Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2024

Pearson Edexcel Level 3 Award
In Algebra (AAL20)

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Principal Examiner Feedback – Level 2

Introduction

Students found the time allowed sufficient to complete the paper and there were few instances where a student had not attempted a question. Most students seemed well suited to enter for this level 2 examination. The majority of students showed proficiency across most areas of the specification.

It was a concern that some students did not take enough care in writing numbers clearly. For example, there were a significant number of cases where examiners could not distinguish whether a symbol represented the number 4 or the number 9 or the number 7. Similarly, examiners sometimes found it difficult to distinguish between 1 and 2 or between 3 and 5. Students are reminded that not everyone is familiar with their handwriting. It was also the case that a considerable number of students lost marks because they misread details given in the question or from miscopy from their own previous working. They are advised to carry out checks at every stage in their working in order to eradicate any unnecessary loss of marks.

That said, responses to questions were generally logically presented, allowing examiners to award partial credit where deserved. Students showed a good knowledge of standard techniques and were generally able to solve equations where the variable appears on one side of the equation, expand and factorise expressions and sketch, plot and draw graphs. The main areas where centres might seek to help candidates improve their performance were in solving equations where the variable appears on both sides of the equation, using the graph of a quadratic function to solve an equation, finding the gradient and equation of a straight line, solving inequalities and re-arranging formulae. Formulating expressions is also still a key area where there is considerable scope for greater proficiency, particularly in cases where the use of brackets and subtraction of expressions is involved.

Reports on Individual Questions

Question 1

This question provided a good start to the paper for students. Nearly all students answered parts (c) and (d) correctly. The small number of students who answered part (c) incorrectly frequently gave u^4 as their answer. Parts (a) and (b) of the question were also answered well though there was a significant number of students for whom dealing with the signs in part (a) was not straightforward and terms in $7x$ and $6y$ sometimes formed a part of answers seen. A loss of marks in part (b) was often due to students not fully simplifying the product. This was exemplified by answers such as $5 \times 3p^3$ and $5p \times 3p^2$. Students should note that in this specification the instruction to simplify should be interpreted to mean a full simplification. The great majority of students scored at least one of the two marks available in part (e) for getting the 16 and/or the t^{12}correct. Common errors seen were due to students not raising the 2 to power 4 or adding rather than multiplying the 3 and the 4 when simplifying $(t^3)^4$. This part of the question acted as a good discriminator.

Question 2
A large proportion of students were able to match the straight-line graphs to the correct equations. Students could usually identify the graphs corresponding to the equations $y = -2$, $y = -x$ and $x = 4$. Identification of the graphs for $y = x + 3$ and $x + y = 1$ was less well done with the result that D and A were quite often transposed.

Question 3
Part (a) of this question was usually answered correctly though a significant proportion of students gave one of the incorrect responses $h(0 - h)$ and $h(- h)$ which reflected an under-confidence in what to do with the first term, h in the unfactorised expression when h was identified as the common factor. It was encouraging that in part (b) students usually scored both of the marks available for a fully factorised expression. There were very few students who gave a partially factorised expression as their answer. However, there was a significant number of students who gave an expression which did not multiply out to give the expression given in the question. A common error was for students to wrongly interpret the term pt^2 as $(pt)^2$. Students are advised to check their answer by multiplying out.

Question 4
Students showed themselves to be generally proficient in solving the linear equations presented to them in this question. Nearly all students found the correct solution to the equation in part (a) and although fewer students were able to solve the equations in parts (b) and (c) successfully, they still attracted correct solutions from a large majority of the students entered for this paper. For the equation given in part (b), students who added 3 to each side of the equation usually proceeded to complete the solution successfully, whereas of those students who chose to multiply both sides of the equation by 3, a significant number of them did not multiply both terms on the lefthand side of the equation by 3. This usually led to them giving the incorrect solution, $w = 13$. A high proportion of students successfully expanded the brackets as a first step for part (c). Most of them were able to complete this part of the question to score all 3 marks. Examiners noticed that in cases where students did not score full marks here, many of them miscopied the right-hand side of the equation, writing 16 instead of −16. Students are advised to carry out continuous checks to ensure they have written what they meant to write.

Question 5
This question on sequences was found to be straightforward by most students. Part (a) was correctly answered by nearly all students. The small number of incorrect responses seen were usually restricted to errors in arithmetic rather than to a misunderstanding of what to do. Part (b) was also answered well. Of those students who did not give a completely correct expression, a significant number of them were able to get some credit for writing an expression in the form $6n + c$. The most common responses scoring no marks included $4n + 6$ and $n + 6$.

