Mark Scheme (Results)

Summer 2306

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)		$\frac{60}{380}$	1	B1 for $\frac{60}{380}$ oe
1(a)(ii)	380 ÷ 2 – 168	22	2	M1 for 380 ÷ 2 – 168 A1 cao
1(b)(i)	191 ÷ 5 ÷ 60 = 0.6366… **or** 600000 × 60 × 5 = 180 million oe "0.6366…" × 1000000	Shown	2	M1 for method to find comparable figures C1 for comparable figures from correct working, eg 636000 – 637000 **or** 180 million oe (total cost for period)
1(b)(ii)	5100 ÷ 3 ÷ 168 = 10.119.. eg "10.119"…− "0.6366…" = 9.482… **or** "10.119…" ÷ "0.6366…" = 15.893… eg "9.482…" ÷ "0.6366..." × 100 = 1489.37.. **or** ("15.893…" − 1) × 100 = 1489.37…	1489 %	4	M1 for finding cost of a game for both time periods M1 ft for beginning method to find percentage change M1 ft for complete method to find percentage change A1 for awrt 1490 (increase) Accept accurate figures from sensible rounding, eg awrt 1590 or awrt 1570
1(c)(i)		Explanation	2	C2 for complete explanation in context, eg 12.3 represents the flat fee of 12.3 million for the first 10 games **and** 1.12 represents the additional 1.12 million per extra game (beyond 10) (C1 for partial explanation, eg 12.3 represents the guaranteed fee **or** 1.12 represents the additional 1.12 million per extra game)

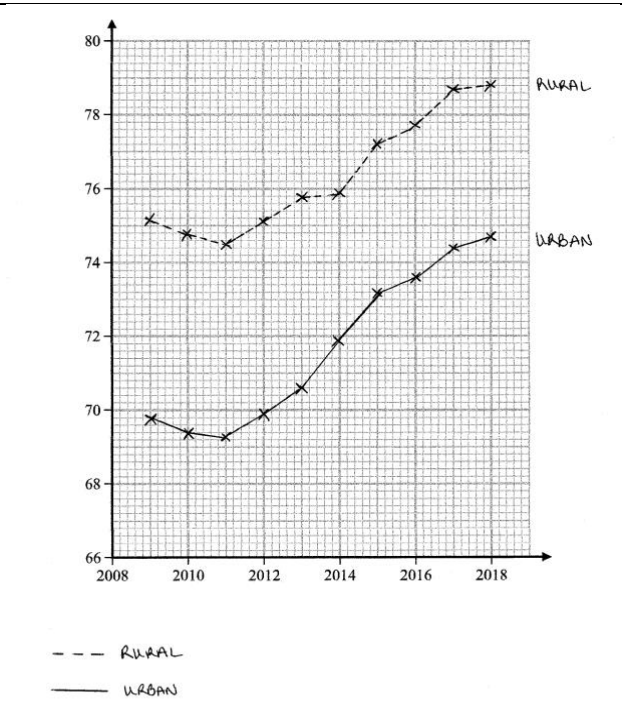
<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>1(c)(ii)</td><td></td><td>30.22</td><td>1</td><td>B1 cao</td></tr>
<tr><td>1(c)(iii)</td><td></td><td></td><td>1</td><td>C1 for explanation, eg Burnley will never get less than 12.3 million but using the formulae will subtract 1.12 for each game under 10 that have been live on TV</td></tr>
<tr><td>2(a)</td><td>$40.53 – 1.93 \times 8 = 25.09$
$40.53 – 1.93 \times 17 = 7.72$
$1.93 \times (17 – 8) = 17.37$</td><td>17.37 million</td><td>2</td><td>M1 for method to use 8 or 17 in model

A1 for awrt 17 million, using the model</td></tr>
<tr><td>2(b)(i)</td><td></td><td>Explanation</td><td>1</td><td>C1 for explanation, eg 20 is the number of teams in the Premier League</td></tr>
<tr><td>2(b)(ii)</td><td>$a = 40.53 – 1.93(1) = 38.6$
$l = 40.53 – 1.93(20) = 1.93$
<table><tr><td>n</td><td></td><td>n</td><td></td></tr><tr><td>1</td><td>38.6</td><td>11</td><td>19.3</td></tr><tr><td>2</td><td>36.67</td><td>12</td><td>17.37</td></tr><tr><td>3</td><td>34.74</td><td>13</td><td>15.44</td></tr><tr><td>4</td><td>32.81</td><td>14</td><td>13.51</td></tr><tr><td>5</td><td>30.88</td><td>15</td><td>11.58</td></tr><tr><td>6</td><td>28.95</td><td>16</td><td>9.65</td></tr><tr><td>7</td><td>27.02</td><td>17</td><td>7.72</td></tr><tr><td>8</td><td>25.09</td><td>18</td><td>5.79</td></tr><tr><td>9</td><td>23.16</td><td>19</td><td>3.86</td></tr><tr><td>10</td><td>21.23</td><td>20</td><td>1.93</td></tr></table>$0.5 \times 20 \times (38.6 + 1.93)$
$0.5 \times 20 \times [2 \times 38.6 + (20 – 1) \times (-1.93)]$</td><td>405.3 million</td><td>3</td><td>M1 for method to calculate at least one term

