Pearson Edexcel

Mark Scheme (Results)

January 2021

Pearson Edexcel Award
In Statistical Methods (AST20)
Level 2

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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
isw – ignore subsequent working
oe – or equivalent (and appropriate)
indep - independent
ft – follow through
SC: special case
dep – dependent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

5 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.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

8 Use of ranges for answers

If an answer is within a range this is inclusive, unless otherwise stated.

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.

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Question	Working	Answer	Mark	Notes
1 (a)		Continuous Categorical Discrete	2	B2 for all three correct (B1 for two correct)
(b)		3, 8, 9, 10, 7, 3	2	M1 for using tallies or 2 correct frequencies A1 for all frequencies correct
(c)		$15 < h \leq 20$	1	B1ft follow through their frequencies
(d)		Frequency polygon	2	M1 for frequencies plotted consistently within interval A1 ft for frequencies plotted at mid intervals and joined with line segments, ignore line segments drawn outside range of points
2 (a)		<table><tr><th></th><th>Use the staff canteen</th><th>Do not use the staff canteen</th><th>Total</th></tr><tr><td>Office workers</td><td>21</td><td>15</td><td>36</td></tr><tr><td>Warehouse workers</td><td>28</td><td>16</td><td>44</td></tr><tr><td>Total</td><td>49</td><td>31</td><td>80</td></tr></table>	3	B1 for 15, 36, 28 and 80 B1 for 21 and 44 B1 for completely correct
(b)		Suitable question with response boxes	2	M1 for a suitable question including time frame A1 for at least 3 non-overlapping response boxes
3		Three things misleading/wrong	3	B3 for three things misleading / wrong from • Incorrect labelling of quarters (repeated quarter 2) • Missing cross (for quarter 2 2017) • Vertical scale starts at 300 (thousand) • Vertical scale not equally spaced / 600 missed

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Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		40	1	B1 for 40 cao
	(b)		Oil & other and Coal	1	B1 for both correct, accept in either order
	(c)		66	2	M1 for 88 – "22" or "88" – 22 A1 cao
5	(a)		Complete sample space diagram	2	B2 for fully correct entries, condone missing brackets (B1 for 7, 8 or 9 correct entries)
	(b)(i)		$\frac{4}{16}$ oe	1	B1ft for $\frac{4}{16}$ oe
	(b)(ii)	$1-\frac{4}{16}$	$\frac{12}{16}$ oe	2	M1 for $1-\frac{4}{16}$ A1ft follow through their table
6	(a)	$0.1+0.15$	0.25 oe	2	M1 for $0.1+0.15$ A1 for 0.25 oe
	(b)	1 – (0.1 + 0.15 + 0.25 + 0.15 + 0.2)	0.15 oe	2	M1 for 0.1 + 0.15 + 0.25 + 0.15 + 0.2 or 0.85 A1 for 0.15 oe
	(c)(i)	0.25×300	75	2	M1 for 0.25×300 A1 for 75
	(c)(ii)		Any correct reason	1	B1 for any correct reason e.g. may not exactly match theoretical probability

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Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)		**All** the students at the sixth form college	1	B1 for description of population, must refer to all of the students at the college
	(b)		Any correct reason	1	B1 for e.g. quicker / easier / less data to handle
	(c)	$540 + 383 + 427 = 1350$ Abbey Rd $= \frac{540}{1350} \times 60 = 24$ Bailey St$= \frac{383}{1350} \times 60 = 17.02\ldots$ Cross Hill$= \frac{427}{1350} \times 60 = 18.97\ldots$	Attwood Road 24 Bailey Street 17 Cross Hill 19	3	M1 for eg 540 ÷ (540+383+427) × 60 oe A1 for one correct answer A1 for all correct
8	(a)		0 | 9 1 | 6 7 8 8 2 | 0 4 4 7 3 | 2 3 8 4 | 3 5 5 8 5 | 3 7 8 Key: 1|6 represents 16 hours	3	B1 for correct stem (0, 1, 2, 3, 4, 5) B1 for correct leaves in order B1 for key
	(b)		32	1	B1 for 32 **or** ft their ordered stem and leaf diagram
	(c)	$45 - 18 = 27$	27	2	M1 for 18 and 45 seen together or ft their ordered stem and leaf A1 cao
	(d)(i)		Correct comparison	1	B1 for e.g. Baljit's group volunteered for longer on average or ft their answer to (b)
	(d)(ii)		Correct comparison in context	1	B1 for e.g. the number of hours spent volunteering was more consistent for Baljit's group or ft their answer to (c)

