Mark Scheme (Results)

October 2020

Pearson Edexcel Level 3 Certificate

Mathematics in Context

Paper 1: Comprehension (7MC0/01)

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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)	$\dfrac{23.6(\text{million}) - 2.7(\text{million})}{2.7(\text{million})} \times 100$	Increase of 774(.074..)(%)	3	B1 evidence of using 2.7 million **and** 23.6 million M1 for complete method to find percentage change C1 e.g. 4G subscriptions increased by (awrt) 774(%) or 4G subscriptions have increased 7 (or 8) fold
1(b)	$23.6 \div 28 \times 100$	84(.285..)million	2	M1 for complete method to calculate reverse percentage A1 awrt 84 million
1(c)(i)	$\dfrac{(100 - 14.7)}{100} = 0.853$	Full explanation	2	C2 correct interpretation of 110 e.g 110 (billion) is initial amount of SMS sent in 2014 **and** correct explanation that 0.853 is decimal multiplier for a 14.7% decrease (C1 correct interpretation of 110 e.g 110 (billion) is initial amount of SMS sent in 2014 **OR** begins to show that 0.853 is decimal multiplier e.g. 100 – 14.7 = 85.3 **OR** state geometric series)
1(c)(ii)	110×0.853^{10} **OR** <table><tr><td>2014</td><td>110</td></tr><tr><td>2015</td><td>93.83</td></tr><tr><td>2016</td><td>80.03699</td></tr><tr><td>2017</td><td>68.27155247</td></tr><tr><td>2018</td><td>58.23563426</td></tr><tr><td>2019</td><td>49.67499602</td></tr><tr><td>2020</td><td>42.37277161</td></tr><tr><td>2021</td><td>36.14397418</td></tr><tr><td>2022</td><td>30.83080998</td></tr><tr><td>2023</td><td>26.29868091</td></tr><tr><td>2024</td><td>22.43277482</td></tr></table>	(year) 2024	3	M2 appropriate method used to find n = 10 **OR** 22.4… identified as final number of SMS messages (M1 for trials for at least 2 years using 0.853) A1 (year) 2024 NB Use of Logarithms may be seen and should be awarded marks

