



Pearson

Mark Scheme (Results)

January 2017

Pearson Edexcel Level 2 Award
in Statistical Methods (AST20)

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NOTES ON MARKING PRINCIPLES

- 1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- 2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- 3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- 4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- 5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 6** Mark schemes will indicate within the table where QWC is being assessed. The strands are as follows:
 - i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.
 - ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
 - iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Guidance on the use of codes within this mark scheme

M1 – method mark

A1 – accuracy mark

B1 – Working mark

C1 – communication mark

QWC – quality of written communication

oe – or equivalent

cao – correct answer only

ft – follow through

sc – special case

dep – dependent (on a previous mark or conclusion)

indep – independent

isw – ignore subsequent working

awrt – answer which rounds to

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Question	Working	Answer				Mark	Notes	
1		The weight of a fish – Continuous The type of dog – Categorical The number of pupils in a classroom – Discrete				2	B2 for all 3 sentences using the correct words (B1 for 2 sentences using the correct words)	
2	(a)	Pasture 20% Crops 72% Set aside 8%				3	B3 for all 3 entries in the correct place (ignore % sign) (B2 for 2 entries in the correct place (ignore % sign)) (B1 for 1 entry in the correct place (ignore % sign))	
	(b)	All 3 types drawn to the correct height with correct shading				3	B3 for a fully correct composite bar chart drawn to the correct heights, shaded correctly. (B2 for all 3 types drawn to the correct heights but no shading/incorrect shading) (B1 for one type drawn to the correct height with correct shading)	
3			P	Salad	Pasta	Total	2	B2 for all 6 numbers in the correct place (B1 for 4 or 5 numbers in the correct place)
		C	(12)	(10)	3	(25)		
		I C	(10)	10	(20)	(40)		
		F	(4)	(2)	1	7		
		T	26	22	(24)	(72)		

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Question	Working	Answer	Mark	Notes
4	(a)	$26 \div 2 = 13^{\text{th}}$ number	2	M1 for $26 \div 2$ or $25 \div 2$ (=13 th number) A1 cao
	(b)	$47 \div 25$	1.88	M1 for $0 \times 0 + 1 \times 10 + 2 \times 8 + 3 \times 7$ (=47) M1 for '47' $\div 25$ A1 for 1.88 (accept 1.9 or 2 if both M marks have been awarded)
5	(a)	$130 < w \leq 140$	1	B1 oe
	(b)	(105, 4) (115, 8) (125, 11) (135, 17) (145, 5)	Correct frequency polygon drawn	2 M1 for all points plotted to the correct heights consistent within the interval and joined up with line segments A1 cao (Ignore any line drawn outside of the data range) (Ignore bars) SC B1 for a fully correct frequency polygon but first point joined to the last point to make a polygon
6	(a)	Outlier	1	B1 for outlier oe
	(b)	As the height of the children increase the weight of the children increase	1	B1 for as the height of the children increase the weight of the children increase oe (Condone positive correlation)
	(c)	Line of best fit drawn	1	B1 for a sensible line of best fit
	(d)	143	1	B1 for answer in the range 140 – 145 or ft from sensible line of best fit

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Question	Working	Answer	Mark	Notes												
7		Two correct reasons	2	B2 for any 2 from <ul style="list-style-type: none"> The frequency axis does not start at 0 One of the bars is drawn too wide One of the bars has a missing label One bar is shaded (B1 for one correct reason)												
8 (a)		<table border="1" style="display: inline-table; vertical-align: middle;"> <tbody> <tr><td>1</td><td>8</td></tr> <tr><td>2</td><td>7 8 9</td></tr> <tr><td>3</td><td>3 4 4 5 8</td></tr> <tr><td>4</td><td>2 3 8</td></tr> <tr><td>5</td><td>2 6</td></tr> <tr><td>6</td><td>0</td></tr> </tbody> </table> <div style="display: inline-block; border: 1px solid black; padding: 5px; vertical-align: middle; margin-left: 10px;"> Key: 1 8 represent s18 minutes </div>	1	8	2	7 8 9	3	3 4 4 5 8	4	2 3 8	5	2 6	6	0	3	B1 for correct stem (1, 2, 3, 4, 5, 6) B1 for correct leaves in order B1 for key
1	8															
2	7 8 9															
3	3 4 4 5 8															
4	2 3 8															
5	2 6															
6	0															
(b)		35	1	B1 for 35 or ft their ordered stem and leaf diagram												
(c)	48 – 29	19	2	M1 for 48 – 29 or ft their ordered stem and leaf A1 cao												

