Principal Examiner Feedback

January 2017

Edexcel Award in Algebra
Level 2 (AAL20)

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Introduction

The paper appeared to provide all students with the chance to show what they knew. Students found they had enough time to complete the paper.

Many students presented scripts which were a joy to mark and there were many high scores. In general, it seems that students were realistically entered for this level 2 qualification with the majority of students obtaining a creditable mark. Students had a good knowledge of standard techniques and were generally able to manipulate equations, factorise expressions, use formulae with accuracy and plot and draw graphs. The main areas where centres might seek to help candidates improve their performance were changing the subject of a formula involving cases such as that in question 4(b), sketching the graph of a quadratic function, finding gradients, taking into account the scales used on a graph and solving linear inequalities.

The performance of weaker students was characterised by poor graph sketching and the inability to manipulate algebraic expressions. Students using a flow chart approach for solving an equation or changing the subject of a formula were rarely successful.

Reports on Individual Questions

Question 1

This question was generally well answered. All students were able to gain some credit for their responses. In part (a), nearly all candidates scored both marks with a minority of candidates making errors, usually arithmetic in nature.

A large majority of students scored the marks available in part (b) which tested the laws of indices.

The expansion of the brackets in part (c) was done well but less so in part (d) with a considerable number of students working out $5t \times 3t$ as $15t$ or $5t \times t^2$ as $5t^2$. Students often scored both marks in part (c) and one mark for their answers to part (d).

Question 2

Students usually completed part (a) correctly, expressing their answer in the usual concise form rather than using multiplication signs.

Examiners were very disappointed that students more often wrote $3k$ as their answer to part (b) instead of a correct expression such as $\frac{k}{3}$. Students are advised to read such questions with more care in order to identify the correct

operations to build into their expressions and to expect different parts of questions to test different skills.

Question 3

Most students gained all the marks for their answers to this question. A small number made errors in their calculation of the values and appeared not to be concerned when their graph was not a straight line. A few students made errors in plotting their points or did not draw the line over the whole range of x from −3 to 3. To their credit it was pleasing to see some students who had errors in their table of values went on to draw a correct graph, apparently realising that the graph should be a straight line.

Question 4

This question proved to be a good discriminator. A good proportion of students scored 2 marks for their responses to part (a). The incorrect responses seen were usually caused by a lack of understanding that $\frac{1}{2}abh$ denotes a product of four numbers. A significant number of students calculated the value of $\frac{1}{2}(a+b+h)$ or $\frac{1}{2}+a\times b\times h.$ In part (b) far fewer students gave a correct answer. A large proportion of students were unable to carry out a correct first step, for example, multiplying both sides by 2 to give $2v=abh$. Of those students who could carry out a correct sequence of operations to make a the subject of the formula, a large proportion of them did not give a concise formula as their answer. Students were awarded both marks for an unambiguously written formula equivalent to $a = \frac{2v}{bh}$ whatever form it was written in. A number of students used a flow chart approach. This was rarely successful and often resulted in students giving a final expression involving $\frac{1}{2}v$ rather than $2v.$

Question 5

This question was generally answered well though there were many responses which were only partially factorised. These answers were credited with one mark provided they were equivalent to the original expression.

Question 6

Responses to part (a) of this question showed a further improvement in the area of graph sketching compared to previous sessions. Many students clearly knew exactly what was expected and drew a sketch of a parabola, placed symmetrically about the y axis and with the y intercept marked and labelled at (0, −16). Few students tried to plot and draw a graph. Examiners were generous in rewarding a sketch intended to be a parabola though some students would benefit in further practise sketching this shape. Compared to previous sessions the number of inverted parabolas sketched was small. A small minority of students drew a straight line or did not attempt the question.

Part (b) of the question was generally well answered with a substantial number of students giving an acceptable description for the behaviour of y.

Question 7

Nearly all candidates gave a correct response to part (a) of this question and the great majority of students also got part (b) correct. A small proportion of students were let down by a lack of accuracy. For example "$42 \div 7 = 7$"was seen all too often. Though this specification is not testing number work it is expected that candidates will have sufficient facility in this area to be able to deal with the equations in this question with accuracy. Parts (c) and (d) were more discriminating. Students usually expanded the brackets in part (c) as a first step and this was almost always done correctly. Most students completed the question successfully but not all students gave their answer in its simplest form, that is $1.5, \frac{3}{2}$ or $1\frac{1}{2}$. Students leaving their answer as $\frac{15}{10}$ scored 2 marks for their answer. It is expected that simple fractions given as the solution to equations and inequalities will be given in their lowest form. Part (d) was less well done though there was still a large number of a fully correct answer. A significant number of students appeared under-confident in dealing with an equation involving both fraction form and terms in y on both sides of the equation. Students should expect to have to deal with equations involving fractions somewhere in this paper. A significant number of students gave an answer of $y = 2$ from $3 = 6y$.