Question	Working	Answer	Mark	Notes
2(a)		Valid statement	1	C1 Valid statement e.g. unequal class intervals (allow widths) or age is continuous data
2(b)	$0.74 \times 9 = 6.66$ or $0.24 \times 30 = 7.2$ $16 \div 20 = 0.8$ or $8.2 \div 10 = 0.82$	6.66, 7.2 **and** bars drawn at correct height **and** correct width	4	M1 for correct calculation to find at least 1 frequency e.g. 0.74×9 oe A1 Correct frequencies calculated 6.66 **and** 7.2 B2 Completed histogram (B1 for at least 1 bar drawn correctly or correct calculation used to find at least 1 fd
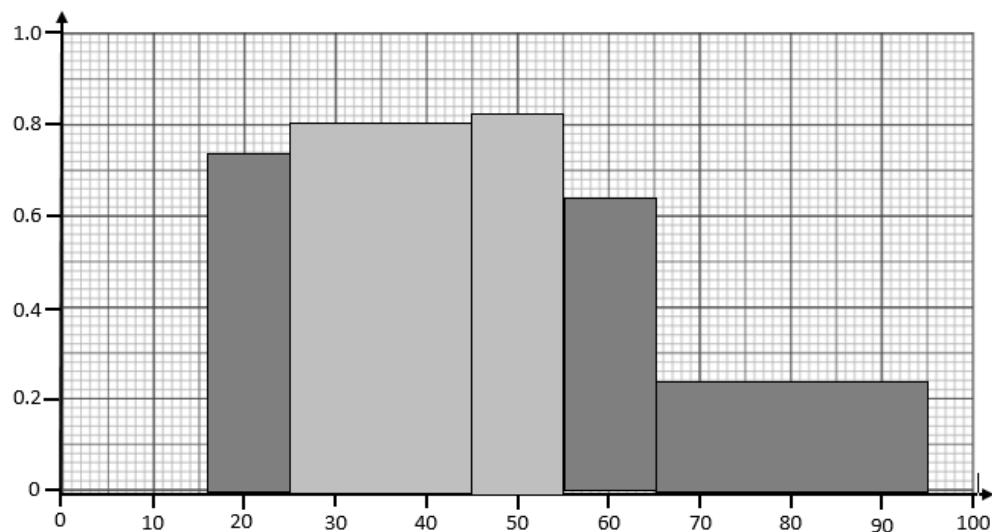
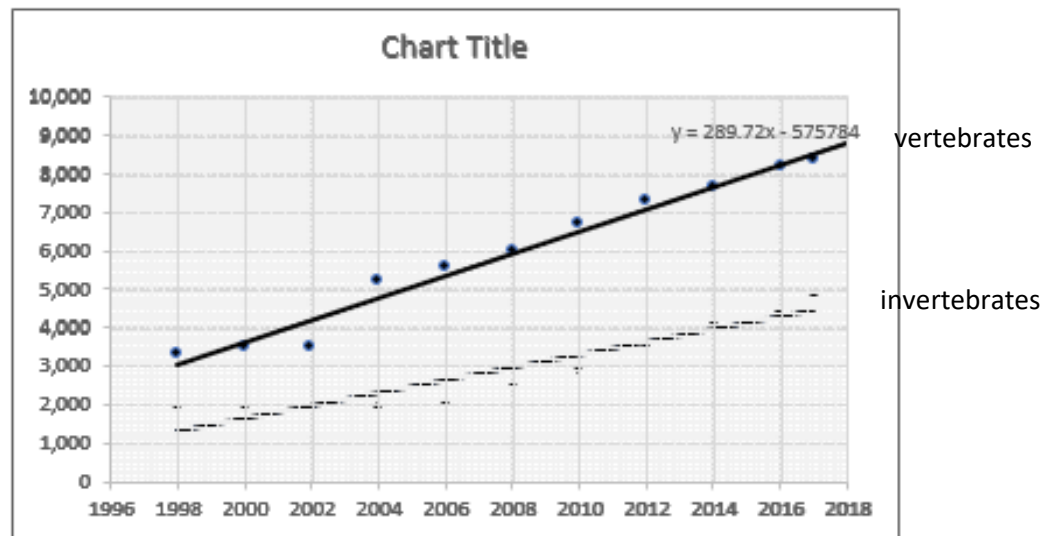| Question	Working	Answer	Mark	Notes
2(c)	$25 + (22.23 - \text{"6.66"}) \times \dfrac{20}{16.0}$	44 (years old)	2	M1 appropriate method used A1 44.46 or 44.5 (years old)
2(d)	$\dfrac{\text{"6.66"} + 16}{\text{"6.66"} + 16 + 8.2 + 6.4 + \text{"7.2"}}$	0.50967…	2	M1 ft Complete method to calculate correct probability for their frequencies A1 ft awrt 0.51

Question	Working	Answer	Mark	Notes
3(a)		Explanation	1	C1 Valid explanation e.g. they are tied ranks as they have the same charging time **or** equally 6th and 7th in order of charging time
3(b)	= (B4 – C4)^2 **OR** = (B4 – C4)*(B4 – C4)	=(B4 – C4)^2	2	M1 for implying $(-12)^2$ A1 correct spreadsheet notation oe
3(c)		Statement	1	C1 Valid statement e.g. negative correlation so no she is wrong **OR** No because it is close to 0 so there is no correlation
4(a)	$$\frac{40-22}{12} = 1.5$$	1.5 billion	3	B1 Identifies Jan 12 = 22 and Jan 13 = 40 M1 complete method to find average for their identified values A1 1.5 billion oe
4(b)(i)	$$\frac{1.49 \times (1 - 1.52^{10})}{(1 - 1.52)}$$ **OR** Summing totals for 2009 – 2017	185(.76810..) billion	3	M1 use of 2 of a = 1.49, r = 1.52, n = 10 in correct formula e.g. $1.49 \times (1 - 1.52^{n}) / (1 - 1.52)$, n = 9, 10 or 11 **OR** summing at least 3 individual totals **OR** calculating 9, 10 or 11 individual totals M1 $1.49 \times (1 - 1.52^{10}) / (1 - 1.52)$ **OR** calculating the sum of 10 individual totals for the years 2008 – 2017 A1 answers in the range 185-186 billion (downloads) oe
4(b)(ii)		Original model plus reason	1	C1 ft e.g. Indicates original model plus reason e.g. the original model gives a total closer to 180 billion and doesn't account for the first year being a potential outlier as it was the year of opening