Question 6
Expanding brackets was well understood by students taking this paper. Parts (a) and (b) were successfully answered by a large majority of students. There were few errors seen in part (a). The most common errors seen in part (b) involved writing $8u$ instead of $8u^2$

for $4u \times 2u$ and/or $12u^2$ instead of $12u^3$ for $4u \times 3u^2$. Examiners were unable to give any credit for the answer $8u - 12u^2$. Students who wrote $4u \times 2u = 8u^2$ and $4u \times 3u^2 = 12u^3$ separately in the working space sometimes wrote $8u^2 + 12u^3$ on the answer line. These students could be given some credit.

Question 7

A good discriminator, this question attracted fully correct answers from a minority of students. However, nearly all students gained some marks for their response. A majority of students could categorise $c^2 + 6$, $p^2 = 2p$ and Speed $= \frac{distance}{time}$ correctly as an expression, an equation and a formula respectively. However, a much smaller proportion of students categorised $r = 2d$ as a formula. They often thought this was an equation.

Question 8

This question was also a good discriminator with only the higher attaining students giving complete and correct responses to all three parts of the question. Nearly all students were able to represent Louise's rest, highlighted in part (b), on the graph. Most students realised that the gradient of the first part of the graph would give the speed at which Louise ran from her home to her friend's house. They usually proceeded to get the correct value, 8 km/h. There were, however, a significant number of students who used a correct method to find the gradient and wrote down $\frac{2}{0.25}$ or $2 \div \frac{1}{4}$ or $\frac{2}{15}$ but who could not process this correctly to give a correct answer. Those students who wrote down $\frac{2}{0.25}$ or $2 \div \frac{1}{4}$ sometimes gave 0.5 ($2 \times \frac{1}{4}$) as their answer. Some students changed the $\frac{1}{4}$ hour to 0.4 hours. A disappointing proportion of those students who wrote down $\frac{2}{15}$ then went on to give 7.5 ($15 \div 2$) as their answer. Part (c) of the question required students to represent a speed of 6 km/h for 15 minutes on the graph. A significant proportion of students drew the correct line segment on the graph without showing any working. Some other students worked out the distance (1.5 km) and recorded this in the working space before attempting to draw this part of Louise's journey on the graph. They were sometimes successful and sometimes not.

Question 9

In answering this question, too many students drew the straight line with equation $y = 3x - 1$ instead of the line with the given equation, $y = 3(x - 1)$. On occasion, examiners also saw the line with equation $y = 3(x + 1)$ drawn. Students usually completed their own table of values before plotting points and joining them with a ruler. Of those students who did interpret the equation correctly, most went on to complete the question successfully, though there were some students who did not draw a single straight line because they had incorrect y values corresponding to negative x values. Occasionally, lines were drawn freehand, and this was accepted provided the intention was clear.

Question 10

Students usually gave a correct integer in response to part (a) of this question. Many students were also able to give fully correct answers to parts (b) and (c) which involved using a number line to represent inequalities. For part (b), it was not unusual to see a response in the form $-4 \leq 1$ instead of the correct $-4 < x \leq 1$. Sometimes students used $\leq$ instead of $\geq$ and $>$ instead of $<$. For part (c) it was fairly common to see $h \geq 1$ represented instead of $h \leq 1$. In both part (b) and part (c) the correct notation using empty and filled in circles was usually seen. Part (d) of the question was answered less well. Though a good proportion of students were able to find the critical value of 3.5, many students seemed unable to deal correctly with there being a term in t on both sides of the inequality.

Question 11

This question proved to be a good discriminator with some lower attaining students not able to identify that the graph sketched should be a U-shaped parabola. Straight lines were seen occasionally. However, a large percentage of students did draw a parabola with correct orientation and most of them placed the vertex on the y axis. Unfortunately, many students did not clearly show that the intercept of the y axis was at the point (0, 1) and so were unable to gain credit for this aspect of the sketch. There were too many students who constructed tables of values then tried to plot them even though no grid was provided. Students should note that the instruction to sketch a graph requires a student to show the general shape of the graph together with critical points on the graph, in this case the vertex placed at the point (0, 1).

