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Principal Examiner Feedback

January 2016

Pearson Edexcel Level 2 Award in Algebra (AAL20)

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Introduction

Students seem to have found the time allowed sufficient to complete the paper and most students achieved a very creditable total score for the paper. Centres are to be congratulated in their judgement of which students were well suited to an entry for this examination and at this level.

Students showed they had a good knowledge of standard techniques and were generally able to manipulate equations, factorise expressions and use formulae with accuracy. They also generally answered questions involving graphs well whether it was drawing, sketching or interpreting them.

The proportion of students who are unable to calculate the gradient of a line or find the equation of a line has decreased and many students appeared to find the question focussing on this to be routine.

The performance of weaker students was often characterised by poor algebraic manipulation, a lack of care when dealing with signs and exponents and the inability to deal with and convert units.

Students generally appear to have been prepared well across all areas of the specification and so were more likely to be judged as proficient at this level.

The design of this paper and the performance of students on this paper were consistent with previous papers so allowing a pass mark of about 66% of the total mark to be considered as showing proficiency in Algebra at Level 2.

Reports on Individual Questions

Question 1

This question was generally well answered. Most students were able to gain the majority of the marks available.

In part (a), most students scored both marks though a significant proportion of students were unable to give a completely correct expression and made errors in collecting the y terms or the constant terms so responses such as $5x + y + 9$, $5x + y - 9$ and $5x - y + 1$ were frequently seen.

Nearly all students found the simplification of the expressions in part (b) to be straightforward and they showed a good understanding of the laws of indices.

Part (c) was also well answered though a surprising number of students wrote "$12r + 8r$" instead of "$12r + 8r^2$".

The expansions of the brackets in part (d) were also done well with nearly all students expanding at least one of the brackets correctly but many students went on to make errors when simplifying the resultant expansion and so did not score both marks. Where final answers were incorrect, the responses

"10x + 33" and "10x − 9" featured prominently, suggesting these students had been unable to deal with the signs correctly.

Question 2

Students nearly always completed the table of values correctly so most students were awarded the 2 marks available. Nearly all students also their plotted points accurately and drew a correct straight line. A small minority of students did not join the points.

Question 3

Nearly all students gained at least half marks for their answers to this question and a good proportion of students were awarded 8 or 9 of the 9 marks available.

In part (a) nearly all students gave a correct answer. Those students who were less confident with their 7 times table sometimes gave an incorrect answer.

The majority of students also scored the 2 marks available in part (b) of the question and again mistakes were usually due to arithmetic rather than a misunderstanding of the operations required.

Part (c) was less well done but there were still many correct answers. Students usually identified expansion of the brackets as a first stage and went on to do this accurately but far fewer students successfully dealt with the next stage. "6x + 3 = 2x" was often followed by "4x + 3" without the necessary "= 0" and then the incorrect answer "$x = \frac{3}{4}$ This incorrect answer was also often given after the correct working leading to "–3 = 4x" or "3 = –4x" Answers in any of the forms $-\frac{3}{4}$, $\frac{-3}{4}$, $\frac{3}{-4}$ were accepted for full marks despite the last two forms not being fully processed. The decimal form, –0.75 was, of course, also accepted.

Most students also gained some credit for their response to part (d) though some students did not seem familiar or comfortable with an equation such as this involving an algebraic fraction. Some students got as far as 5y = 4 only to make an error in the last stage of their working. There were also a significant number of students who obtained $y = \frac{4}{5}$ in their working only to give the answer y = 1.2 or y = 1.25 on the answer line.

Question 4

Many students demonstrated a good understanding of what was required in part (a) of this question. They could usually write a correct expression though there was some clumsiness and expressions such as 24 × p + 7 × q and p24 + q7 were commonly seen. The most common incorrect response was p + q.

A large proportion of students were able to give a correct expression in part (b) of the question.

Part (c) was less well answered and though there were a good number of fully correct responses, many students lost marks either because they put a £ sign in

their expression or because they did not give an expression for the cost in pence, rather than pounds. This part of the question discriminated well between students who gave the fully correct expression $\frac{100T}{24}$, those who scored one mark for giving partially correct expressions such as $\frac{T}{24}$, £$\frac{T}{24}$, $T \times 100$ and £$\frac{100T}{24}$ and students who gave incorrect expressions, most commonly $\frac{24T}{100}$. Students are advised to leave units out of the formulation of algebraic expressions.
The use of multiplication signs was condoned though it might be expected that students taking an examination focussing on algebra might be expected to use $24T$ rather than $24 \times T$ as a matter of routine. Similarly, the use of upper case or lower case letters was accepted.

Question 5

This question was generally answered well.

A high proportion of students scored 2 marks for their responses to part (a), though some students, after making a correct substitution, evaluated $\frac{6}{3}$ as 18 or $\frac{1}{2}$.
In part (b) many students gave the right answer. Students who did not show intermediate stages in their working usually scored no marks.

The most common error seen was for students to add 6, rather than multiply by 3 as their first operation.

Very weak students often gave $t = \frac{4w-6}{3}$ as their answer – they had simply replaced t with w and w with t in the original formula.

In part (c), a good proportion of students obtained a correct value for b. The working seen suggested that many students had worked out the value of 5^2 but had then used a trial and improvement approach to determine b. As a result students generally scored only 1 mark for evaluating 5^2 or full marks for a correct answer. A small number of students scored 1 mark for working out $2 \times 12 - 10$ following the evaluation of 5^2 as 10.

