Questions matter

Level 3
Certificate in Mathematical Studies

1350/2C Graphical Techniques

Report on the Examination

1350
June 2024

Version: 1.0

Further copies of this Report are available from aqa.org.uk

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

© 2024 AQA and its licensors. All rights reserved.

Summary

Students generally found the questions common to components 1350/2A and 1350/2B (Q1-3) more challenging than in previous years. Several items within this section required a comparison of proportion and often the mathematical justification was lacking to validate any conclusion.

Questions 4-8 were specific to the 1350/2C specification and overall performance has improved from previous years. While some aspects of the mark scheme may have been easier to access, there is clear evidence that a greater proportion of students are now demonstrating competencies with technical skills such as applying logarithms.

The Questions

Question 1

Over 85% of students were able to identify the correct multiple-choice answer from the preliminary material in **part a**.

Part b required suggestions to improve the graphs, a typical item on this paper. More students scored one mark than two. Incorrect responses were usually too vague, for example suggesting 'axis labels' with no further clarification. The second graph had labels, but in an unorthodox position. Many single word responses such as 'gridlines' could not be awarded as valid improvements.

Vague responses were also common for **part c** that could not be awarded. Examples include 'too much information' or 'unlabelled arrows.' Only one quarter of students scored the single mark, with the most common correct response being the use of percentage ranges. A small, but not insignificant, number of scripts criticised the preliminary material graphs rather than the diagram.

Many students evaluated the proportion of daily listeners at the sports club in **part d** but failed to make a similar calculation for the overall consumers. This led to just over 40% of students scoring one mark, while less than 10% scored two. A common misconception was that the 5% in the preliminary material could just be taken at face value, rather than needing to be combined with the 9% to obtain the proportion 5/14.

Part e was split into two sections, with the vast majority of students correctly validating the statement for 'The Recorder.' The validation of the other statement was worth three marks and not as well attempted. As with **part d**, many responses evaluated the proportion from one ratio, but not from the other leading to an incomplete proof. This item did lead to an even distribution of marks from 0-4, making it one of the best discriminator items in the common questions.

Less than 10% of students were able to be awarded the mark on **part f**. Most responses simply confirmed that the percentages did not add up to 100% without further comment. Reasoning was required to explain why they do not add to 100%. Two valid reasons are suggested in the mark scheme, although only one was required for the single mark.

© 2024 AQA and its licensors. All rights reserved.

Question 2

Less than one quarter of students were awarded full marks in **part a**. Very few students scored partial marks. In previous years, reverse-percentage questions have been more successfully answered. The majority of students incorrectly used the price including VAT as the 100% value and so did not recognise the nature of the reverse percentage.

Part b was well answered, with almost two thirds of students identifying both errors. The mark scheme was forgiving in the way that the errors could be identified (for example, only suggesting what it should be instead). A small number of responses used the same error twice, ie, stating the magnitude of each stage of the answer should be in tens of millions rather than hundreds.

Question 3

The command of this question to write a report is an aspect of the specification not assessed on previous years' exams. This may have increased the demand of the item. The question was scaffolded by two bullet points for students to take two explicit objectives from and should have been treated as two separate tasks. Half of the students accessed either one or two marks, typically from the first instruction. Reporting on raw values would award one mark but stating differences would award two, making this section relatively low demand. Only 25% of students accessed the other two marks available for responding to the second bullet point. In many cases it simply was not attempted, while in others there was clear misunderstanding of the objective, with many invalid proportions calculated.

Question 4

Part a and **part b(i)** were low demand items to act as a gateway to the questions for the component specialism. There were generally no issues calculating and plotting the curve, although finding the intersections from the wind-speed interval caused some issue, with only two thirds of students scoring full marks. The most common mistake was an invalid substitution into the equation, mistaking the wind-speed interval for some form of error-interval.

Part b(ii) was well attempted, although many students described in detail how the 'steepness' changes rather than simply stating that the property is the gradient. The mark scheme condoned this.

Part c was less well attempted. A common response that has typically been valid on similar items in previous years was invalid here. The algebraic model has no defined domain and so simply stating 'the trend may not continue' did not apply here. About a third of students gave a valid response, typically relating to either maximum possible winds or other factors.

