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Principal Examiner Feedback

January 2015

Pearson Edexcel Level 2 Award in Algebra (AAL20)

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Introduction

This level 2 exam paper provided all students with the chance to show what they knew.

Students seem to have found the time allowed sufficient 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. The majority of students obtained a creditable mark. Students had a good knowledge of standard techniques and were generally able to manipulate equations, factorise expressions and use formulae with accuracy.

Many students showed a good understanding of the topics involving graphs though this area was perhaps the one where most improvement could be made. In particular there are still a significant number of students who are unable to calculate the gradient of a line or sketch the graph of a quadratic function. Too many students relied on plotting points when required to produce a sketch.

The performance of weaker students was characterised by poor graph sketching and the inability to solve equations and factorise expressions.

Students should expect to be tested on all areas of the specification and will be at an advantage if they have a good knowledge of all topics.

Reports on Individual Questions

Question 1

Most students demonstrated a good understanding of differences between an equation, an expression and a formula. Nearly all students scored at least one mark.

Question 2

This question was generally well answered. Almost all students were able to gain some credit for their responses. In part (a), most students scored both marks with a minority of students making errors, usually with the term in y. The most common incorrect answers seen to this part were $5x - 3y + 13$ and $5x + 7y + 13$.

The expansion of the bracket in part (b) was also done well with only a small number of students not scoring 2 marks. These students often got the $15x$ correct but forgot to multiply the 4 by 5.
Over three quarters of students scored the marks available in parts (c) and (d) with a slightly bigger proportion of them scoring the mark in part (c) than in part (d).

Question 3

Students are advised to leave units out of the formulation of algebraic expressions. In this question a large proportion of students lost marks for including £ signs as an integral part of their expressions, for example $£4a + £6c$, $£T = £8a$. A considerable number of students also used powers of *a* and *c* in their expressions and this usually meant that examiners could not award any marks. $\frac{T}{8} = a$ was a frequently seen as a response in part (b). Since this was not a formula for T in terms of a it could only be awarded part marks.

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 $4a$ rather than $4 \times a$ as a matter of routine. Similarly the use of upper case or lower case letters was accepted.

Question 4

This question proved to be a good discriminator. A high proportion of students scored 2 marks for their responses to part (a). The incorrect responses seen were usually caused by incorrect arithmetic. In a few cases students had calculated $3+6+4$ or $36+4$.

In part (b) many students gave the right answer. However, there were a significant number of students who substituted $r = 54$, and gave 544 as their answer. Many students did not show a clear substitution followed by clear steps in the manipulation of the resulting equation. A common error in part (b) was for students to interpret rt as $r+t$, not $r \times t$ and give an answer of $r = 40$.

In part (c), a good proportion of students obtained a correct formula, often with little working seen. This part of the question was one of the least well answered questions on the paper and it was clear many students could not complete the correct operations accurately in the correct order.

Students are advised to write down every step in the manipulation of formulae rather than to try to write down a final answer without any working. Some students attempted a flow diagram approach. This was rarely successful. Some students gave incorrect responses to part (b) but a correct formula in part (c).

Question 5

A large proportion of students gained some credit for their answers to this question and over a third of students were awarded at least 6 of the 7 marks available.

In part (a) many students could not handle the $-2x$ on the right hand side of the equation and often used the inappropriate operation of subtracting $2x$ from both sides of the equation. Another common error was to evaluate $4-14$ incorrectly and write $5x = 10$. These errors both led to the award of no marks in this part of the question.

In part (b) most students successfully expanded the brackets and could isolate either the terms in *y* or the constants on one side of the equation to score 2 marks. Far fewer students could complete this part successfully to give a correct solution in the form $9.5, 9\frac{1}{2}$ or $\frac{19}{2}$.

Part (c) was quite well done though a good proportion of students started by multiplying by 4 but did not multiply the 5 by 4.
There were a significant number of students with incorrect answers to part (a) but fully correct answers to both part (b) and part (c).
Students are reminded that they can check their answers by substituting them back into the equation.

Question 6

This question discriminated well between students of different abilities. Some students clearly knew exactly what was expected and drew a sketch of an inverted parabola, placed symmetrically about the *y* axis and with the y intercept marked and labelled at $(0,10)$. Fewer students than in previous sessions 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. Sometimes students' curves appeared in only two quadrants and though most students drew inverted parabolas there was a significant proportion of U shaped curves. Some weaker students drew straight lines. A significant number of students made no attempt to answer this question.

Question 7

Part (a) of this question was answered successfully by many students though a substantial number of students gave the incorrect answer 85.

In part (b) a good proportion of students gave the correct response, usually without showing any working.

There were also many correct solutions to part (c), though many students did not give a "whole number of hours". Where students have used readings from the graph they are advised to show lines on their graph as evidence of this so that method marks may be awarded accordingly.

Question 8

Students usually completed the table correctly. Where entries were incorrect, it was often the negative value which was wrong. In only a small proportion of cases were all the entries incorrect. The graph was usually drawn accurately and most students scored 2 marks. However, sometimes students did not join the points.

