Pearson
Edexcel

Mark Scheme (Results)

Summer 2022

Pearson Edexcel Level 3 Core
In Mathematics in Context (7MC0)
Paper 01

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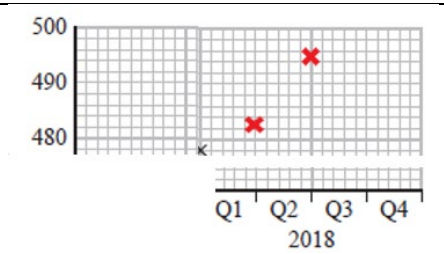
General Marking Guidance

- 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)	Total sales for 2015: 398 + 403 + 363 + 451 = 1615 Total sales for 2016: 418 + 459 + 442 + 547 = 1866 (1866 – 1615) ÷ 1615 × 100 OR (467 – 404) ÷ 404 × 100	15.5%	3	B1 For finding total sales for 2015 or 2016 OR for identifying both 404 and 467 M1 Full method to calculate percentage change between 2015 and 2016 A1 for awrt 15.5% OR 15.6%
1(b)(i)		Correct explanation	1	C1 Correct explanation relating to **seasonal** trends e.g. to smooth out **seasonal** trends or There are **four quarters** in a year.
1(b)(ii)	(463 + 461 + 462 + 592) ÷ 4	494.5	2	M1 Full method to calculate the correct moving average A1 494 OR 494.5 OR 495
1(c)		Points plotted correctly	1	B1ft answer to part (b)(ii) both points plotted correctly

Question	Working	Answer	Mark	Notes
1(d)(i)	Q2 2016 − 750 000, recent trend shows great increase Q2 2018 − 550 000, recent trend shows slight increase	Q2 2016 − 750 000 Q2 2018 − 550 000 With valid reasons	2	C2 Correctly stating both values with correct years with valid reasons. e.g. sales went up a lot in 2016, sales slowed down in 2018 (C1 Correctly stating values with correct years OR correctly stating one value with correct year with valid reason)
1(d)(ii)		Q2 2018 with reason	1	C1 Selecting the most recent prediction with valid reason e.g. 2018 because more recent data is more likely to give a more accurate prediction or Includes data from longer period of time.

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>2(a)(i)</td><td><table><tr><th>f</th><th>x</th><th>fx</th></tr><tr><td>364</td><td>6</td><td>2184</td></tr><tr><td>531</td><td>3.5</td><td>1858.5</td></tr><tr><td>349</td><td>1.5</td><td>523.5</td></tr><tr><td>1244</td><td></td><td>4566</td></tr></table></td><td>3.67</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 (dep) for use of at least 2 correct midpoints. Can be implied by correct products if midpoints not explicitly stated.

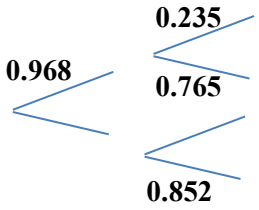
M1 (dep on 1st M) for 'Σfx' ÷ 1244

A1 awrt 3.7</td></tr>
<tr><td>2(a)(ii)</td><td><table><tr><th>f</th><th>x</th><th>fx</th><th>fx²</th></tr><tr><td>364</td><td>6</td><td>2184</td><td>13104</td></tr><tr><td>531</td><td>3.5</td><td>1858.5</td><td>6504.75</td></tr><tr><td>349</td><td>1.5</td><td>523.5</td><td>785.25</td></tr><tr><td>1244</td><td></td><td>4566</td><td>20394</td></tr></table>e.g. √(20394 ÷ 1244 – “3.67”²) =1.7102..</td><td>1.71</td><td>3</td><td>M1 for finding at least 2 products fx^2 within interval (including end points). Can be implied by correct products if midpoints not explicitly stated.