Section B

Question	Working	Answer	Mark	Notes
5(a)		Explanation	1	C1 explanation e.g. 1971 was the point of intersection meaning that human demand on the Earth exceeded the natural resources available (Ecological Footprint overtook the biocapacity)
5(b)	$0.2x + 7.1 = 2(0.05x + 9.4)$ oe $0.1\,x = 11.7$ $x = 117$ $1961 + 117$	2078	4	M1 for setting up correct equation e.g. $0.2x + 7.1 = 0.1x + 18.8$ M1 ft correct method to isolate x in their equation **OR** method to use trial and improvement to find value of $x > 110$ A1 ft method to use their value of x to find the expected year **OR** $x = 117$ B1 ft 2078
6(a)(i)		Comment	1	C1 Valid comment e.g. smaller data set so easier to analyse or may be impossible to evaluate whole population
6(a)(ii)		Comment	1	C1 Valid comment e.g. Less accurate results or sample may be biased or sample may not be representative/comparable
6(b)		Yes and reason	1	C1 Yes and reason e.g. More species were assessed in 2017 than in 2000 so analysis of the state of populations will be more accurate **or** the more species that are evaluated, the better the monitoring
6(c)		Amphibians and reason **OR** Coral and reason	2	B1 Identifies Amphibians C1 Reason e.g. because they have the lowest index value and so are of most concern **OR** B1 Identifies Coral C1 Reason e.g. the gradient is steeper, so the index value is decreasing at a quicker rate

Question	Working	Answer	Mark	Notes
7(a)		-36	1	B1 cao
7(b)		Explanation	1	C1 ft Explanation e.g. The number of threatened (mammals) species has decreased by 36 (between 2000 and 2002) **or** there are 36 less threatened mammals species
7(c)	$$\sqrt{\frac{572535}{9} - \left(\frac{1625}{9}\right)^2}$$	176.11 (or 176.06)	2	M1 Correct method to calculate standard deviation A1 awrt 176 NB condone the use of $n=10$ or 11
7(d)		Reason	1	C1 valid reason e.g. because there is an extreme outlier in 2004 that will affect the mean
8(a)		Statement	1	C1 Statement e.g. Year is set
8(b)		Points plotted	2	B2 for plotting all 11 points correctly. (B1 for plotting at least 5 points correctly)

Chart Title

y = 289.72x - 575784   vertebrates

invertebrates

Question	Working	Answer	Mark	Notes
8(c)	$b = \dfrac{121945.45}{420.91}$ $a = \dfrac{65400}{11} - 289.72 \times \dfrac{22087}{11}$	Correct working shown	4	B1 correctly shows that $b = 289.72$ M1 for method to find mean of x or y M1 for use of $a = \bar{y} - b\bar{x}$ A1 for a complete method to show $a = -575785.97$ **or** awrt $a = -576000$
8(d)	$290 \times 2025 - 576000 = 11250$	11250	2	M1 ft for method to find number of threatened species with 2025 A1 11250
8(e)	"22858" = 290x – 576000 "598858" = 290x 2065.0275.. = x	2065 and comment	4	M1 ft for setting up equation e.g. "22858" = 290x – 576000 M1 ft for isolating x in their equation A1 x = 2065(.0275..) C1 Comment e.g. data not within range so not reliable **or** in danger of extrapolating too far into the future

8(f)		Extended statement and assumption(s)	2	C1 Description of gradient in context e.g. **gradient** is showing an **increase** in the number of **threatened species per year** C1 for comparisons between vertebrates and invertebrates e.g. increase for **vertebrates** is much **greater**