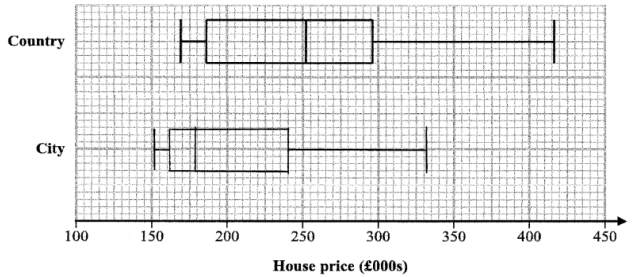
M1 for method to find sum of arithmetic series OR calculating the sum of at least 10 individual terms for the 20 league positions

A1 for awrt 405.3 million oe</td></tr>
</table>

Question	Working	Answer	Mark	Notes
2(b)(iii)		Reliable with reason	1	C1 ft for eg (fairly) reliable with valid reason, eg 405.3 million is very close to 405.5 million **or** 99.9% accurate
3(a)	$8 \times 3 + 2 \times 1 + 24 \times 3$	98	2	M1 for full method to calculate number of points A1 cao
3(b)	Arsenal = $\frac{11}{17}$ oe Leicester = $\frac{8}{15}$ oe	Arsenal	2	M1 for identifying two correct probabilities to work with C1 for Arsenal **s**upported by comparable figures eg 0.64(7..) **and** 0.53(3..) **or** 64(.7..)% **and** 53(.3..)% **or** $\frac{165}{255}$ **and** $\frac{136}{255}$
3(c)(i)		$\frac{19}{38}$	1	B1 for $\frac{19}{38}$ oe
3(c)(ii)		$\frac{12}{14}$	2	M1 for $\frac{x}{1+1+12}$, $x < 14$ **or** $\frac{12}{y}$, $y \neq 14$ **and** $y > 12$ A1 for $\frac{12}{14}$ oe
3(c)(iii)	P(FTL) × P(HTL) ≠ P(FTL∩HTL)	Not independent supported	1	C1 ft valid statement relating to independence, eg shows that the 2 events are not independent as P(L) ≠ P($L \mid HTL$) **or** P(FTL) × P(HTL) ≠ P(FTL∩HTL) **OR** the two events are likely to be linked and dependent as P(L) ≠ P($L \mid HTL$) so losing at half time is likely to lead to a full time loss

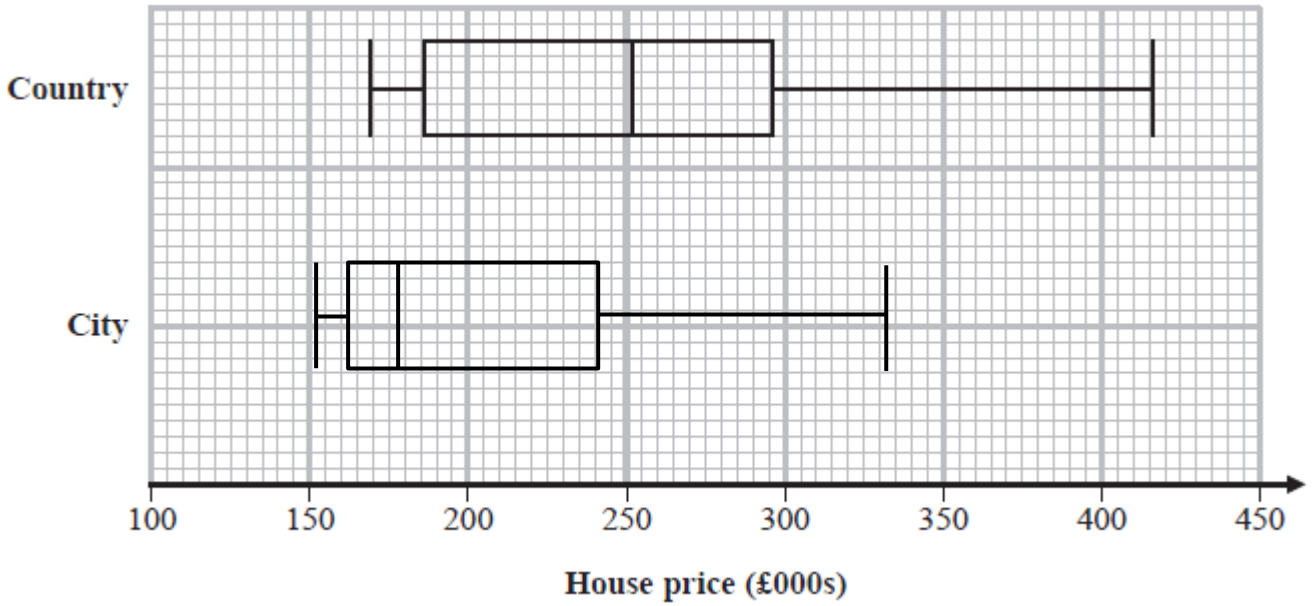
Question	Working	Answer	Mark	Notes
4	$19.4 \times 45^{0.42} = 95.973..$	254000	2	M1 for use of 45 in formula A1 awrt 254000
5(a)		Graph drawn	4	B1 for appropriate labels **or** key M1 for 7 or 8 points plotted correctly M1for 15 or 16 points correctly plotted A1 for two accurate time series graphs drawn
5(b)		Decision and valid statements	2	C2 ft for doesn't support the claim **and** comment about level of employment, eg urban percentage in employment is lower than rural so data **AND** for (Figure 1) does support the claim **and** comment about access to key services eg average urban travel time is about half the average rural travel time (C1 for one valid statement with or without a decision)