Question 6

Responses to part (a) of this question showed much improvement in the area of graph sketching compared to previous sessions. The question discriminated well between students of different abilities. 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 $(0, -3)$. Only a small proportion of students tried to plot and draw a graph. Many students scored partial credit for getting one or two of the aspects listed on the mark scheme correct. It was rare to see inverted parabolas sketched. A few weak students either drew a straight line or did not attempt the question.

Students are advised to use a pencil to sketch graphs. This enables them to change their sketches should they wish to.

Part (b) of the question was generally well answered with a substantial number of students giving a correct explanation backed up with clear reasoning and sometimes with the use of more advanced mathematical expression such as "as $x \to \infty$, $y \to \infty$". This was not expected.

Question 7

There were many completely correct answers to this question and it was also a good discriminator producing a wide range in the total number of marks awarded. Students usually scored at least 3 marks in total for their responses to this question and slightly fewer partial factorisations were seen than in previous sessions.

Part (a) was usually answered correctly.

Parts (b) and (c) attracted many good answers and when 2 marks were not scored, students usually scored 1 mark for a correct but only partial factorisation as specified in the mark scheme. It is encouraging to report that more students than previously seem to be checking that their responses by multiplying out to give a correct expression.

Question 8

This question was quite well answered. The great majority of students were able to score 2 marks in the first part of the question. Those students who did not score both marks usually scored 1 mark for a correct second term. These students often gave 1 as their third term.

Part (b) was answered less well with "n + 8" being frequently seen by examiners. Some other students who correctly identified the need to use the common difference 8 and 50 in their expressions gave the response 50n + 8. There were however a large number of correct responses.

Part (c)(i) was answered correctly by almost all students. However (c)(ii) provided more challenge to many students. Few students formulated, wrote down and solved an equation, most preferring to use inverse operations ((43 – 7) ÷ 2) or write out the series instead. This approach was often successful but some arithmetic errors were seen, particularly in the evaluation of 43 – 7 . The calculation (43 – 9) ÷ 2 was seen quite frequently but few students realised this gave 1 less than the number of the term required.

Question 9

In previous sessions of this examination, finding the gradient or the equation of a line has often been poorly done. In this session many more students were successful.

In part (a) many students gave the correct gradient usually accompanied by a clear indication of a correct method on the diagram. A small proportion identified a correct triangle together with height and base 3 and 1 respectively only to add these numbers or to divide 1 by 3 rather than 3 by 1. Commonly

seen incorrect responses included $3x$, $3x + 1$ and $y = 3x + 1$. Examiners could give some credit for these responses.

A smaller proportion of students could give a fully correct equation in part (b) but many students who did not score both marks, gained 1 mark for using the correct gradient in their equation or for using the intercept on the y-axis in their equation.

Question 10

This question was answered correctly by about one third of all students. Unfortunately a significant proportion of students gave only one of the two solutions and could not be awarded the mark available. Some students tried to solve the equation algebraically but without success.

Question 11

This question discriminated well between students of different abilities. Most students showed a good understanding of the notation used and were able to gain credit for their attempts.

The large majority of students gave a correct response to part (a) of the question though a significant number of students drew a line with an arrow above 3 on the number line rather than an open circle.

Most students scored full marks in part (b). The most common error seen was for students to include one or both of -7 and -2 in their list of integers.

Most students scored both the marks in part (c). The most common error was for students to use $<$ instead of $\leqslant$ in their inequalities. Nearly all students showed they knew how to use the notation to describe x as a number in a given interval.

Part (d) proved to be a good discriminator. A good proportion of students were able to get as far as $4m \geqslant -2$ or $4m = -2$. However, a large number of these students either failed to divide both sides of the inequality by 4 or they did not simplify $\frac{-2}{4}$ fully. Examiners expected students to give their final answer as either $m \geqslant -0.5$ or $m \geqslant -\frac{1}{2}$

Question 12

There were many good answers to this question. Most students completed the table of values correctly. When there were errors here, the most common was to have a $y = 0$ as the value corresponding to $x = -1$

Students usually went on to complete a good drawing of the required curve. Points were invariably plotted accurately. However, a substantial number of students did not indicate a minimum point of the curve below the x-axis, preferring to join (0, 0) to (1, 0) with a straight line. These students could not be given both marks for a smoothly drawn correct curve. There were also a number of students who joined their points with straight line segments.

Many students were also able to score both marks in part (c) for reading off the two values corresponding to $y = 3$ from their graph. This was generally accurately done but on occasion students gave only the positive value of x. Sometimes this part of the question was not answered.

Question 13

Answers to this question were usually fully correct but when they were not students usually assigned the correct letter to the first two descriptions but had assigned C to the third description and D to the fourth description.

Question 14

This question attracted a large number of fully correct answers.

Nearly all students correctly labelled Jake's travel graph in part (a).
The success rate in part (b) was lower. There were many fully correct answers but there were also a significant number of students who wrote $\frac{12}{15}$ but could not deal with the change of units from minutes to hours. Some students converted 15 minutes to $\frac{1}{4}$ hour but then worked out
$12 \div 4$ instead of $12 \div \frac{1}{4}$.

Drawing the travel graph in part (c) proved to be a good discriminator with most students scoring at least one mark and usually at least two marks. Errors commonly seen included lines from (0, 0) rather than (10, 0) and lines with incorrect gradients.

Summary

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

Grade boundaries for this, and all other papers, can be found on the website on this link:
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