M1 (dep) for a complete method to find the standard deviation using their mean value from pt(i)

A1ft answers in the range 1.6 – 1.71</td></tr>
</table>

Question	Working	Answer	Mark	Notes
2(b)		Correct comments and conclusion	2	C1ft for a valid comment comparing means OR SDs C1ft for a valid comment comparing means AND SDs with at least one comparison in context e.g. men cycle on more days per week than women (accept men cycle more than women) OR Since standard deviations are approximately equal the **spread** of the number of days cycled per week is the same for men and women OR SD for men is greater than that for women so there is a greater spread of days cycled for men

Question	Working	Answer	Mark	Notes
3 (a)		Correct explanation	1	C1 e.g. Some participants had two or more health issues, so will have been included more than once or some might have no health issues.
3(b)(i)	6751 ÷ 213050	Shown	1	B1 6751 ÷ 213050 = 0.032 NB 6751 ÷ 206299 = 0.0327… scores B0
3(b)(ii)	998 ÷ 6751 = 0.1478..	Shown	2	M1 $x \div 6751$, $x < 6751$ OR $998 \div y$, $y > 998$ A1 0.148
3(b)(iii)		Correct probabilities	2	B2 all probabilities correct (B1 one probability correct)

Question	Working	Answer	Mark	Notes
3(b)(iv)	P(A) = 0.032 (Given) P(B|A) = 0.148 P(A∩B) = 0.032 × 0.148 = 0.005 (4.736×10^{-3}) If the tree diagram is used to calculate P(B) P(B) = 0.032 × 0.148 + "0.968" × "0.235" = 0.233 P(A) × P(B) = 0.032 × "0.233" = 0.007 (7.456×10^{-3}) P(A|B) = 4.736×10^{-3} ÷ "0.233" = 0.0201 If the table is used to calculate P(B) P(B) = 52 690 ÷ 227 272 = 0.232 P(A) × P(B) = 0.032 × "0.232" = 0.007 (7.424×10^{-3}) P(A|B) = 4.736×10^{-3} ÷ "0.232" = 0.0205	Not independent with supporting figures	3	B1ft Calculates P(A∩B) OR P(B) OR STATES "P(B|A) = 0.148" M1 For comparable probabilities P(A) × P(B) AND P(A∩B) calculated OR P(B) AND P(B|A) OR P(A) AND P(A|B) C1ft A full numerically correct solution with clear statement e.g. P(A) × P(B) ≠ P(A∩B) OR P(B) ≠ P(B|A) OR P(A) ≠ P(A|B) AND states A and B are not independent (ft their tree diagram in (b)(iii))
3(c)	e.g. 0.235 ÷ 0.148 = 1.587.. (0.235 − 0.148) ÷ 0.148 = 0.587.. OR 0.148 + 0.6 × 0.148 = 0.2368	Valid conclusion with supporting figures	2	M1 0.235 ÷ 0.148 OR (0.235 − 0.148) ÷ 0.148 o.e. OR 0.148 + 0.6 × 0.148 o.e. C1 Valid decision AND e.g 1.59 or 0.59 (awrt) o.e. OR Valid decision AND 0.237 (awrt) (S.C M1 only for 0.148 ÷ 0.235 OR (0.235 − 0.148) ÷ 0.235)

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>4</td><td></td><td>55%</td><td>1</td><td>B1 55(%)</td></tr>
<tr><td>5(i)</td><td>
<table>
<tr><th>Country</th><th>Waste</th><th>GDP</th><th>d^2</th></tr>
<tr><td>Australia</td><td>1 (12)</td><td>2 (11)</td><td>1</td></tr>
<tr><td>United States</td><td>2 (11)</td><td>1 (12)</td><td>1</td></tr>
<tr><td>Japan</td><td>3 (10)</td><td>4.5 (8.5)</td><td>2.25</td></tr>
<tr><td>Germany</td><td>4 (9)</td><td>3 (10)</td><td>1</td></tr>
<tr><td>Portugal</td><td>5 (8)</td><td>8 (5)</td><td>9</td></tr>
<tr><td>France</td><td>6 (7)</td><td>6 (7)</td><td>0</td></tr>
<tr><td>South Korea</td><td>7 (6)</td><td>7 (6)</td><td>0</td></tr>
<tr><td>United Kingdom</td><td>8 (5)</td><td>4.5 (8.5)</td><td>12.25</td></tr>
<tr><td>Brazil</td><td>9 (4)</td><td>11 (2)</td><td>4</td></tr>
<tr><td>Russia</td><td>10 (3)</td><td>9 (4)</td><td>1</td></tr>
<tr><td>India</td><td>11 (2)</td><td>12 (1)</td><td>1</td></tr>
<tr><td>China</td><td>12 (1)</td><td>10 (3)</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td>36.5</td></tr>
</table>
$1 - \frac{6 \times 36.5}{12 \times (12^2 - 1)}$
</td><td>0.872378</td><td>6</td><td>M1 method to use tied ranking
e.g. GDP from low to high or
both Food waste and GDP from high to low
(condone one error)

