Examiners' Report
Principal Examiner Feedback

January 2020

Pearson Edexcel Level 2 Award
In Algebra (AAL20)
Paper 1

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Introduction

Students seem to have found the time allowed sufficient to complete the paper. Most students scored well over half marks and nearly all students seemed well suited to an entry for this examination and at this level. A majority of students showed proficiency across most areas of the specification.

There was evidence that students had a good knowledge of standard techniques and were generally able to manipulate equations, factorise expressions, interpret, sketch and draw graphs and work with sequences accurately.

The proportion of students who are unable to calculate the gradient of a line still remains significant with too many students failing to take into account the scales on the axes. Formulating expressions is also a key area where there is considerable scope for greater proficiency. Expressions were often clumsily presented or left in an unsimplified form.

Report on Individual Questions

Question 1

This question was generally well answered. All students were able to gain some credit for their responses. Parts (a), (b) and (c) were answered successfully by nearly all students, though in part (a), weaker students often left multiplication signs in their simplified expression.

Many students gained some credit in part (d), usually for giving r^{15} as part of their answer but only a minority of students gave a completely correct answer. Commonly seen incorrect responses to this part of the question included $2r^{15}$, $8r^{15}$, $10r^{15}$, $32r^{15}$ and $2r^{8}$.

Question 2

This question was answered successfully by a high proportion of students who usually scored all 4 marks.

Sometimes students made an error in the completion of the table but then corrected themselves by drawing a fully correct straight line graph in part (b).

Question 3

This question was a good discriminator. It was not generally answered well with few students giving expressions of the form given in the mark scheme. Instead, expressions were littered with “£” signs and were often unsimplified. Students should be advised not to include units in algebraic expressions. Though unsimplified expressions were often awarded marks, expressions such as $4\frac{1}{2}x$, often seen in part (b) answers, could not be accepted.

One of the objectives being tested in this question was whether students could distinguish between the words equation, formula and expression. A few students wrote formulae rather than expressions. Examiners took this into account when awarding marks.

Question 4

There were many good responses to this question and most students scored full marks. Where 2 marks were not scored, students frequently expanded both brackets correctly only to make an error when collecting terms. For example, the final answers $2x + 22$, $2x - 2$ and $8x - 2$ all suggested such a mistake had been made.

Question 5

There were many good responses to this question on graph sketching and the question discriminated well between students of different abilities. Students usually recognised 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, −18). Only a small number of students tried to plot and draw the graph. Many students scored one or two marks for a partially correct or for an incomplete answer.

Question 6

Many students scored full marks for their answers to this question and the stages involved in solving the equations were usually written down clearly.

Nearly all students obtained the correct answer to part (a) of this question.

Part (b) of the question was also very well answered though a surprising number of students evaluated $\frac{-5}{5}$ as 1 or 0.

The great majority of students also scored all 3 marks for their answers to part (c). Where students did make an error, it was usually at the stage when they attempted to isolate terms in e on one side of the equation. Weaker students sometimes correctly expanded the brackets to give $8e - 20 = 3e$ only to follow this by writing $8e = 23e$. Other errors seen included expanding the brackets incorrectly to obtain $6e - 20 = 3e$ and evaluating $-20 \div -5$ as -4.

Question 7

Many students gained all the marks for their answers to parts (a), (b) and (c) of this question.

Nearly all students scored the marks for the straightforward use of the conversion graph in parts (a) and (b). A small number of students misread values from the axis to give, for example, 23 or 25 as their answer in the first part of the question.

In part (c), although a large proportion of students gave a correct answer, there was a significant number of students who either did not attempt the question or who spoiled their chances of scoring any credit because their working was jumbled and unclear. Where this was the case, and students did not give a correct answer, examiners could not usually identify a correct method so could not award any marks. Successful students usually used one of the conversions 15 miles = 24 km, 5 miles = 8 km or 7.5 miles = 12 km from the graph though students could, of course have used their answer to part (a).

Part (d) was less well done. Examiners accepted statements such as "how many kilometres in a mile" or "conversion rate from miles to kilometres" but not statements such as "conversion between kilometres and miles" or "conversion of kilometres and miles" or "the steepness of the line" because they were either not specific enough or did not relate to the context of the graph.

Question 8

This question was answered well by many students, though some of the expressions seen in parts (b) and (c) were only partial factorisations. A good proportion of these answers were awarded one mark. Students are always advised to check that their factorised expressions are equivalent to the original expression by multiplying out their final answer. In part (b) the most common partial factorisation seen was $4e(2f - 3ef)$. In part (c), $5a(5a^3c^2 + a)$ was a commonly seen partial factorisation. Each of these responses scored 1 mark. A few students who did check their answers wrote factorised expressions correctly in the working space then wrote down the original expression on the answer line.

Question 9

Students could nearly always generate the next two terms of the sequence in part (a).

Part (b)(i) was also quite well answered. The most common error seen was for weaker students to give the nth term as $n + 10$.

Part (b)(ii) was successfully answered by many students who correctly used their answer to part (b)(i). Some students wrote down the first 12 terms of the sequence and scored the 2 marks available that way.

