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Unit 2 Higher Tier 43602H

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General

The paper contained a mixture of familiar style, problem solving and functional context questions. As such it represented a significant change of emphasis from previous specifications and also a real challenge for the first cohort of candidates.

The response was mixed. There were some good attempts at most of the early questions, but some of those later in the paper were either at best patchy in terms of success or often not attempted. There were many instances where an algebraic approach to a question was the best approach, but where very many candidates decided to adopt a trial and improvement strategy. Trial and improvement is a risky strategy as it invariably results in either a completely correct solution or a wrong answer and is unlikely to gain credit for quality of written communication. A more serious concern is the standard of basic arithmetic. Answers need to be checked carefully to make sure that they are realistic when viewed in the context of the question. On the grade A and A* questions towards the end of the paper, performance was variable. Candidates sitting this paper might not have spent sufficient time on some of these topics and there were quite a few occasions where no attempt was made.

Topics that were well done included:

- approximations
- place value
- percentage calculations
- distance-time graph
- ratio
- solving a linear equation
- simplifying expressions.

Topics which candidates found difficult included:

- algebraic addition pyramid
- indices
- reverse percentage
- sequence problem
- factorising expressions
- change of subject of a formula
- coordinate geometry problem involving parallel lines
- surds
- algebraic proof.

Question 1

This question was generally well answered but many errors were seen due to confusion with the square root sign. Common errors were $\frac{\sqrt{100}}{2} = \sqrt{50}$ or 50 and $\frac{\sqrt{99}}{2}$ or $\frac{\sqrt{98}}{2}$ leading to $\sqrt{49} = 7$. $\sqrt{100}$ was not always recognised as 10. There were some attempts to use surds to simplify, for example, $\frac{\sqrt{100}}{2} = \frac{(\sqrt{25}\times\sqrt{4})}{2} = \frac{5\sqrt{2}}{2}$, $\frac{\sqrt{99}}{2} = \frac{3\sqrt{11}}{2}$ or $\frac{\sqrt{98}}{2} = \frac{7\sqrt{2}}{2}$.

Question 2

Part (a) was usually correct but part (b) was less well done. In part (c) many candidates realised that they had to add on another 23.5 to 1504 but a significant number used alternative build-up calculations, often with errors. Many candidates resorted to long multiplication, usually with correct place value but also with frequent arithmetic errors. 1504 + 65 or 1504 + 64 were seen occasionally. Some alternative build-up methods were used, for example, 1300 + 65 × 3.5, but these often resulted in arithmetic errors. Inaccurate build-up methods included 24 × 65 – 0.5, 65 × 4 – 0.5 and 20 × 60 + 3.5 × 5.

Question 3

This question challenged the majority of candidates. Many progressed as far as stating –90 but there were few totally correct answers. The three main problems were an inability to manipulate negative numbers, an inability to manipulate the algebraic expression and not dealing with the '2' correctly. Examples of common errors are:
10 × –9 = –90 so x = 10 and y = –7
$xy + 2 = -90$ leading to $xy = -92$ or $xy + 2x = -90$ followed by $3x = \frac{-90}{y}$ or $x(y + 2) = -90$
or $x = \frac{-90}{(2+y)}$
Candidates would then use trial and error to find a solution.

Question 4

There were many correct answers. £8 was usually seen with a variety of successful build-up methods for 40%. Some gained partial credit for an answer of 60%, presumably misreading the question. Occasionally $\frac{8}{20}$ was seen but the division was then performed using 20 ÷ 8.

Question 5

Part (a) was almost always correct. In part (b), trial and error was very common. Many candidates tried to input 1 and 2 but few then looked at a value in-between, and tried –1 instead. It was rare that a good algebraic solution was given. There were some who stated $5n - 6 = n$ but then used trial and improvement with no further algebra. The most common answer was –1 due to incorrect manipulation of negative numbers. An input of 1 leading to –1 but stating a final answer of 1 was also common.

Question 6

Part (a) was well done. Part (b) was reasonably well done with 1.6 being the usual answer. Some candidates read off a value in the range 6.6 to 6.8 but did not subtract the 5. It was also common to see an answer 1 from a misread of Vicki and Pat. A significant number of candidates read the value as 6.5, which was outside the accepted range of answers and there were a number of answers of 6.3 or 6.4 coming from a misread of the scale on the vertical axis.

Question 7

This was a standard ratio question and was well done with clear working shown. A common error was to evaluate $\frac{600}{9}$, $\frac{600}{6}$ and $\frac{600}{5}$. Some found one value correctly but then used trial and improvement or trial and error for the other two. Occasionally build-up of ratio was tried and this was usually unsuccessful.

Question 8

There were many good answers to this question, which involved functional elements and also assessed quality of written communication. The question contained a lot of information and some candidates had difficulty extracting the key facts. Candidates should systematically set out the steps required, for example 50 jars @ £3, work out 60% of £3, 30 jars @ £1.80, work out the total cost, subtract £95, is it greater than £100? One of the main problems was that candidates did not interpret the steps correctly or omitted steps. Errors included working out 80 jars @ £3, calculating 40% of £3 rather than 60%, ignoring the £95 or failing to state the conclusion.