M1 ft finds d for their rankings
(condone one error)

M1 ft for finding Σd^2 for their ranking
(condone one error)

A1 $\Sigma d^2 = 36.5$

M1 for using the Spearman rank formula correctly for their figures

A1 awrt 0.87</td></tr>
<tr><td>5(ii)</td><td></td><td>Valid decision with reason</td><td>1</td><td>C1 ft Valid decision with reason, e.g.
Yes, the SR coefficient is (quite) close to 1 or
Correct, (strong) positive correlation.</td></tr>
</table>

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr>
<td>6(a)(i)</td>
<td>Waste = 275×0.95^{13}
OR by listing terms
<table>
<tr><td>2017</td><td>275.00</td></tr>
<tr><td>2018</td><td>261.25</td></tr>
<tr><td>2019</td><td>248.19</td></tr>
<tr><td>2020</td><td>235.78</td></tr>
<tr><td>2021</td><td>223.99</td></tr>
<tr><td>2022</td><td>212.79</td></tr>
<tr><td>2023</td><td>202.15</td></tr>
<tr><td>2024</td><td>192.04</td></tr>
<tr><td>2025</td><td>182.44</td></tr>
<tr><td>2026</td><td>173.32</td></tr>
<tr><td>2027</td><td>164.65</td></tr>
<tr><td>2028</td><td>156.42</td></tr>
<tr><td>2029</td><td>148.60</td></tr>
<tr><td>2030</td><td>141.17</td></tr>
</table>
</td>
<td>Correct conclusion with supporting figures</td>
<td>3</td>
<td>B1 Use of a GP with 1st term 275 and common ratio 0.95 OR 261(.25) seen

M1 Full method e.g. “275” × $(1 - \frac{5}{100})^{n}$,
where n = 12, 13 or 14
OR 12, 13 or 14 terms calculated

C1 “No” AND awrt 141 AND 137.5 OR
“No” AND awrt 141 AND 282

(accept the use of 93 kg rather than 275 kg in parts (a) and (b))</td>
</tr>
<tr>
<td>6(a)(ii)</td>
<td>$275 \times (1 - 0.95^{14}) \div (1 - 0.95)$
OR attempt to sum first 14 terms (see table above)</td>
<td>2820 kg</td>
<td>3</td>
<td>M1 $275 \times (1 - (1 - \frac{5}{100})^{n}) \div (1 - \frac{5}{100})$
where n = 13, 14, 15
OR attempt to sum first 13, 14 or 15 terms in a GP where a = 275 and r = 0.95

M1 $275 \times (1 - (1 - \frac{5}{100})^{14}) \div (1 - \frac{5}{100})$
OR attempt to sum first 14 terms in a GP where a = 275 and r = 0.95

A1 awrt 2820 (kg)</td>
</tr>
</table>

<table>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>6(b)</td><td>Use of an AP with 1st term 275 and 14th term 137.5
137.5 ÷ 13 = 10.5769..
n = 12, 11.4583..
n = 14, 9.8214..</td><td>11kg</td><td>2</td><td>M1 137.5 ÷ n, where n = 12, 13 or 14