Question 10

In part (a) many students scored both marks or made a good start by considering a triangle drawn onto the line. However, a significant proportion of students ignored the significance of the scale on each axis and merely counted squares, obtaining an answer of "1" for the gradient. Examiners could not award any marks in these cases.

In part (b) students often used a method which relied on them remembering to add a negative sign to the gradient. As a result, many students gave the incorrect equation $y = x + 3$. These students scored one mark for using the y intercept correctly when formulating the equation. About a half of all students obtained full marks in this part of the question. Examiners noted that some students omitted the "$y =$" writing their answer as "$-x + 3$". Some other students wrote "N = $-x + 3$". These responses were awarded 1 mark.

Question 11

This question discriminated well between students of all abilities. It attracted totally correct answers only from about 1 in every 5 students.

There were too many students who interpreted the formula given for parts (a) and (b) as $A = \frac{1}{2} \times (t + b) + h$ or who expanded the bracket then failed to multiply both the $\frac{1}{2}t$ and the $\frac{1}{2}b$ by h.

A fair proportion of students scored 2 marks for their responses to part (a). The most common error was, as stated above, to add h (= 10) to the rest of the expression instead of multiplying by it.

Part (b) was not well done by many of the students taking the examination. Many students carried through errors they had made in part (a) into part (b). Written statements such as $15 = \frac{1}{2} \times (2 + 4) + h$ or $15 = \frac{1}{2} \times (2 + 4) \times h$ followed by $15 = 1 + 2 \times h$ were often seen.

In part (c), few students were able to change the subject of the formula successfully to score all 3 marks available. Students who were not successful often either intended to divide both sides by 8 but wrote $\frac{f}{8} = \sqrt{e} - 7$ or subtracted 7 to get the incorrect statement $f - 7 = 8\sqrt{e}$. Too many students who successfully carried out the rearrangement as far as $\sqrt{e} = \frac{f+7}{8}$ then gave their final answer as $e = \sqrt{\frac{f+7}{g}}$. These students scored 2 of the 3 marks available provided they showed their working clearly.

Question 12

A majority of students provided a good answer to this question, completing the table of values correctly and going on to plot and draw the curve. Many students could also find two estimates for the solution of the equation given in part (c).

Where there were errors in the table, they usually involved the calculation y values for negative x values. It was noticeable that students who obtained an incorrect value for y corresponding to $x = -1$ (often 2) sometimes realised that something was wrong with the value but did not correct it. The evidence for this was that these students sometimes did not plot a point on the grid corresponding to $x = -1$. Points were usually plotted accurately but if there were incorrect values in the table, this usually resulted in a curve which was clearly not a smooth parabola. The specification requires students to be able to sketch quadratic functions so students should know what to expect and are advised to check their working if they do not get a smooth curve.

About a half of all students were able to score both marks in part (c) for reading off the two values corresponding to $y = 0$ from their graph though some students did not attempt this part of the question.

Question 13

Expanding brackets is usually carried out well by level 2 students and this question was no exception. Part (a) was nearly always correctly answered. Part (b) was also very well answered though $2d \times 3d$ was sometimes simplified incorrectly to $5d^2$ or $5d$ or $6d$.

Question 14

This question attracted fully correct answers from just under a half of the students sitting the examination. However, a significant proportion of students did not take account of the £120 payment for the hire of the room and drew a graph from the origin to the point (40, 500). Some other students drew a line from (0, 120) to (40, 500).

Students who drew an incorrect line sometimes went on to give a correct answer to part (b) by subtracting the £120 from £470 then using a line with gradient 12.5 drawn through the origin to find the number of people as required. Only a small minority of students drew a graph which did not consist of a single straight line and most students showed they knew how to use the graph to find the greatest number of people that could attend the party as required in part (b).

Question 15

The majority of students gave a correct response to part (a) of the question. Students often wrote their answer in the form $15 \leq t$. This was acceptable as were responses where a different letter, usually x was used instead of t. The most commonly seen unacceptable answers included $t > 15$, $x > 15$, $t \leq 15$, and $x \leq 15$.

Most students scored full marks in part (b). Common errors included getting only one end of the interval correct or using full circles instead of empty circles or vice versa.

Students usually scored at least 1 mark in part (c) for finding the critical value, 40 and about three quarters of all students gave a fully correct answer.

Question 16

This question was a good discriminator with students usually scoring a total of at least 3 marks for their answers.

Finding the speed, that is the gradient of the graph, in part (a) was found challenging for a significant number of students. Often, students could identify that they needed to calculate $4.5 \div 1.5$ but were unable to process this accurately.

Part (b) was usually answered correctly though 30 minutes was a commonly seen incorrect response.

Completing the graph in part (c) presented a difficulty for many students because it demanded combining the skills of linking gradient, speed and time. Some students appeared not to take into account the speed and joined the point (4.5, 6.5) to a point on the time axis, one hour later. They could be given some credit for this.

Summary

Based on their performance on this paper, students should:

- practise using formulae to find the unknown value of a variable which involves substitution followed by the need to solve an equation

- include in your method for finding the gradient of a straight line, a safeguard to take into account when the gradient is negative

- when changing the subject of a formula, set out each step separately so that examiners can give some marks for correct intermediate steps in cases where the final answer is incorrect.

- practice how to interpret the gradient of a graph in a real life context.

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