Question	Working	Answer	Mark	Notes
6		Decision and valid reason	1	C1 statement eg Do not know with reason eg as only percentages were given
7(a)(i)	$\bar{h} = \frac{2072200}{10} = 207220$ $\sqrt{\frac{466015400000}{10} - \left(\frac{2072200}{10}\right)^2}$	£207220 £60509.60	3	B1 for mean cao M1 ft for method to calculate standard deviation using formula A1 for awrt 60510
7(a)(ii)		Explanation	2	C2 ft Valid explanation with reason eg house prices are larger (extreme) in London **and** so the mean and SD would increase (C1 ft partial explanation eg London house prices are larger **or** mean **and** sd would increase)

Question	Working	Answer	Mark	Notes
7(b)(i)	LQ 164400 **or** 164050 UQ 240700 **or** 256800 IQR = 240700 – 164400 = 76300 **or** 256800 – 164050 = 92750 240700 + 1.5 × 76300 = 355150 (UB) 164400 – 1.5 × 76300 = 49950 (LB) **OR** 256800 + 1.5 × 92750 = 395925 (UB) 164050 – 1.5 × 92750 = 24925 (LB)	Shown	3	M1 for valid method to find either the LQ or UQ May be seen on the table M1 for full method to calculate at least one boundary C1 for identifying there are no outliers with correct figures, eg 355150 **and** 49950 **or** 395925 **and** 24925
7(b)(ii)	Med (173700 + 184500) ÷ 2 =179100 Min 151100 LQ 164400 **or** 164050 UQ 240700 **or** 256800 Max 331500  	Box plot drawn	3	M1 for correctly identifying the median as 179000 – 180000 may be seen in part (i), on the table or on the diagram only B2 ft for a fully correct box plot drawn (B1 ft for a partially correct box plot, allow up to 2 plotting errors)
7(c)		Two comparisons made	2	C2 ft for TWO valid comparisons, at least one in context eg median country price is larger so country houses are more expensive **and** country prices show less consistency/more variation as IQR/range is larger (C1 ft for one valid comparison eg median for city is smaller **or** IQR/range for city is smaller)

Question	Working	Answer	Mark	Notes
8(a)	144950 ÷ 23000(=6.302..) **OR** 6.2 × 23000(=142600) **OR** 144950 ÷ 6.2 (=23379.03..)	No/not affordable supported	2	M1 for method to find comparable figures to check for affordability C1 for No/ not affordable **and** supporting figures eg multiple of earnings would need to be greater than 6.3 **OR** max price of house is (£)142600 **OR** salary would need to be at least (£)23379(.03..)
8(b)(i)	$S_{rm} = 5138$ $S_{rr} = 10861000$ $S_{mm} = 2.824$ $\frac{1716260 - \left(\frac{217700 \times 78.6}{10}\right)}{\sqrt{\left(4750190000 - \frac{(217700)^2}{10}\right)\left(620.62 - \frac{(78.6)^2}{10}\right)}}$ $\frac{5138}{\sqrt{10861000 \times 2.824}}$	0.927..	3	M1 for a method to find one of S_{rr}, S_{rm} or S_{mm} **OR** for finding $(\sum r^2 - \frac{(\sum r)^2}{n})(\sum m^2 - \frac{(\sum m)^2}{n})$ M1 for a complete method to find correlation coefficient A1 0.927 to 0.928
8(b)(ii)		Explanation	1	C1 ft for explanation relating strong correlation to suitability, eg *r* is close to 1 so suggests strong positive correlation meaning strong linear correlation suitable for linear regression modelling
8(b)(iii)		Urban with reason	1	C1 ft for Urban with reason, eg there is a slightly stronger correlation meaning greater accuracy

Question	Working	Answer	Mark	Notes
8(c)	$y = 0.000555 \times 25600 - 5.48$	8.728 times with comment	3	M1 for use of $y = 0.000555x - 5.48$ A1 for 8.7 to 8.8 C1 ft for Comment about reliability e.g. data not within range so not reliable **or** not too far out of range so should be fairly reliable



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