Question 9

Part (a) was well done and part (b) slightly less well done with many candidates not taking out the full factor of 4. In part (c) the common errors were to give $6m - 4$ and $5m + 2$. Some candidates expanded the brackets correctly but then tried to multiply them. $8(3m - 2)$ was a fairly frequent first step. Other candidates went on to solve the equation $11m - 2 = 0$. Parts (d) and (e) were reasonably well done. Many candidates did not simplify fully, leaving answers as, for example, $8 \times g^4 \times k^5$. In part (e), many candidates did only a partial factorisation.

Question 10

This question highlighted poor algebraic techniques. These combined with difficulties dealing with + and – signs meant that many poor responses were seen. Common errors were $x^2 - 4x + 4x = x^2 - 8x$, $x(x - 4) = x^2 - 4$ or $x(x - 4) = -4x^2$ and $10x - x^2 + x^2 - 4x = 10x - x^4 - 4x$ Candidates often wrote down two correct algebraic expressions but then made no further progress. Some candidates tried to multiply the expressions rather than add them, even though a numerical example was given at the start of the question. A small proportion of attempts used trial and error, but these were often unsuccessful. Those who chose a number greater than 4 had more success than those who chose a number less than 4 because of the negative number aspect, but there were very few correct solutions. Some candidates, having used correct algebra to obtain $10x$, then gave a different value for k, for example, $10x = kx$ leading to $10x - x = k$ and then $k = 9$ or $9x$.

Question 11

Many candidates appeared unprepared for this question. $\frac{2}{3}$ of 27 = 18 was very common, as was $27 \times 1.5 = 40.5$. Some candidates worked out $\sqrt[3]{27} = 3$ and then multiplied by 2. A few worked out $27^2 = 729$ and then made no further progress.

Question 12

This question was in general poorly attempted. The majority of candidates worked out 10% and added it on to 108 kg.

Question 13

This question assessed problem solving and quality of written communication for clear presentation of the steps of working. Many candidates made a good attempt at working out the value of a, although the presentation of work was often very poor. Realising that a had to be negative was a key step in the process but there were many unconvincing explanations of this. It was not uncommon for candidates to work backwards from 52 to 12 and realise that 'dividing by 4 then subtract 1' was the step required. This frequently led to the correct answer of 2 for the first term. Some candidates, having obtained $a = -1$, gave a final answer of 4 from 3 – (–1). Candidates should be encouraged to use an algebraic approach rather than trial and improvement, for questions of this type, for example, setting up an equation such as $4(12 - a) = 52$.

Question 14

In part (a) there were many clearly presented correct solutions, but common errors usually occurred in the signs or in incorrectly simplifying the correct expansion. The instruction to 'Show clearly that' was either ignored or not understood by many candidates and answers were often unconvincing. In part (b) there were very few correct solutions with many candidates offering no attempt. Many candidates did not realise the need to factorise the numerator or denominator. Many candidates cancelled individual terms in the numerator and denominator, typically cancelling the x^2 terms and cancelling by 5 into 25 and 20. Few spotted the connection between parts (a) and (b).

Question 15

This question was not well answered. Only a minority of candidates knew how to change the subject of a formula when the required subject appears twice. Many candidates expanded the brackets and made no further progress. Those who attempted to isolate y often completely ignored or overlooked the term 'hy' and therefore gave an answer for y in terms of p, h and y, for example $y = \frac{(2h + hy + p)}{3}$. Those who did successfully isolate the 'y' terms often failed to factorise. There were sign errors from some of those who knew all the steps of the process.

Question 16

Many candidates did not attempt this question. A common error in finding the coordinates of B was to double the coordinates of M giving B = (4, 14). This sometimes led to $y = 3x + 14$ or $C = 3x + 14$. Some candidates understood that the gradient should be 3 but did not do anything constructive with it. There were a relatively small number of completely correct solutions of $y = 3x + 13$.

Question 17

A significant number of candidates did not attempt this question. There were a small proportion of correct answers but it was clear that 'surds' is a topic unfamiliar to many candidates. A large number of those who made an attempt were only able to process one part correctly, usually the $\sqrt{75}$. It was common to see conceptual errors, such as, $2\sqrt{3} + 5\sqrt{3} = 7\sqrt{6}$

Question 18

Responses to this question were generally very poor with significantly high numbers of candidates making no attempt. Some candidates tried to use numerical substitution to verify the result and such an approach was not acceptable. The processes required for a valid algebraic proof, where a general statement of one half of the desired result is taken and worked upon, using algebraic techniques such as expanding and factorising, so as to reach a statement that represents the other half of the desired result, is one that candidates should be familiar with. Starting with $(n + 3)^2 - n^2$, or perhaps using the difference of two perfect squares to form an expression that, when factorised and followed through correctly would yield the desired result, were the two most appropriate routes through this proof. An approach such as this was evident in only a small number of cases.