



Pearson
Edexcel

Mark Scheme (Results)

Summer 2019

Pearson Edexcel Level 3 Certificate
In Mathematics in Context (7MC0) Paper 2

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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)	because there are 4 quarters in the year	correct statement	1	C1 correct statement.
(a)(ii)	$(45.5+61.7+72.2+53.2)\div 4$	58.2 million	2	M1 for complete method to calculate moving average. A1 58.15 or 58.2 (million) oe. NB may be seen in table or on graph.
(b)	52.7, 53.0, 53.8, 54.4, 55.1, 55.9, 56.5, 57.4, 58.2	Points correctly plotted	2	B2 ft All points plotted correctly with no extra points (B1ft At least 5 of their points plotted correctly (no more than 2 extra points plotted)) NB Condone "58.2" omitted for B2. SC B1 for all points plotted consistently within relevant quarters (allow one error/omission)
(c)		Answers in the range 235000000- 255000000	3	M1 Evidence of use of graph for 2016 OR finding value for one quarter in 2016 OR draws a trendline. M1 complete method to find total for 2016 A1 Answers in the range 235000000-255000000 or 235 million - 255 million SC B2 answers in range 235-255 (without millions)
2(a)		0 – 15	1	B1 0 – 15 OR 0 – 15.5

Question	Working			Answer	Mark	Notes
2(b)(i)	f	x	fx	17.91996 (minutes)	4	<p>M1 for finding at least 4 products fx within interval (including end points). Can be implied by correct products if midpoints not explicitly stated.</p> <p>M1 (dep) for use of at least 3 correct midpoints. Can be implied by correct products if midpoints not explicitly stated. Condone use of 45, 120 and 270 used as midpoints.</p> <p>M1 (dep on 1st M) for 'Σfx'=469007</p> <p>A1 awrt 17.9 (minutes) OR awrt 18.1 (minutes)</p> <p>NB additional tables of values at end of MS for endpoints</p>
	354461	7.5	2658457.5			
	57334	23	1318682			
	36564	45.5	1663662			
	18810	120.5	2266605			
	1838	270.5	497179			
	469007		8404585.5			
2(b)(ii)	f	x	fx²	28.57534 (minutes)	3	<p>M1 for finding at least 4 products fx^2 within interval (including end points). Can be implied by correct products if midpoints not explicitly stated. OR</p> <p>for finding at least 3 values using $f(x - \bar{x})^2$</p> <p>M1 (dep) for a complete method to find the standard deviation using their mean value from ptb (i)</p> <p>A1 answers in the range 28.4 - 28.6 minutes</p> <p>NB tables of values at end of MS for endpoints and $f(x - \bar{x})^2$</p>
	354461	7.5	19938431.25			
	57334	23	30329686			
	36564	45.5	75696621			
	18810	120.5	273125902.5			
	1838	270.5	134486919.5			
	469007		533577560.3			
	$\sqrt{\frac{8404585.5}{469007} - \left(\frac{533577560.3}{469007}\right)^2}$					
2(c)					2	<p>C1 ft for a comment comparing means</p> <p>C1 ft for a comment comparing SD</p> <p>For C2 at least one comparison must include a decision relating to the claim.</p>

Question	Working	Answer	Mark	Notes
2(d)			2	C2 ft Valid explanation with reason eg the midpoint is bigger than the actual value so the mean would decrease (C1 ft Partial explanation eg the midpoint is bigger or mean would decrease)
3(a)		$V=1.015^n x$	2	B2 for $V=1.015^n x$ oe (B1 for $V=a^n x$ oe) or $1.015^n x$
(b)		Graph D	1	B1 Graph D indicated
4(a)	1591.5 + 1688.5815 + 1791.584972 1591.5 or 1688.5815 or 1791.584972	5071.67	4	M2 for 2 of $1500 \times "1.061"$ oe or $1500 \times "1.061"^{2}$ oe or $1500 \times "1.061"^{3}$ oe (M1 for finding value for one year correctly) M1 (dep M1) for a complete method to find the total A1 5071 to 5071.67
(b)		No and reason	2	M1ft for a relevant calculation eg $1500 \times "1.061"^{4}$ (=1900.87) or $"5071.67" \times "0.061"$ (= 309.37...) C1 No supported by accurate reason OR C2 ft fully explained reason eg No AND she will owe extra interest on the original amount (for the 4 th year as well as an additional 1591.50 from the extra amount borrowed) (C1 for a partial explanation)
5(a)(i)		(£)4250	2	M1 for $3000+5 \times 250$ OR $3000+250n$ where $n > 1$ and $n \neq 5$ A1 cao

