Mark Scheme (Results)

Summer 2024

Pearson Edexcel Level 3 Certificate
In Mathematics in Context (7MC0) Paper 1

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- 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.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question	Working	Answer	Mark	Notes
1(a)(i)		1.7 (million)	1	B1 for 1.7 (million) oe or ft their readings from the graph to give a figure in the range 1.68 to 1.9 (million)
1(a)(ii)	"1.7" ÷ 4.5 × 100 (= 37.77..)	38	2	M1 (ft their answer to part (i) for "1.7") full method to calculate percentage change between 1968 and 2019 A1 for awrt 38(%) or ft their "1.7" providing full method seen. Accept 37(%) SCB1 for −37(%) or awrt −38(%)
1(b)		1986 – 1994 with reason	2	B1 for any time period in the range 1986 to 1994 C1 for reason, eg the graph is almost horizontal which indicates very little to no change during this time
1(c)	40 × 90 (=3600) or 60000 ÷ 40 (=1500) or 60000 ÷ 90 (=666.6…) 60000 ÷ (40 × 90) (= 16.66…)	17	3	B1 for use of 40 bees per minute or 60000 bees M1 for full method to find number of hornets A1 for an answer in the range 16.6 to 17

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>2(a)</td><td>
<table>
<tr><th>f</th><th>x</th><th>fx</th><th>fx²</th><th>$f\left(x_i-\bar{x}\right)^2$</th></tr>
<tr><td>9</td><td>25</td><td>225</td><td>5625</td><td>1433.16…</td></tr>
<tr><td>16</td><td>35</td><td>560</td><td>19600</td><td>109.75…</td></tr>
<tr><td>14</td><td>45</td><td>630</td><td>28350</td><td>762.69…</td></tr>
<tr><td>3</td><td>55</td><td>165</td><td>9075</td><td>906.29…</td></tr>
<tr><td>42</td><td></td><td>1580</td><td>62650</td><td>3211.90…</td></tr>
</table>
$\sqrt{\frac{62650}{42}-\left(\frac{1580}{42}\right)^2}$ (= 8.74...)
$\sqrt{\frac{3211.90...}{42}}$ (= 8.74…)
</td><td>8.7</td><td>4</td><td>M1 for finding at least 2 products fx within interval (including end points). Can be implied by correct products if midpoints not explicitly stated.

M1 for finding at least 2 products fx² within interval (including end points).
Can be implied by correct products if midpoints not explicitly stated.
or for finding at least 2 products $f\left(x_i-\bar{x}\right)^2$

M1 (dep M2) for a full method to find the standard deviation using correct midpoints.

A1 answers in the range 8.7 – 8.8</td></tr>
<tr><td>2(b)</td><td></td><td>Correct comments and conclusion</td><td>2</td><td>C2 ft for a valid comment comparing means and SDs with at least one comparison in context,
eg the mean % lost in winter was greater than summer
and
there was less spread in the % of lost colonies per state in winter compared to summer

(C1 ft for a valid comment comparing means or SDs
eg mean (% loss) was less in summer or greater in winter
or
SD was greater in summer or smaller in winter)</td></tr>
</table>

Question	Working	Answer	Mark	Notes
3(a)		Shown	1	C1 for showing eg (20 ÷ 217) × 100 = 9(.21…) or 10% = 21(.7) and 21(.7) > 20 or $100-\left(\frac{217-20}{217}\times 100\right)=9(.21...)$
3(b)	269 ÷ 106 × 100 (= 253.773…)	254 million	3	B1 for use of 269 **and** 6% can be implied by use of 269 **and** 106 or 1.06 M1 for complete method to calculate original value A1 awrt 254 million. Accept 253 million if coming from correct working
4(a)		= (B11 + B12 + B13)/3	2	M1 for implying addition and division by 3 in a formula eg (B11 + B12 + B13) ÷ 3 A1 for use of correct spreadsheet notation =SUM(B11:B13)/3 or =AVERAGE(B11:B13) or =SUM(B11, B12, B13)/3 or =AVERAGE(B11, B12, B13)
4(b)(i)		Yes with reason	1	C1 eg Yes and the data follows the trend line more closely
4(b)(ii)		50	1	B1 for 50 accept 49.9