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Question	Working		Answer				Mark	Notes		
9	(a)	0.2 + 0.1		0.3				2	M1 for 0.2 + 0.1 A1 for 0.3 oe	
	(b)	1 – (0.25+0.2+0.1)		0.45				2	M1 for 1 – (0.25+0.2+0.1) A1 for 0.45 oe	
	(c)	0.1 × 500		50				2	M1 for 0.1 × 500 A1 cao	
	(d)	500 ÷ 4 = 125		The biased spinner will land on 3 less than the fair spinner				1	B1 for the biased/Suji's spinner will land on 3 less than the fair/Mary's spinner or Because for the biased spinner, P(3) = 0.1 < P(3) = 0.25 for the fair spinner or 50 < 125	
10	(a)		1	2	3	4	5	6	2	B2 for all entries correct (B1 for 19 or 20 entries correct)
		R	(R,1)	(R,2)	(R,3)	(R,4)	(R,5)	(R,6)		
B		(B,1)	(B,2)	(B,3)	(B,4)	(B,5)	(B,6)			
Y		(Y,1)	(Y,2)	(Y,3)	(Y,4)	(Y,5)	(Y,6)			
	G	(G,1)	(G,2)	(G,3)	(G,4)	(G,5)	(G,6)			
(b)									1	B1 for $\frac{3}{24}$ oe

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Question	Working	Answer	Mark	Notes
11 (a)		Correct reason	1	B1 for testing all the pies will lead to destruction oe
(b)		Two correct reasons	2	B2 for 2 correct reasons from <ul style="list-style-type: none"> • Sample size is too small oe • Only sampled at the start of the day oe • It is only on one day oe • It is bias/not random/not representative of the population (B1 for one correct reason)
12 (a)		Two things wrong	2	B2 for 2 things wrong from <ul style="list-style-type: none"> • The time frame is incorrect oe • Boxes overlap oe • No option for 0 oe (B1 for 1 thing wrong)
(b)		Suitable question with response boxes	2	M1 for a suitable question including hours/minutes per day A1 for at least 3 non overlapping exhaustive response boxes

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Question	Working	Answer	Mark	Notes
13 (a)		Correct probabilities on branches	2	B1 for $\frac{5}{9}$ on 1 st branch B1 for $\frac{6}{11}, \frac{5}{11}$ and $\frac{6}{11}$ on 2 nd branches
(b)	$\frac{4}{9} \times \frac{5}{11}$	$\frac{20}{99}$	2	M1 $\frac{4}{9} \times \frac{5}{11}$ A1 $\frac{20}{99}$ oe
(c)	$\frac{5}{9} \times \frac{6}{11}$	$\frac{30}{99}$	2	M1 for $\frac{5}{9} \times \frac{6}{11}$ or ft 'tree diagram' A1 for $\frac{30}{99}$ oe
14 (a)		$30 < t \leq 40$	1	B1 oe
(b)	$5 \times 18 = 90$ $15 \times 14 = 210$ $25 \times 16 = 400$ $35 \times 24 = 840$ $45 \times 28 = 1260$ $2800 \div 100$	28	4	M1 for $f \times x$ consistent within interval (allow one arithmetic error) M1 for $\sum f'x'$ (=2800) (must use mid points) M1 dep on previous M1 for ' $\sum f'x'$ ' $\div 100$ A1 cao

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Question	Working	Answer	Mark	Notes
15	$\frac{39}{200} \times 40$	8	2	M1 for $\frac{39}{200} \times 40$ A1 cao
16	(a) Smallest 54 LQ 64 Median 69 UQ 81 Largest 84	(a) 69	2	M1 for ordering the data A1 cao
(b)		Correct box plot drawn	2	M1 for box plot and 3 correct values plotted A1 for all correct ft '69'
(c)		Positive	1	B1 cao
(d)		3 comparisons	3	B1 for comparison of medians e.g. Median for males > median for females B1 for comparison of Range/IQR e.g. Range/IQR for males > range/IQR for females B1 for comparison of skew e.g. Males have 'positive' skew and females are symmetrical

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Question	Working	Answer	Mark	Notes
17 (a)	$(64+73+85) \div 3$ $(73+85+91) \div 3$	74 83	2	M1 for $(64+73+85) \div 3$ or $(73+85+91) \div 3$ (May be implied by one correct answer) A1 for 74 and 83
(b)		Upwards	1	B1 for upwards oe
(ci)	$\frac{91}{85} \times 100$	107	3	M1 for $\frac{91}{85} \times 100$ A1 awrt to 107
(cii)		Correct interpretation		B1 for (There has been a) '7% increase' (from November to December) oe
18	$\sqrt{\frac{6800}{40} - \left(\frac{500}{40}\right)^2}$	3.71	3	M1 for $\frac{6800}{40} (=170)$ or $\frac{500}{40} (=12.5)$ M1 for $\frac{6800}{40} - \left(\frac{500}{40}\right)^2$ A1 awrt 3.71
19	$(15 \times 102 + 40 \times 108) \div 55$	106	3	M1 for $15 \times 102 (=1530)$ or $40 \times 108 (=4320)$ M1 dep on 1 st M1 for ('1530' + '4320') $\div 55$ A1 awrt 106