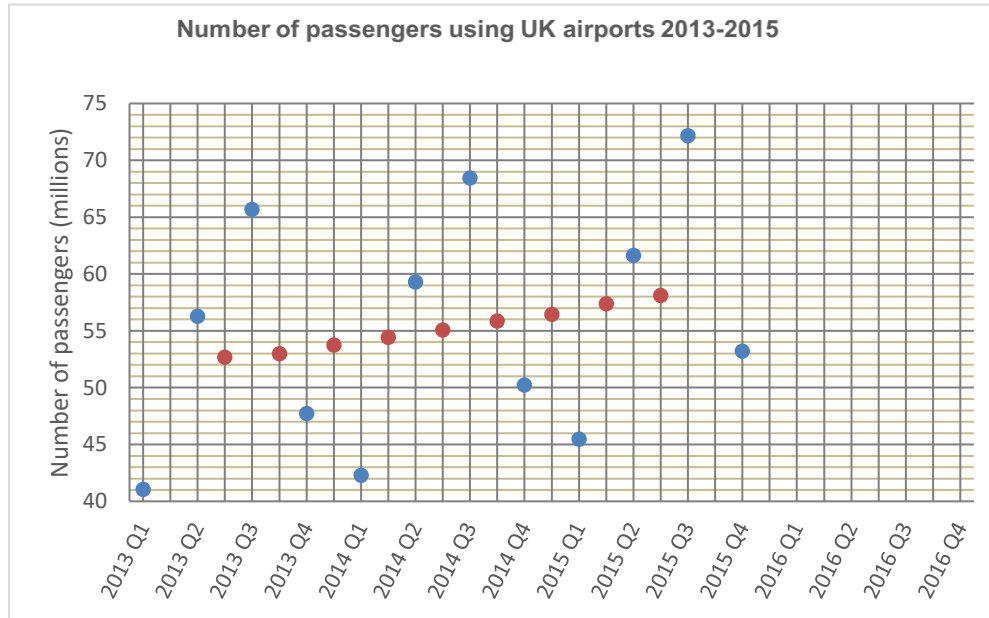
Question	Working	Answer	Mark	Notes
5(a)(ii)		$3000+250(n-1)$	2	M1 for $3000+250n$ or $3000+K(n-1)$ where $K \neq 250$ or $250(n-1)$ A1 oe eg $2750 + 250n$
5(b)(i)		Assumptions	1	C1 eg The interest rate stays the same or Nothing is withdrawn in the first n months or £x invested at the beginning of first year or no tax will be paid on the interest earned or no costs are incurred
(ii)		Geometric	1	C1 Geometric or Geometric sequence
(iii)	$1.0048^5 \times 10000 (=10242.31509)$ $\frac{1-1.0048^5}{1-1.0048} (=5.048230953)$ or $1+1.0048+1.0048^2..+1.0048^4$ “10242.3..”+2500×“5.04..”=22862.89 22842 is from truncated figures to 2 dp	22862.89	4	M1 for a method to evaluate the term in x M1 for beginning to work with terms in sigma (at least 3 terms correct) NB 2500 may or may not be seen at this stage M1 for a complete method to evaluate P_n A1 for 22842-22863 (from a correct method)
6		$(A3-B3) \times \frac{9}{100}$	1	$(A3-B3) \times 9/100$ or $\frac{9}{100} \times A3 - \frac{9}{100} \times B3$ or 0.09 *(A3-B3) oe
7(a)	$\frac{57889102}{61064454}$	0.94 – 0.95	1	B1 0.94 to 0.95 oe
7b)		Reason	1	C1 eg probability cannot be over 1