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Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Outlier	1	B1 for outlier oe accept rogue value, anomaly etc
	(b)		Correct relationship	1	B1 for correct relationship described e.g. as the amount of fat increases, the number of calories increases. Condone positive correlation.
	(c)		Line of best fit	1	B1 for suitable line of best fit drawn
	(d)		110 – 140	1	B1 for an answer between 110 and 140 or ft their line of best fit
10	(a)		Correct reason	1	B1 for correct reason e.g. this is only one street / during daytime (people may be out at work) / not representative
	(b)		Correct reason	1	B1 for correct reason e.g. not everyone is in the telephone directory / some people may not answer the 'phone
11	(a)	$2 \times 9 = 18$	18	1	B1 for 18 cao
	(b)	$12 \div 2 = 6$ $5 \div 2 = 2.5$	Bars of height 6, 2.5 and of width 2	2	M1 for calculating frequency density (implied by one bar of correct height) A1 cao
	(c)		Positive	1	B1 for positive or ft their histogram
	(d)		$2 < w \leq 4$	1	B1 for $2 < w \leq 4$, accept any unambiguous indication of the interval

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Question	**Working**	**Answer**	**Mark**	**Notes**
11 (e) Cont	((1×15) + (3×13) + (5×9) + (7×7) + (9×6)) ÷ 50	4.04	4	M1 for Σfx with x consistent within interval (including end points). Condone 1 error in multiplication M1 (dep) for use of midpoints condone 1 error. The first two M marks may be implied by 202 M1 (dep on first M1) for use of 'Σfx' ÷ '50' A1 for 4.04 (allow 4 with correct working)
12 (a)		Complete probability tree diagram	2	B1 for correct probabilities on Raffle branches (0.15, 0.85) B1 for correct probabilities on lucky dip branches (0.25, 0.75)
(b)		0.2125	2	M1 for '0.85' × 0.25 A1 for 0.21 or 0.213 or 0.2125 oe
(c)		0.3625	3	M1 for '0.85' × '0.75' or $0.15 \times' 0.75'$ and $'0.85' \times 0.25$ and 0.15×0.25 M1 for $1 -$'0.85' × '0.75' or $0.15 \times' 0.75' + '0.85' \times 0.25 + 0.15 \times 0.25$ A1 for 0.3625 or 0.363 or 0.36 oe
13 (a)	$\frac{775000}{500000} \times 100$	155	2	M1 for $\frac{775000}{500000} \times 100$ oe A1 for 155
(b)		e.g. the price of the house increased by 55%	1	B1 for e.g. the price of the house **increased** by **55%**

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Question	**Working**	**Answer**	**Mark**	**Notes**
14		Three correct comparisons	3	B3 for three from • correct comparison of medians (median for 2018 greater than the median for 2008) • correct comparison of spread, eg range, interquartile range (range / IQR for 2018 greater than for 2008) • correct comparison of skew (2008 is positively skewed, 2018 is negatively skewed) (B2 for two correct comparisons, B1 for one correct comparison)
15	$380.4 \div 30$	12.68	3	M1 for 12×14.6 (=175.2) or 18×11.4 (=205.2) M1 for ('175.2'+ '205.2') ÷ 30 A1 for 12.68
16 (a)	$\frac{418}{19}$	22	2	M1 for $\frac{418}{19}$ A1 for 22
(b)	$\sqrt{\frac{8114}{22} - 19^2}$	2.8	3	M1 for $8114 \div$ '22' (=$368.\dot{8}\dot{1}$) M1 for $\sqrt{8114 \div \text{'22'} - 19^2}$ A1 awrt 2.8

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