Question	Working	Answer	Mark	Notes
5(a)		Correct graph drawn	2	M1 for 4 or 5 cumulative points correctly plotted at the end of the intervals or consistently plotted within the interval A1 fully correct diagram SC B1 for 4 or 5 cf values plotted at correct heights not at end but consistently within each interval and joined provided no gradient is negative
5(b)	(2700 – "950") ÷ 2700 × 100 (= 64.81..)	62 to 65	3	B1 ft for accurate figure read from their graph at $x = 43$ M1 ft for full method to write as a percentage A1 for answer in range 62 to 65 or accurate % ft their cf graph
5(c)	Median = 48 to 50 pounds "49" × 2.54 = 124.46 "124.46" – 110.63 = 13.83 OR 110.63 + 20 =130.63 or "124.46" – 20 =104.46 $\frac{110.63}{2.54}\ (=43.55...)$ and $\frac{20}{2.54}\ (=7.87...)$ "43.55..."+"7.87" $(=51.42...)$	Decision with accurate figures	3	B1 ft for accurate median read from their graph M1 ft full method to use \$2.54, eg their median multiplied by \$2.54 or $\frac{110.63}{2.54}\ (=43.55...)$ **and** $\frac{20}{2.54}\ (=7.87...)$ May be seen as part of a difference calculation C1 ft (dep M1) a valid comment supported by accurate comparative figures, eg claim is incorrect **and** \$121.92 to \$127 or \$11.29 to 16.37 difference Or claim is wrong **and** \$51.42 **and** \$"49"

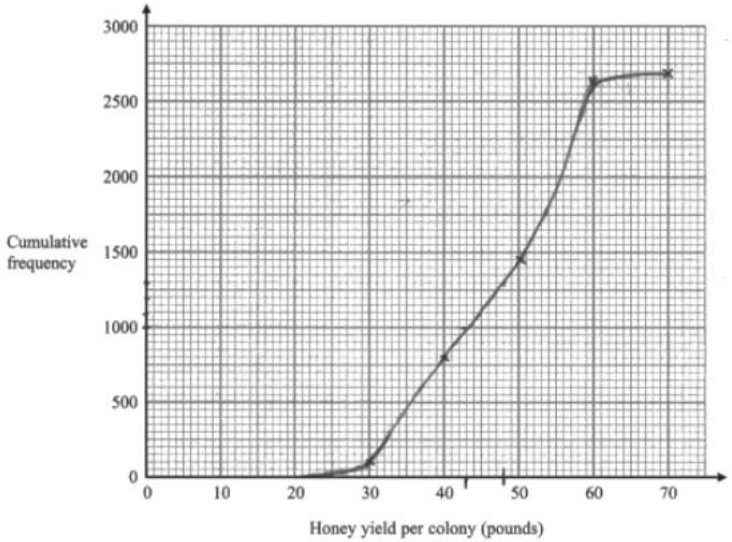
Question	Working	Answer	Mark	Notes
6(a)(i)		Shown	1	C1 for eg 17219 ÷ 365 = 47(.175…) Allow use on any value in the range 17000 to 17250
6(a)(ii)		Explanation	1	C1 for valid explanation, eg the number of stores opening is still declining but the number of stores closing is levelling off or The gap between the two graphs is getting wider which means the difference between closures and openings is getting larger or the closures per year is always higher than the openings per year

Question	Working	Answer	Mark	Notes
6(b)	Total closures 17219 Total openings 7160 High street closures = 6887 ÷ "17219" (= 0.39(9…)) oe High street openings = 2600 ÷ "7160" (= 0.36(3…)) oe Retail park closures = 1197 ÷ "17219" (= 0.069(…)) oe Retail park openings = 604 ÷ "7160" (= 0.084(…)) oe High street closures = 6687 ÷ (6887 + 2600) (= 0.72(0…)) oe High street openings = 2600 ÷ (6887 + 2600) (= 0.27(4…)) oe Retail park closures = 1197 ÷ (604 + 1197) (= 0.66(4…)) oe Retail park openings = 604 ÷ (604 + 1197) (= 0.33(5…)) oe 604 : 1197 = 1 : 1.98… or 0.50… : 1 2600 : 6887 = 1 : 2.64… or 0.37… : 1	Claim is correct and supportive figures	3	B1 for using 2 of 6887, 2600, 1197 or 604 M1 for finding one valid proportion for high street or retail park C1 for claim is correct with accurate comparative figures and explanation eg closures for high street is greater than openings but openings for retail parks is greater than closures
7(a)		Description	1	C1 for description relating to outliers
7(b)		800 to 900	2	B1 for correctly identifying the UQ 1900 to 1950 **and** LQ 1050 to 1100 A1 for answer in range 800 to 900