Question	Working	Answer	Mark	Notes
7c)	eg $61064454 \div 100 \times 52 (=31753516.08)$	30 million	2	M1 a complete method eg $60\,000\,000 \div 100 \times 50$ NB rounding can take part at any time in the working or in the final answer or may not be seen A1 30 to 32 million (supported by relevant calculations)
8a	$184/4 = 46$ $184/2 = 92$ $\frac{3}{4} \times 184 = 138$ SC using 50, 100 and 150 LQ=9, Median=19-20, UQ=39	Shown	4	B1 for correctly identifying either the LQ 8 or UQ 35 NB may be seen in part b M1 for $LQ - 1.5 \times [UQ - LQ]$ or $UQ + 1.5 \times [UQ - LQ]$ A1 for -32.5 or a clear conclusion that the answer is below zero and 75.5 C1 ft (dep M1) for comparison of maximum and minimum values to show no outliers SC B2 for a whole process using graph readings at 50, 100 and 150
8b		Boxplot drawn	3	B1 for correctly identifying the median as 17-18 B2 ft for a fully correct box plot drawn with 5 items (B1 for a partially correct box plot, must plot 3 of items correctly (outliers are 1 item))

Question	Working	Answer	Mark	Notes
9(i)	$1 - \frac{6 \times 524}{15(224)} = 1 - \frac{3144}{3360}$	0.06..	6	M1 method to rank number of landlines and number of mobile phones either way round but consistently M1 ft finds d for their rankings M1 ft for finding Σd^2 for their ranking A1 for $\Sigma d^2 = 524$ M1 ft for using the Spearman rank formula correctly for their figures A1 for SR= 0.06(428571)
(ii)		Decision with valid statement	1	C1 ft eg no correlation and so cannot support this statement
10		Two reasons	2	C2 two valid reasons (C1 for one valid reason eg only cities used or no representative from Northern Ireland, Wales or Scotland or most of the people asked come from London or 400 is only a small proportion of the population of the UK or sample size is too small)
11(a)	$12x + 4y = 2592$ and $7x + 5y = 1656$ $60x + 20y = 12960$ $28x + 20y = 6624$ or $84x + 28y = 18144$ $84x + 60y = 19872$	£2826	6	B1 for setting up the correct equations M1 for correct method to eliminate one variable M1 for a complete method to find the other variable eg by substitution or by elimination A1 for $x = 198$ and $y = 54$ M1 ft for complete method to find the total cost of the required items using their values for x and y A1 for 2826
(b)		$y = 15x + 20$	1	B1 oe

Question	Working	Answer	Mark	Notes
9c)	$200 < ("15x + 20")$ $\frac{180}{15} < x$ or $12 < x$	13	4	M1 ft for 0.1 ("15x + 20") used M1 $20 < 0.1$ ("15x + 20") oe (accept equality here) M1 for method to isolate the term in x or $x = 12$ A1 cao
12(a)(i)		Inequalities shown	3	M1 for $15x + 25y \leq 10 \times 60 \times 60$ oe or $10x + 8y \leq 19 \times 1000$ oe M1 for $15x + 25y \leq 10 \times 60 \times 60$ and $10x + 8y \leq 19 \times 1000$ oe A1 for simplification to correct form
(a)(ii)		$x \geq 4y$	2	M1 for x [sign] $4y$ oe OR $x \geq ny$ oe where $n \neq 4$ A1 $x \geq 4y$ oe
(b)		Diagram drawn	4	M1 for $3x + 5y = 7200$ drawn M1 for $5x + 4y = 9500$ drawn M1 ft for " $x \geq 4$ "y drawn A1 fully correct diagram