Question 9

This question also 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. A large majority of students gave a correct response to part (a) of the question. Substantially fewer students scored full marks in part (b). Common errors included not including the variable (x) in their answers and getting one or both of the inequality signs the wrong way round.

Many students scored the marks in part (c) but a significant minority of students either drew a line from 3 to the right or used the wrong notation at $y = 3$.

It was encouraging to see many completely successful attempts to solve the inequality in part (d). However, a large number of students wrote $\frac{3t}{2} > -3 - 4$ followed by $\frac{3t}{2} > 7$, whilst other students got as far as $3t > -14$ only to write $t > \frac{14}{3}$ or the equivalent decimal on the answer line and missed off the negative sign. Some students started their solution by showing the intention to multiply by 2 but then failed to include the 4 and wrote $3t + 4 > -6$. This was one of the least well done parts of a question on the paper.

Question 10

A disappointingly small proportion of students could give the equation of the line $x = 3$. Many different equations and expressions were seen by examiners. These included $L = 3$, $y = 3x$ and $y = 3$. "0" was also a commonly seen answer and evidence seen suggested that students thought that the gradient of the line was 0.

In part (b) of the question, many attempts were not accompanied by sufficient detail of the method used. In particular, many answers of 3 did not gain any credit as no evidence of a gradient calculation was given. Students should be advised that a clear triangle drawn on the line with the differences in x values and the difference in y values marked then the division of the two shown would help examiners to award part marks where incorrect final answers are given. Students need to consider carefully whether the gradient is positive or negative when giving their final answer.

Question 11

This question was quite well answered. Most students were able to score 2 marks in the first part of the question. The minority of students who did not identify the "Fibonacci" nature of the sequence appeared to assume that the terms 3 and 5 were enough to suggest a sequence of odd numbers.

The great majority of students successfully wrote down the two terms of the sequence in part (b)(i). In part (b)(ii), most students found that it was the 12th

term of the sequence which was 51. The evidence seen suggested that this had been done by using inverse operations rather than by a more formal approach of solving the equation $4n + 3 = 51$. However, a significant number of students substituted 51 into the expression $4n + 3$ and gave their answer as 207. Weaker students often listed all terms but many started with 3 rather than 7 so gave the 13th term as their answer.

About a half of all students gave a correct expression for the *n*th term in (c)(ii). Some students did not attempt the question but, more often than not, students not gaining any marks gave one of the responses $n + 2$, $3n + 2$ or $5n + 2$.

Question 12

There were many completely correct answers to this question. It was also a good discriminator and produced a wide range in the total number of marks awarded. Students usually scored both marks in part (a) of the question. Those students who did not score both marks usually scored one mark for taking out the 5 and giving a correct partial factorisation. In part (b) of the question, again one mark was commonly awarded to students for not fully factorising the expression.

In part (c) many students gave the answer "$2ty(ty + 5)$". This response was not a correct partial factorisation and was not given any credit. Centres are reminded to emphasise the need to fully factorise expressions in order to gain full marks.

Question 13

This question differentiated well and there was a wide spread in the marks awarded. Part (a) of the question was answered quite well and many students gave 5 correct values.

The graph drawing was also well done although sometimes correctly plotted points were joined with straight line segments rather than a smooth curve. Weaker students often presented a straight line graph which, of course, could not be given any credit.

In part (c) students often missed the opportunity to score a method mark for showing the use of the line $y = -2$ on their graph in order to find estimates for the given equation. In cases where the line $y = -2$ was shown, students often only found one solution. Some students attempted to solve the equation without using the graph.

There were many scripts where full marks were gained in parts (a) and (b) but no attempt made in part (c).

Question 14

About two thirds of students scored the mark in part (a). The incorrect response -16 was commonly seen.

The success rate in part (b) of this question was again about two thirds. Nearly all the students who did not score full marks here worked out 15^2, that is $(5 \times 3)^2$ rather than 5×3^2 . Students are advised to show their substitution in questions like this one before working out any values. A surprising number of students gave 32 as their answer from working such as "$5 \times 3^2 = 5 \times 6 + 2$" or "$15^2 + 2$".

Question 15

A minority of students scored both marks in part (a) of this question. Those students who did obtain the correct answer appear to have considered an approach which used multiplying the 3 by 12 as there are twelve 5 minute periods in each hour. A smaller proportion of the students who tried to calculate the gradient could complete their calculation successfully. Some students multiplied 3 by 5 and gave the answer 15.

The great majority of students earned both marks in part (b) of the question.

In part (c), most students could draw the part of the graph to represent the 5 minutes when the coach stopped but there was a lack of care and checking to ensure the line representing the return journey ended at $(75,0)$. In many cases the line ended at $(70,0)$ or more often $(80,0)$.

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.
- make sure you are familiar with the general shape of curves given by quadratic expressions.
- use a pencil to draw graphs so that you can change your answer if you find a mistake.
- make sure you learn how to write all stages down when substituting values, solving equations or changing the subject of a formula.
- ensure you can find the gradient of a straight line and check the sign of your answer.

Grade Boundaries

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