LEVEL3
MATHEMATICAL STUDIES

Paper 2C Graphical Techniques
Report on the Examination

1350
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General

This was the first examination for this specification and the students found some of the questions to be very demanding. There were several questions where there was no response from a large number of students.

In a number of questions where the drawing of graphs was required, many students drew graphs that did not fully represent the functions involved. This was particularly true for exponential functions, where the shape was often poorly represented.

Question 1

There were a large number of incorrect responses to **part (a),** with all of the alternative answers being selected by the students.

There were many good responses to **part (b)**, with students making suitable suggestions. In a few cases the second suggestion was effectively a repeat of the first suggestion. A few students gave answers that were about the data or the way that it had been collected rather than the way in which it was presented.

In **part (c)**, many students gave two correct criticisms, usually noting the fact that 680 had been used in place of 608 and that the division should be by 6 rather than 5. However, very few students realised that he could have used a quicker way by just working with the initial and final values. Also very few students stated that the result of the calculation should be given.

There were some good answers to **part (d)**, but these were not seen very often. A lot of the responses did not compare like with like. Some students often obtained one correct value, such as 7.14% as the percentage of Instagram users who had just been a Facebook account, but did not make a valid comparison.

Part (e) was frequently done well, with many students gaining full marks. The other students presented solutions in which they had used the exchange rate incorrectly.

Question 2

There were a lot of good responses to **part (a)**. A few students gave responses that were about the graph when asked about the table or vice versa.

In **part (b)**, the responses to Paul's argument were generally poor, although there were also some good responses. Many students used a value for the population of the world rather than using the given information to work this out. There were many good responses which related to Rena's claim, but in a few cases the students used the data correctly but did not state their conclusion.

Question 3

There was a variety of responses to this question. Some students worked out the cost for a number of different levels of electricity use and tried to base recommendations on these. This

method rarely resulted in a good solution. Some simply went for the 'average' consumption of 2500 kWh and gave a recommendation for that one figure. Many of these students did not attempt to use the graph paper provided.

A good number of students drew graphs and often produced these correctly. Some went on to reach the correct conclusions. Some were hampered by poorly drawn graphs or by having one line incorrect. A number of students drew good graphs but did not attempt to make any recommendation having done this.

Question 4

There were some good responses to this question, but most students did not find the correct value for *a* even if they had found *c* correctly. Some students recognised that *c* was the *y*-intercept and then treated *a* as the gradient of the line joining $(1, 560)$ and $(2, 640)$ – which gave them $a = 80$. Some students produced correct equations, but did not solve them correctly.

There were a number of good responses to **part (a)**, with exponential and linear being the most common incorrect responses.

Question 5

There were a few good sketches for **part (a)**, but although many showed the correct shape, there were a number that passed through the origin. There were some weaker attempts that included straight line graphs.

In **part (b)**, many students worked with $90\,000$ rather than 90, not realising that N was given in thousands. Most of these students obtained the answer 11.4, which gained partial credit. Some correct solutions were seen.

A correct answer to **part (c)** was very rare. Most students did not use the properties of the rate of change of the exponential function and instead often tried to calculate the gradient of a tangent or chord.

Question 6

Part (a) was done well, with the vast majority of students obtaining the correct average speed. While some students drew tangents to the curve and found the gradient as expected, there were a number of incorrect approaches. Probably the most common of these was to just pick two points on the curve and find the gradient of a chord joining these two points. Not drawing a tangent was an issue for many students.

There were very mixed responses to **part (c)**. Several responses showed roughly the right shape, but they often lacked detail or showed incorrect detail. Often the initial and final velocities were incorrect and many did not show the maximum speed in the correct place.

Question 7

Part (a) was often done well, and there were a good number of correct responses. In some cases a correct statement was followed by an incorrect evaluation. In a few cases students evaluated $e^{-0.2^{0.3}}$ instead of $e^{-0.2\times0.3}$.

Part (b) was found to be much more demanding. Some students drew reasonable graphs, but in many cases the curvature of the graph did not match the exponential function being used. Common errors were to not show either the correct maximum speed, or any maximum at all. Also, many of the graphs started at points on the vertical axis and did not show the initial zero speed. While some did show a constant final speed, many of the students that included this feature did not indicate that this had a value of 8.

Part (c) was found to be very demanding, and there were very few correct responses. Very few students were able to obtain values for B or k. The equation $2 = Be^{-2k}$ was often seen, but the students were unable to progress beyond this. Quite a number of students mixed up the information given, for example using a speed of 10 at 2.5 seconds.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator