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General Certificate of Secondary Education
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Mathematics 43602H

(Specification 4360)

Unit 2: Number and Algebra (Higher)

Report on the Examination

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General

Candidates generally were able to complete the paper within the time. Most candidates showed sufficient working but there were a significant minority of candidates whose presentation was poor. Many basic arithmetic errors were also seen. The later problem solving questions often required a high level of algebraic manipulation which proved too challenging for the majority of candidates.

Topics that were well done included:

- substitution
- approximations/estimation
- money problem
- linear equation
- graphical interpretation
- algebraic simplification
- common factor factorisation.

Topics which candidates found difficult included:

- fractions problem
- sequence problem
- changing the subject of a formula
- algebraic LCM
- ratio problem
- quadratic operation
- algebraic fractions
- surds
- indices.

Question 1

Almost all candidates had some success with this question. Most candidates substituted correctly, but some candidates did not calculate 54 – 90 accurately. This often led to ±44 which would then not divide easily by 12. Any remainder often became the decimal part of the answer, for example. 44 ÷ 12 = 3.8. Another error was to lose a negative sign.

Question 2

This question was well answered. A common error was to not round one of the numbers, usually 795.4. Some candidates reached the correct fraction but then made an error in dividing 80 by 4. A few candidates attempted the division without rounding first.

Question 3

Questions involving money are invariably well done and this one was no exception. Almost everyone stated a conclusion. The most common error was to use 30% for one-third. Arithmetical errors, such as 210 – 84 = 326, 21 × 4 = 88 and 195 ÷ 3 = 63 were seen. A small proportion of the candidates found 40% of 210 and $\frac{1}{3}$ of 195, but failed to subtract either from the original amounts.

Question 4

A large number of correct answers were seen but many candidates were not able to interpret the question mathematically and clear concise working was rare. Presentation was often poor. The statement 'three times as many blue counters as yellow counters' was often written using the terms 3B and Y, with 3B + Y + R = 43 very common. R = 7 or R = 14 were often given but many candidates made no further progress. Careless arithmetic such as 50 – 43 = 6 and 36 ÷ 4 = 8 was often seen.

Question 5

Most candidates were able to solve the equation in part (a). A few rearranged incorrectly and stated $7x - 3x = 15$, or wrote 15 – 3 = 12. Part (b) was well answered. Candidates who expanded the brackets correctly usually managed to collect the terms to obtain $6x + 12$. This sometimes resulted in 6 and 12 being given as the answers for a and b, respectively, with the final factorising step missing.

Question 6

This was a challenging question, although many good responses and part responses were seen. A common error was to add Amy and Ben's shares then find out what needed to be added to their total to give a half. Some candidates assumed D = A = $\frac{1}{6}$ at the outset, and verified the result rather than deducing it. A small number of candidates chose a value for the total money shared, typically £30 or £60, and then correctly calculated all the relevant shares showing all the correct steps in the process.

Question 7

Part (a) was generally well answered. A significant number of candidates misread scales, stating for example, 'Plan A is cheaper after 670 minutes'. A significant proportion of candidates did not show any working in part (b) and very few candidates appeared to consider whether their answer was sensible. Good clear working on the graph with readings clearly labelled was rarely seen. Some candidates who attempted to interpret the graph were unable to deal with the units. A common error was taking 2 cm to be 100 minutes. There were also many errors with division. Those who used a scaling method were generally the most successful, for example, working out that if 200 minutes cost £60 then 20 minutes cost £6 and 10 minutes cost £3 and so on.

Question 8

Part (a) was generally well answered. A common error was to include the letter n in the response, for example, $n - 4$ then $3(n - 4)$. Another error was to put $\times 3$ in the first box but then –4 instead of –12 in the second. In part (b) many candidates wrote $3(n - 4)$ and $3n - 12$ but did not include $= n$. Others expanded the brackets and gave
$3n - 4 = n \rightarrow 2n = 4 \rightarrow n = 2$. Some candidates obtained the answer 6 by trial and improvement.

Question 9

A majority of candidates did not show every step required and gave an unconvincing response. Miscopying the given rule as $2(a - 4)$ was quite common. A few candidates tested a value, for example, let $a = 10$, then $b = 16$ and $c = 28$, then checking this with $a = 10$ in the formula $c = 4(a - 3)$, which only verifies the result for the chosen value of a.

Question 10

Many fully correct answers were seen in part (a). Common errors included $6x^4y^7$, $2x^4 \times 4y^7$, $8x^3y^{10}$ and $8x^3y^7$. Some attempted to take out $2xy$ or $2xy^2$ as a common factor. Part (b) was generally well answered with correct factors found. A number of candidates only factorised partially and a number took out $2y$ rather than $4y$. Some tried to factorise into two brackets or apply 'difference of two squares'. In part (c) candidates who subtracted y from both sides before multiplying by r were more successful than those who tried to multiply by r first. The latter group almost invariably did not multiply the y term by r. In part (d) very few candidates had success with the least common multiple of two algebraic terms.

Question 11

This question proved too challenging for most candidates. Candidates should be encouraged to use an algebraic method or other mathematical techniques such as ratio to solve these problem solving questions. By far the most successful method in this question was to start with the ratio 1 : 3 and then state that 2 parts = 16 so 3 parts = 24, giving 24 boys and 24 + 11 = 35 girls. Those who used a combination of algebra and ratio had little success.

Question 12

A small number of candidates realised what to do and usually obtained the correct quadratic equation. Many of these successfully completed the question. Many candidates worked with a and b and did not replace them with x and 3. Teachers should note that a similar question appears in one of the unit 2 practice papers on AQA's 'All About Maths' website.

Question 13

Many candidates had multiple attempts at this question. The fact that the answer was given in the question should indicate that the fractions need to be cleared. Those who realised this tried various strategies. A common error was to multiply by $x+2$ but only for two terms giving 7 + 10 = $\frac{9(x+2)}{x}$.

Question 14

Many candidates showed ability in expanding the brackets but there were some sign errors or errors in one term. Having expanded correctly, a lot of candidates eliminated the middle terms, but some wrote $\sqrt{150} - \sqrt{30} + \sqrt{30} - \sqrt{6} = \sqrt{144}$. Others wrote $\sqrt{150} - \sqrt{6} = \sqrt{144}$, often leading to $\sqrt{12}\sqrt{12}$. Weaker candidates often wrote $\sqrt{10} + \sqrt{2} = \sqrt{12}$ and $\sqrt{15} - \sqrt{3} = \sqrt{12}$ and from this some then obtained $2\sqrt{3} \times 2\sqrt{3} = 4\sqrt{6}$, giving the correct answer from incorrect working. Some candidates who obtained $\sqrt{150} - \sqrt{6} = 5\sqrt{6} - \sqrt{6}$ then gave an answer of $5\sqrt{6}$.

Question 15

Candidates had very little success with this question. In part (a) answers such as ... $9^2 = 81$ followed by $81 \div 3 = 27$ were seen. A common error in part (b) was to use $8m = 2m^2$.

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