value
	+ (9 or 10)	M1F		Adding their (b)(i)
	AWFW 112 to 114	A1	3	
(iii)	Eg More bad weather Christmas effect on numbers Restaurant may reach capacity Extrapolation is risky – the trend may change	E1	1	Any sensible reason
(c)(i)	Friday 16th Other Fridays above trend line, this one below	B1 E1	2	Or similar reasoning. Dep on B1
(ii)	Sunday 18th Other Sundays well below trend line, this one close to it	B1 E1	2	Or similar reasoning. Dep on B1

AQA_June_2013_6

6(a)	$1616.6 - 706.2 = 910.4$ **thousand** hectares	B1 B1	2	Accept 910 Dep on first B1
(b)	$(528.0 + 631.3 + 692.0 + 374.3 + 281.2) \div 5$	M1		Allow M1 A0 if wrong row used.
	= 501.(36) thousand hectares	A1	2	AWRT 501. Do not penalise omission of thousands more than once. Unsupported answer scores B2
(c)	$256 / 360 \times$	M1		Anywhere
	$2.2 \times (8718100)$	M1		Anywhere
	= 136(38983)	A1		
	= 13.6 million tonnes. (13 600 000)	A1	4	CAO
(d)(i)	Oats because positive correlation	B1		Or their plot from data (shown)
(ii)	Corn for grain, because quantity stays approximately constant.	B1		Or their plot from data (shown)
(iii)	Soybeans because negative correlation	B1	3	Or their plot from data (shown) SC If **no** reasons given but all three correctly identified allow B1

AQA_June_2012_3

3(a)	2791 – (1+9+72+366+1173+11+22) = 1137	M1 A1	**2**	Or B2 for answer only seen.
(b)	Adding at least 10 numbers and ÷ 10 65 ÷ 10 = 6.5	M1 A1	**2**	Must specify divided by 10 SC 5.9 B1

AQA_June_2011_1

1(a)(i)	On graph	B1 B1	2	B1 accurate plot – by eye B1 trend line – must be a line
(ii)	Riz effect (49.3 + 66.3 +70.7)/3 = 62.1	M1 m1 A1	3	M1 attempt to find Riz deviations from trend line or moving average m1 method, ignore sign A1 62.1 (60 ~ 64)
(iii)	555 + 62.1 = 620	B1 M1 A1	3	B1 trend 555 (545 ~ 565) M1 'their' trend + 'their' seasonal effect A1 620 (605 ~ 630)
(b)	Week 18 – trend line below 640 for weeks 16 and 17. Attendances for Ed and Ja not likely to be above trend line. Week 18 trend line about 600 and Riz likely to be more than 40 above trend line.	B1 E1 E1	3	B1 week 18 E1 justification for any of weeks 16, 17, 18 E1 full explanation

AQA_June_2010_5

5(a)(i)	327 million tonnes	B1 B1	2	B2 327 million tonnes acf allow B1 for 327
(ii)	1254 - 776 = 478 million tonnes allow 1254 - 479 - 298 = 477	M1A1	2	M1 1254 - 776 (or - 479 - 298) A1 478 or 477 million tonnes - only penalise omission of million tonnes once
(iii)	1215/77 = 16	M1 A1 B1	3	M1 1215/77 or 1162/77 A1 16 (15.5 ~ 16) B1 16 CAO
(b)	Maximum reserves are lower in 2006 than in 1995 Proven reserves are about the same (a bit larger) proportion of the total in 2006 than in 1995 Probable reserves are a smaller proportion of the total in 2006 than 1995 Possible reserves about same in 1995 and 2006	E1 E1 E1	3	E1 lower in 2006 E1Proven similar (a bit larger) proportion in 2006 E1 Probable smaller proportion/ possible larger proportion in 2006 Also allow a mark for numerical statements e.g. proven about a third in 2006/ total about double in 1995 - max 2 marks for 3 similar points

AQA_June_2009)3

3(a)	113 million	B1 B1	2	113 113 million
(b)(i)	Upward trend in London - relatively slow 1994/95 (decrease in 1998/99) - increasing more rapidly 2000/01 onwards.	E1		E1 upward in London
(ii)	Outside London there is a slow downward trend (apart from 1998/99 to 2000/01 when there was little change).	E1 E1	3	E1 downward outside London E1 additional valid (but not trivial) point
(c)(i)	Increase in fares index outside London far exceeds increase in RPI - this explains reduction in bus journeys outside London. Increase in fares index in London is similar to increase in RPI. Thus any reason for increased bus journeys (eg congestion charge / increased population) should not be inhibited by price.	E1 E1 E1	3	E1 comparison of fares outside London with RPI E1 comparison of fares in London with RPI E1 comparison of London with outside London E1 any sensible conclusion **Maximum 3**
(ii)	Outside London increase in bus fares > increase in rail fares > both RPI and increase in motoring costs (which have declined in real terms). This may explain reduction in bus journeys. In London increase in bus fares is < increase in rail fares / similar to RPI / only slightly > than increase in motoring costs. This may explain increase in bus journeys.	E1 E1	2	E1 valid comparison outside London E1 valid comparison in London

AQA_June_2008_3

3(a)	1023000	B2	2	B1 for 1023
(b)	N.Ireland > Scotland > Wales at each election	E1		Any valid comparison of % in different countries
	2003 election less than 1998/9 (about 5% less in N.I., 8 or 9% less in Wales and Scotland)	E1		Any valid comparison of % in different years
	All less than 70%	E1	3	Complete answer
(c)(i)	Welsh assembly 2003	M1 B1		Any valid calculation – may be implied Welsh assembly 2003
(ii)	Labour	B1	3	
(d)	Welsh assembly $\frac{2230000}{60}=37200$	M1		Method of calculation
	Scottish parliament $\frac{3879000}{129}=30100$			
	N.I. assembly $\frac{1098000}{108}=10200$	A1		All correct 3sf
	N.Ireland has many less electors per member than Wales or Scotland.	E1	3	Any sensible comment – method mark not essential

AQA_June_2006_3

3(a)	Random variation about a downward linear trend	E1 E1	2	random downward linear
(b)	Random variation about a downward non-linear trend	E1 E1	2	random downward non-linear
(c)	Seasonal variation about a downward linear trend	E1 E1	2	seasonal downward linear
(d)	Short-term variation about an upward linear trend	E1 E1	2	short term upward linear only penalise omission of 'downward/upward' twice. Only penalise omission of 'linear/non-linear' twice