Examiners' Report/
Principal Examiner Feedback

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Grade Boundaries

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Introduction

This paper proved to be accessible to most students, allowing them to demonstrate their ability across the assessment criteria. They often failed to score marks on the nth term of a sequence, HCF/LCM and Venn diagram questions and some struggled to appreciate that the probability question was without replacement. Adequate working was usually shown although it is an area some students would benefit from improving.

Report on Individual Questions

Question 1

Fewer students than expected showed that they understood the requirements of this question. Those who secured part marks usually gave an answer of 3n + a where $a \neq 4$. Incorrect responses included $4n + 3$ and $n + 3$.

Question 2

Most students scored full marks. Those who didn't were usually able to score at least one mark for expanding the brackets correctly, although some gave the expansion of $3(y + 3)$ as $3y + 3$. Rearranging the equation caused the occasional issue, with some students adding $8y$ rather than subtracting or/and subtracting 18 rather than adding.

Question 3

The majority of students scored full marks in part (a) and did so in a single step, but a significant minority found 20% of 485 and subtracted their 97 form 485. Occasionally, 97 was given as the final answer. Although part (b) proved more of a challenge, most students still scored full marks. Common errors included 79 × 1.2, 79 × 1.25, $\frac{79}{0.8}$ and 79 = 80%.

Question 4

The overwhelming majority of students answered parts (a) and (b) correctly, showing a good understanding of alternate and corresponding angles. Although part (c) was more demanding, it was generally well answered. Those who were able to find the sum of the interior angles usually gained full marks. However, the most common alternatives to 720° were 360° (from 4 × 90° or the sum of exterior angles), 540° (= 6 × 90°) and 1080° (= 6 × 180°). Some students correctly summed the interior angles, subtracted from 720, but then divided by 2 instead of 4. There were some well-worked correct solutions using exterior angles, but those who attempted this method often became confused and tried to use $3x$ and x, rather than $(180 - 3x)$ and $(180 - x)$, when adding the angles.

Question 5

It was fairly rare for students to answer parts (a) and (b) incorrectly. Part (c) was also answered very well although some students added the powers and others gave 15*a* as their answer. Part (d) tested basic algebraic skills and most students proved themselves to be competent at expanding brackets and simplifying like terms. Some students divided the correct answer of $10x + 22$ by 2 and so lost the final mark.

Question 6

Although most students answered this question correctly, there were a number of basic errors that led to dropped marks. Some multiplied the frequencies by the end points of each interval while others multiplied all the frequencies by 6 (the class width) or made errors finding the midpoints. The occasional student calculated the mean.

Question 7

As expected, most students scored full marks. The most common error resulted from incorrectly finding y as 5 for an x value of –1. This was as a result of evaluating $(-1)^2$ as –1. Curves were generally drawn through their plotted points although a series of straight lines was sometimes seen.

Question 8

In part (a), students usually scored at least 2 marks for identifying the transformation as an enlargement with scale factor 2. Finding the centre proved a little more difficult. Some wrote it as a column vector while others stated it as (0, 1). There weren't many instances of multiple transformations being given. Most students answered part (b) correctly although there were instances of moving in the wrong direction. In part (c), a recurring error was to rotate 90^o clockwise rather than anticlockwise.

Question 9

This question was generally very well answered with almost all students realising that they had to use Pythagoras' Theorem. Most did so correctly, although a few subtracted squared sides rather than adding. The most common error was the failure to calculate the perimeter of the triangle after working out the length of *AC* and as a result scored 2 marks for 61.5. A small number of students used trigonometry, although very few reached the correct answer using this method.

Question 10

Many students were not sure how to approach this question. Method was often unclear, although many scored at least one mark for breaking down some of the numbers into products of prime factors, usually by using factor trees. A few drew a Venn diagram but not all were sure how to use it. Common incorrect answers included 7 and 21.

Question 11

Parts (a) and (b) were answered correctly by the overwhelming majority of students. Parts (c) and (d) were also answered correctly by most although in (c), some didn't write their answer correctly in standard form. Answers, such as 10.8×10^8 and 1080 000 000 were seen. In (d), some students subtracted rather than divided and others gave 10.8 as their final answer.

Question 12

This was a well-answered question with almost all students showing some understanding of the relationship between the sides of similar triangles. Most students managed to find the scale factor to gain at least one mark in part (a). Some students added or subtracted the lengths of corresponding sides. The most common error in part (b) was to find the length of *AD* (9cm) and then fail to subtract 4, thus losing the accuracy mark.