Question 8

This question was quite well answered. The great majority of students were able to score at least 1 mark in the first part of the question. It was surprising to see so many students either not able to expand both brackets accurately or not able to simplify the resultant expansion correctly. Students are reminded to ensure their answers are written clearly. In particular, in some students' final answer "29" could often be mistaken as "2a".
Part (b) was not answered as well and it appeared that many students made errors because of the multistage nature of the demand. Most students substituted $g = 5$ into the unsimplified expression but they did not always show a complete and coherent approach to this. A few students expanded and simplified the expression but did not substitute $g = 5$ and so could not be awarded any marks.

Question 9

This question discriminated well between students of different abilities. Most students showed a good understanding of the notation used and so scored well in most parts of the question.

The large majority of students gave a correct response to part (a) of the question. Common errors included getting only one end of the interval correct or using full circles instead of empty circles.

A large majority of students scored full marks in part (b). The most common error seen was for students to include one or both of 6 and 12 in their list of integers.

Most students also scored both the marks in part (c). The most common error was for students to use < instead of $\leqslant$ in inequalities. A small number of students gave the response "$-4 \geqslant x \geqslant 0$".

Part (d) was a good discriminator. A good proportion of students were able to get as far as $2p = 18$. However, a much smaller percentage of students were able to go beyond finding the critical value to give a correct inequality.

Question 10

Part (a) of this question was answered correctly only by a minority of students. Too often students gave equations for the lines which involved both of the variables x and y.
"L = −1" and "M = 3" were also frequently seen as were $y = -2$ and $x = 3$.
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Perhaps, surprisingly, part (b) of the question was answered better than part (a). Finding the gradient or the equation of a line is being done more successfully by many students taking this examination. Many students worked out the gradient of the line correctly together with a clear indication of a correct method on the diagram. A small proportion identified a correct triangle on the line but labelled it with a height and base of 2 and 1 respectively. This could be given some credit if it was clearly linked to a calculation to work out a gradient. The most commonly seen incorrect response for the equation of the line was $y = 2x - 2$. Examiners could give some credit for this response as the students had used the intercept of the line with the y axis correctly.

Question 11

Students could often successfully use the given expression to work out the first two terms of the sequence defined in part (a) of this question. The main errors crept in because of errors in arithmetic. Part (a)(ii) was quite well answered though there were a significant number of students who substituted $n = 58$ into the expression instead of calculating the value of *n* for which when $3n - 5 = 58$

Question 12

Many students provided a good answer to this question, completing the table of values correctly and going on to complete a good drawing of the curve. Where there were errors they usually involved the calculation y values for negative x values. Points were usually plotted accurately. It is a pity that students who make errors and draw a curve do not seem to check their accuracy. This specification requires students to be able to sketch quadratic functions so candidates should expect a smooth parabola here.

Many students were also able to score both marks in part (c) for reading off the two values corresponding to $y = 0$ from their graph. Some students did not attempt this part of the question.

Question 13

Nearly all students could carry out the conversion in part (a) of this question. Part (b)(i) was less well answered with the incorrect response "1" being commonly seen. In part (b)(ii) students sometimes restricted their interpretation to repeating the first statement made at the beginning of the question. Other students gave a clear, concise and correct interpretation.

Question 14

This question attracted a good number of fully correct answers.
However, for those students who were less successful, common errors included "$4^2 - 6\frac{1}{2} = 9.5$" where the student had apparently correctly evaluated 4^2 but then failed to recognise that $6y$ was a product.

Only the better students were able to change the subject of the formula in part (b). There were many successful attempts. However, many students tried to change the subject without showing or doing any intermediate working.

Question 15

This question was a good discriminator. About a half of all students entered for this examination scored full marks for their responses. In part (a), many students showed they knew what to do but then often made errors in interpreting the scale on the speed axis. These students often gained one of the two marks available in part (a).

Part (b) was answered correctly by nearly all candidates.

Question 16

A large majority of candidates drew a correct graph in part (a) and so scored the mark available for this. A few candidates counted squares on the x axis and so ended their line at 1015 instead of the correct 1130.

Most candidates realised that they needed to use distance divided by time in part (b) but the calculation of $14 \div 2.5$ defeated many students and only a small minority of students gained full marks.

Based on their performance on this paper, students are offered the following advice:

- practise writing down algebraic expressions and formulae from situations expressed in words, taking care with units where relevant.
- make sure you show maximum and minimum points clearly when drawing the curves associated with quadratic expressions.
- use a pencil to draw graphs so that you can change your answer if you find a mistake.
- make sure you write down all stages of your working when substituting values, solving equations or changing the subject of a formula.

Grade Boundaries

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