A1 answers in the range ± (10.5 – 11) (kg) AND
n = 13 explicitly used</td></tr>
<tr><td>7</td><td>
<table>
<tr><th>Region</th><th>%</th></tr>
<tr><td>Europe (H)</td><td>93÷275 = 33.81..</td></tr>
<tr><td>North America and Oceania (H)</td><td>118÷302 = 39.07..</td></tr>
<tr><td>Industrialized Asia (UM)</td><td>72÷233 = 30.90..</td></tr>
<tr><td>Latin America (M)</td><td>24÷219 = 10.95..</td></tr>
<tr><td>North Africa, West and Central Asia (M)</td><td>35÷233 = 15.021..</td></tr>
<tr><td>South and Southeast Asia (LM)</td><td>11÷124 = 8.87..</td></tr>
<tr><td>Sub-Saharan Africa (L)</td><td>7÷183 = 3.82..</td></tr>
</table>
OR
<table>
<tr><td>High</td><td>211÷577 = 36.56..</td></tr>
<tr><td>Middle</td><td>142÷809 = 17.55..</td></tr>
<tr><td>Low</td><td>7÷183 = 3.82..</td></tr>
</table>
OR
<table>
<tr><td>High</td><td>211÷577 = 36.56..</td></tr>
<tr><td>Other</td><td>149÷992 = 15.020..</td></tr>
</table>
</td><td>Correct conclusion with supporting figures</td><td>4</td><td>M1 Method to find one relevant proportion
e.g. $\frac{93}{275}$ or 211 ÷ 577 oe

M1 Method to compare high income region with middle or low income region
e.g. 93 ÷ 275 AND 72 ÷ 233 seen

M1 Method to compare high income region with both middle and low income regions
e.g. Europe 34%, Industrialized Asia 30.9% and Sub-Saharan Africa 3.8% seen

(Condone S and SE Asia considered as low income and Industrialised Asia considered as high income for method marks only)

C1 Correct conclusion with supporting figures
e.g. “Newspaper is correct” AND (Europe) 34%, (Industrialized Asia) 31% AND (Sub-Saharan Africa) 4% seen
May work in fractions, decimals or percentages throughout.</td></tr>
</table>

Question	Working	Answer	Mark	Notes
8(a)	18.4 × 15415 ÷ 365 = 777.084…	777 litres	3	B1 use of 18.4 and 15415 M1 18.4 × 15415 ÷ 365 A1 awrt 777 (litres)
8(b)	Protein in beef: 18.4 × 138 = 2539.2 g OR 138 ÷ 166 (= 0.8313..) Weight of soybeans: 2539.2 ÷ 166 = 15.296.. kg OR "0.8313.." × 18.4 = 15.296..	15.3 kg	3	M1 For a valid first step M1 Full method to calculate weight of soybeans A1 awrt 15.3 kg

Question	Working	Answer	Mark	Notes
8(c)	15.3 × 2145 = 32818.5 litres (yearly water soy) 32818.5 ÷ 365= 89.91.. litres (daily water soy) 18.4 × 15415 = 283636 litres (yearly water beef) METHOD 1 – comparing percentages, e.g. (777.08... - 89.91..) ÷ 2757 × 100 = 24.9% or (“283636” – “32818.5”) ÷ (2757 × 365) × 100 = 24.9% METHOD 2 – Comparing amounts – 25%, e.g. Per day: 777.08.. − 89.91.. = 687.17.. or Per year: “283636” – “32818.5” = 250817.5 Target reduction: Per day: 2757 × 25 ÷ 100 = 689.25 or Per year: 2757 × 365 × 25 ÷ 100 = 251576.25 METHOD 2 – Comparing amounts – 75%, e.g. Per day: 2757 – (777.08.. − 89.91..) = 2069.91.. or Per year: 2757 × 365 – (“283636” – “32818.5”) = 755487.5 (or 2069.91.. × 365 = 755513.5 – 755518.5 Target reduction: Per day: 2757 × 75 ÷ 100 = 2067.75 or Per year: 2757 × 365 × 75 ÷ 100 = 754728.75	Correct conclusion with comparable figures	4	M1 ft Calculates water footprint for soybeans OR Calculates target reduction (per day or per year using 25% or 75%) M1 ft Finds daily water footprint for soybeans OR yearly water footprint for beef M1 ft Full method to compare reduction with target C1ft Correct conclusion with comparable figures, e.g. 24.9% OR 689.25 and 687.1 (per day using 25%) OR 2067.75 and 2069.9 (per day using 75%) OR 251576.25 and 250791.5 (per year using 25%) OR 754728.75 and 755487.5 (per year using 75%) (Follow through answers from pt (a) and (b) for all marks)

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