Question 13

Most students identified the correct relationship in part (a), often finding a correct value for *k*, but some struggled with the notation and failed to give a correct equation. Occasionally, an answer of $M \alpha 0.25p^3$ was seen. Those who gained marks in (a) usually found the correct answer in (b).

Question 14

Many students were not aware of the need to factorise both the numerator and denominator and therefore could not score any marks. Instead they sometimes attempted to cancel terms from the original expression. Those who attempted to factorise often struggled with the denominator and so could only score one mark. Students who correctly factorised both numerator and denominator usually went on to obtain a fully correct answer although some proceeded to cancel further and so deny themselves the final mark.

Question 15

Most students gained full marks in part (a). Errors included incorrectly expanding one of the brackets and changing the denominators to 8 rather than 15. Some worked with no denominator at all while others worked exclusively on the numerator before introducing the denominator later. In part (b), scoring full marks proved to be quite difficult. The most common error was a failure to evaluate the cube root of 8. Common incorrect answers included $8a^3e^2$ and $\frac{8}{3}a^3e^2$. Part (c) required students to show algebraic working. Those who did show such method usually scored full marks but a significant minority attempted to solve the equation by a non-algebraic approach including trial and improvement, thus scoring no marks.

Question 16

Many students scored highly on this question. Although the question referred to two coins being taken, some treated it as a 'with replacement' problem. Thus it was quite common for only one mark to be scored in part (a). The general principles of how to combine probabilities were well understood. This resulted in most students being able to follow their tree diagram and multiply two appropriate probabilities in part (b). In part (c), it was quite common for one of the products, (usually for the 5 cent coin and 10 cent coin) to be omitted while a few only considered the combinations that added to give 20. Some students chose to use decimals rather than fractions. This should be discouraged because it often leads to rounding errors.

Question 17

Most students answered part (a) correctly. In part (b), it was quite common for students to incorrectly square –4 or to write down -4^2 rather than $(-4)^2$ in their working. Some students evaluated f(–4) × g(–4) or gf(–4). Part (c) was generally answered well by those targeting a high grade with a relatively small number leaving their answer in terms of y. Part (d) proved to be more challenging. Many students were able to write a correct expression for gf(x) but then failed to form a correct three part quadratic expression. Those who did, though, usually continued to score full marks, usually by factorising.

Question 18

The most common approach was for students to use the fact that a one centimetre square represented half a person, or equivalent. This approach proved to be successful in part (a) although caused some problems when it came to drawing the bar in part (b). Some drew two bars with the correct total area. Another approach was to calculate frequency densities. Those who were competent at using this method usually scored full marks in parts (a) and (b). In (a), a common error was to ignore the widths of bars, using the frequency of 9 on the frequency density scale, and then proceeding to 3 + 12 + 9 = 24. For both methods, some students drew their bar from 30 to 60 minutes and so only scored one mark in (b).

Question 19

Students with some understanding of surds usually scored at least one mark unless they made an error expanding the brackets. Frequently, students were able to simplify the expression as far as $-5 + 36\sqrt{2}$ but struggled to make further progress. Only students targeting the top grade tended to be equipped with the skills to manipulate the expression fully.

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Question 20

Most students scored at least one mark for finding the curved surface area of the cylinder, although some found its volume instead. Finding the curved surface are of the cone was more challenging and it was common for students not to appreciate the need to find the slope length of the cone. Some tried to work backwards from the final expression, usually without success and others used decimals but were only able to score a maximum of three marks.

Question 21

Those familiar with this sort of question were usually accurate in completing the Venn diagram in part (a). However, a significant number of students just put the given values into sections on the Venn diagram, taking no account of intersections. In part (b), the conditional element of the question was one step too far for many students. Answers such as $\frac{5}{14}$ and $\frac{5}{32}$ were quite common; some tried to multiply pairs of probabilities.

Question 22

Those students familiar with vectors usually scored at least one mark in part (a). Part (b), however, proved only to be accessible to those likely to achieve the top grade. Some understood the need to find an expression for $\overrightarrow{QR}$ but were often not able to offer a valid conclusion, such as $\overrightarrow{QR} = \frac{1}{2}\overrightarrow{OP}$. Insufficient conclusions included comments about factors and gradients while others stated “both have **p**” or “so they are parallel”.

Summary

- In question 6, students should check whether they are being asked to find the total or mean amount of money raised.
- Students might benefit from learning more than one method for finding the HCF and/or LCM, for example, by using factor trees and Venn diagrams.
- In question 12b, students should check whether they are being asked to find the length of *AD* of *ED*.
- For questions that ask for clear algebraic working, marks are unlikely to be awarded unless they show such method.
- For probability questions, if two of the coins are taken at random from a bag, or similar, then this should be treated as without replacement.

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