Question	Working	Answer	Mark	Notes
8(a)	$b = \frac{110.4}{82.5}$ $(=1.338...)$ $\bar{x} = \frac{20145}{10}$ $(=2014.5)$ $\bar{y} = \frac{128}{10}$ $(=12.8)$ $a = "12.8" - 1.34 \times "2014.5"$	Correct working shown	4	B1 correctly shows that b = 1.34 M1 for method to find mean of x or y M1 for use of $a = \bar{y} - b\bar{x}$ Condone incorrect means provided they are clearly identified or use of 1.33… A1 for correctly showing $a = -2687$ or ft their value of b in the range 1.33 to 1.34
8(b)	1.85 × 2021 – 3710 (= 28.85)	28.85	2	M1 for method to find % expected using x = 2021 A1 for 28.8(5)
8(c)		Comparison	1	C1 for a correct comparison of actual figures and predictions for 2020 and/or 2021 eg in 2020 the model is +2.3% which is close so suitable or 28.85 is a long way from 31.02 so not suitable

Question	Working	Answer	Mark	Notes
9(i)	See tables at end of scheme. $1-\frac{6\times"34"}{12\left(12^2-1\right)}$	0.881118..	6	M1 method to rank e.g. advertising spend from low to high or both advertising spend and sales revenue from low to high (condone one error) M1 ft finds d for their rankings (accept absolute differences) (condone one error) M1 ft for finding at least 6 values of d^2 for their ranking M1 ft for finding Σd^2 for at least 10 correct values for their ranking M1 ft for using the Spearman rank formula correctly for their figures A1 awrt 0.88
9(ii)		Yes and explanation	1	C1 ft for valid decision with explanation about strength and type of correlation, eg Yes Florence is correct because 0.88 suggests a strong positive relationship or it is close to 1 so is a strong positive relationship NB Decision may be No dependent on ft figures. Cannot ft from (i) if answer is >1 or <−1

Question	Working	Answer	Mark	Notes
10(a)		Exponential	1	C1 for suitable function, eg exponential or geometric Accept a description, eg growth function
10(b)(i)	eg (2008.2, 0) and (2021, 125) (125 – 0) ÷ (2021 – 2008.2) (= 9.76…) oe	8 to 12.5	3	B1 for drawing a suitable tangent at $y = 2015$ M1 for a complete method to find the gradient eg use of change in $ over change in years Working may be seen on the diagram A1 for answer in the range 8 to 12.5 oe NB No tangent drawn scores no marks
10(b)(ii)		Explanation	1	C1 for explanation, eg the rate of change of the advertising revenue or increase in revenue per year. Any figures stated can ft their answer to (b)(i)
10(c)	$\left[\left(\frac{209.49}{0.07}\right)^{\frac{1}{2021-2001}} - 1\right] \times 100 \ (= 49.21...)$	49(%)	3	B1 for use of 0.07 **and** 209.49 M1 for method to use the formula for G_n A1 for awrt 49(%)


Cumulative frequency
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
Honey yield per colony (pounds)

Store type	Sales revenue (billions $)	Advertising spend (millions $)	rank sales revenue	rank advertising spend	d	d^2
hobby, toy and games	5.9	180	1	2	-1	1
computer	6	90	2	1	1	1
furniture	6.1	190	3	3	0	0
jewelry	8.1	530	4	6	-2	4
shoe	16.9	460	5	5	0	0
womens clothing	17.2	600	6	7	-1	1
home furnishings	20.2	1100	7	9	-2	4
DIY	33.2	420	8	4	4	16
electronics	53.4	1010	9	8	1	1
department	59.8	2150	10	11	-1	1
family clothing	117.6	2920	11	12	-1	1
health and beauty	456.2	1200	12	10	2	4
						34

Store type	Sales revenue (billions $)	Advertising spend (millions $)	rank sales revenue	rank advertising spend	d	d^2
computer	6	90	2	1	1	1
hobby, toy and games	5.9	180	1	2	-1	1
furniture	6.1	190	3	3	0	0
DIY	33.2	420	8	4	4	16
shoe	16.9	460	5	5	0	0
jewelry	8.1	530	4	6	-2	4
womens clothing	17.2	600	6	7	-1	1
electronics	53.4	1010	9	8	1	1
home furnishings	20.2	1100	7	9	-2	4
health and beauty	456.2	1200	12	10	2	4
department	59.8	2150	10	11	-1	1
family clothing	117.6	2920	11	12	-1	1
						34

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