1b



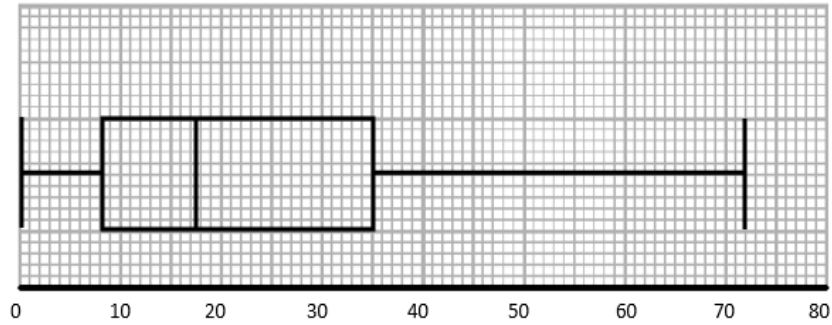
2b (i)

f	x	fx
354461	15	5316915
57334	30	1720020
36564	60	2193840
18810	180	3385800
1838	360	661680
469007		13278255
"13278255" ÷ 469007 (= 28.31142179)		

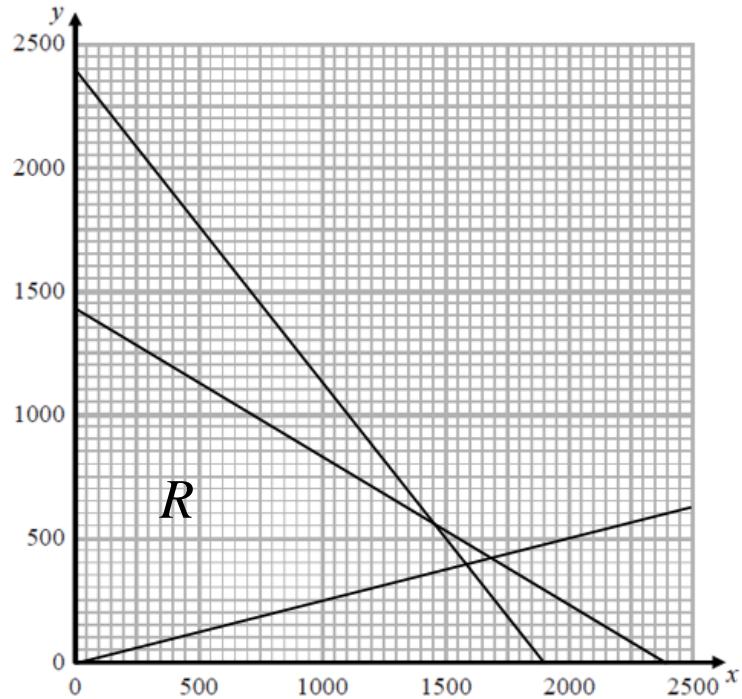
2b (ii)

f	x	fx	x-xbar	(x-xbar)²	F(x-xbar)²
354461	7.5	2658457.5	-10.42	108.5764	38486099.32
57334	23	1318682	5.08	25.8064	1479584.14
36564	45.5	1663662	27.58	760.6564	27812640.61
18810	120.5	2266605	102.58	10522.66	197931166.9
1838	270.5	497179	252.58	63796.68	117258254.5
469007		8404585.5		75214.35	382967745.4
$\sqrt{382967745.4 \div 469007} = 28.57534$					

8b



12b



9 (i)

Country	Number of mobile line subscriptions per 100 people	Number of landlines per 100 people		d^2
South Africa	24	7	$2.5-1=1.5$	2.25
Mexico	91	16	$6-2=4$	16
Bolivia	93	8	$4-3=1$	1
Ireland	100	38	$10.5-4=6.5$	42.25
France	101	58	$13-5=8$	64
Cook Island	105	75	$15-6=9$	81
Norway	109	6	$1-7=-6$	36
Guernsey	113	60	$14-8=6$	36
Peru	120	10	$5-9=-4$	16
Serbia	127	28	$9-10=-1$	1
USA	129	38	$10.5-11=-0.5$	0.25
New Zealand	130	41	$12-12=0$	0
Latvia	135	19	$7-13=-6$	36
Russia	163	23	$8-14=-6$	36
Thailand	171	7	$2.5-15=-12.5$	156.25

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