Question 5

Identifying graph shapes is typically assessed as a multiple-choice question, and in this case around two thirds of students correctly identified a linear equation with negative gradient for **part a**.
The other decreasing (but non-linear) function was the most common incorrect response.

© 2024 AQA and its licensors. All rights reserved.

Part b was a relatively low demand intersection item but made more complex by the context presented. Students needed to be organised, knowing exactly what they were evaluating to declare the answer correctly. While more than half of the students got full marks, around a further 15% were awarded the SC2 mark as they declared the answers for team A and team B the wrong way round.

The skill of establishing a linear equation from its graph was required in **part c**. A variety of techniques could be used, the most common being to establish the gradient and substitute in a coordinate. Two particularly common errors occurred from this method: neglecting the fact that the gradient is negative and misreading the axis scale. Many students did spot that the graph could be extended back to find the y-intercept rather than using a purely algebraic approach. The item proved to be one of the best discriminators on the paper, with an even spread of marks. One third of students were awarded full marks.

Question 6

Just over 15% of students attained full marks on **part a**, typically because they failed to identify the correct value for y. This item did allow follow-through working for their value of y to simply assess if they could use an exponential equation correctly and then declare an answer to two significant figures. This made for a relatively low demand item. Two thirds of students could use the equation, but just over a quarter did not acknowledge the requirement to round or did so incorrectly.

Part b assessed the knowledge that the rate of change of e^x is equal to its value. Less than 10% of students identified this and were able to clearly communicate this property in context. This assessment objective has always proved difficult and high demand.

Question 7

Almost 90% of students demonstrated clear understanding of how to interpret the velocity-time graph on **part a**. Of these, only about 65% could convert their time-reading into a separation of minutes and seconds, with the common misconception that 8.33 minutes represented 8 minutes and 33 seconds. 80% of students identified the greatest acceleration time from the multiple choice in **part b**.

Part c is a typical velocity-time graph item on this paper, requiring an instantaneous acceleration obtained from a tangent. Generally, it was well attempted, but the structure of the mark scheme led to this item being one of the best discriminators on the paper. A third of students scored full marks. Valid methods that did not lead to full marks often declared an answer with invalid units or utilised a poorly drawn tangent. The most common invalid attempts involved drawing a triangle using two arbitrary points on the curve, which is consistent with this item on previous years' exam papers.

Part d assessed distance-speed-time calculations and does not deviate too far beyond GCSE skill. The context of using large numbers and having to do multiple conversions (time and distance) to obtain the correct unit did increase the demand for this item; however, just short of 40% of students obtained full marks. Again, this item was a good discriminator, partial marks often awarded for neglecting one of the unit conversions.

© 2024 AQA and its licensors. All rights reserved.

Question 8

Exponential modelling typically closes the exam, as is the case on this paper. **Part a** required inspection of the equation in detail. Where perhaps previously a similar item has simply asked for identifying growth or decay, students were expected to identify the compound reduction of 2%. The majority of students did not make such a statement or did so incorrectly. Stating the value increased by 0.98 was a common invalid response. Only around 3% of students were awarded full marks, while over half of the students obtained one mark for identifying it as a decreasing function.

Part b assessed the manipulation of the exponential equation, but it was much easier to access marks here than on similar items in the past. The first mark was obtained by most students for a simple substitution. Standard manipulation could be applied without the need for logarithms and three quarters of students were awarded full marks.

Part c was also relatively easy to access marks, as again a valid substitution would lead to the marks being awarded. Logarithms should ideally have been used within the manipulation, and there was a significant increase in the number of students attempting this and doing so without error than on any previous year's exam. Over 60% of students achieved full marks. This item did award full marks for the correct answer from successful trial and improvement (T&I) techniques, and a minority but still sizeable number of students attempted this approach. The majority of T&I responses were awarded full marks as the answer was accepted as the integer value 25, which many students achieved quickly as the lower bound of the domain was 24. Accepting an integer was applicable to the context in this question; however, this may not always be the case in future contexts, so T&I may not prove as accessible to achieving full marks. Failure to obtain the valid answer from T&I will always award zero.

© 2024 AQA and its licensors. All rights reserved.

Mark Ranges and Award of Grades

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

© 2024 AQA and its licensors. All rights reserved.