Question 12

This question acted as a good discriminator between the higher attaining students taking this paper. Nearly all students completed part (a) successfully. Most students were also able to gain some credit for their answers to part (b) for writing down a correct expression for the total number of counters that Tilly and Usha had. Examiners were surprised that, despite the request in the question to give answers in simplest form, a large number of students left their answer in the form $4x + x - 3$ rather than $5x - 3$. Part (c) was correctly answered by only a small number of students who realised the need to use brackets and write $4x - (x - 3)$ before simplifying the expression to give $3x + 3$. A significant number of students gave an inequality, usually $4x > x - 3$, rather than an expression for the difference in the number of counters Tilly and Usha had.

Question 13

Many students scored full marks for their answers to this question focussing on using a graph for a real-life situation. Errors seen were often due to misreading the graph though some students had misinterpreted the scales on the axes. Part (a) of this question was usually answered correctly. £4020 was the most commonly seen incorrect answer to this part of the question. Part (b) was also quite well answered though it was the least well answered part of the question. There did not appear to be any one incorrect answer which predominated. Nearly all students gained some credit for their response in part (c) of the question. Some students used one incorrect figure when working out the increase in the amount of money raised by the charity between the year 1960 and the year 2020. They usually gained some credit for their response. A small number of students gave a single year as their answer to part (d), but an overwhelming majority of students gave the correct 10-year period.

Question 14

This question was answered well, and a large majority of students were successful in part (a) of the question. A small proportion of students made a correct substitution but then evaluated it incorrectly. There was no predominant common error seen here. However, quite a number of students, after writing $\frac{5\times20}{4} - 2$, multiplied each term by 4, then worked out 100 – 8 and gave an answer of 92. For their response to part (b) of the question, most students were able to replace f with 0 in the formula with well over a half of all students making further progress in solving the resultant equation, most of whom were able to find the correct value for g. Part (c) was not answered as successfully as parts (a) and (b). Many students identified the possible first step of multiplying by 4 to change the subject of the formula but did not multiply the 2 on the right-hand side of the equation by 4. Other students successfully added 2 to each side of the equation as their first step and then decided to multiply by 4. These students were more often successful in completing the re-arrangement successfully. Many students gave a final answer of $g = \frac{4f+2}{5}$ either because they had carried out operations in the wrong order or because they had failed to place brackets correctly. In some cases, it was not possible for examiners to tell what had gone wrong because the students had not recorded their steps in enough detail. Students are advised to record single steps clearly when solving equations or re-arranging formulae.

Question 15
This question was answered well by some students who could calculate correct y values, draw smooth curves through their points and use the graph to read off solutions accurately. The table of values in part (a) of this question was completed successfully by a good proportion of students but many students gave one or more incorrect values. The most common error seen was a y value of 2 corresponding to $x = -1$. Where there were errors which were reflected in the general shape of the graph drawn in part (b), it is disappointing to report that relatively few students seemed to realise they had made an error and so did not check their calculations. Using the graph to solve the equation given in part (c) of the question was not done well. A significant minority of students did not attempt this part of the question. This included students who scored full marks in parts (a) and (b). Students who did use a correct method usually read off values from the graph accurately. Solutions given in a form involving pairs of coordinates were not awarded full marks but generally scored the method mark for using $y = 3$ correctly to identify the critical points.

Question 16
Many students successfully solved the equation. However, students generally appeared less confident in dealing with the equation in this question where the variable x appeared on both sides of the equation. In particular, a significant minority of students wrote the equation
$\frac{9x}{2} = 6x + 15$ as their starting point, missing the correct first step of multiplying both sides of the equation by 2. A similar error seen quite often was to write $\frac{3x-15}{2} = 0$ as the first step, so subtracting $6x$ from the denominator of the fraction without clearing the fraction first.

Question 17
This question was answered quite well and there were a good number of fully correct answers. However, many students did not use the scales on the x axis but instead counted squares to find the gradient in part (a). These students could not be awarded any credit for their attempt in part (a). Fortunately, students often recovered in part (b) to use their gradient together with the intercept of the line with the y axis to give an equation. A

surprising number of students gave “equations” which did not link the variables x and y. Examples included $\frac{3}{4}x - 3$, $L = \frac{3}{4}x + c$ and $y = \frac{3}{4} - 3$.

Summary

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

- ensure that your writing is legible, particularly your writing of numbers.
- ensure you check every step in your working to ensure you do not misread a question or miscopy something you wrote previously
- make sure you use brackets when you are subtracting an exporession containing more than one term from another expression, for example write $4x - (x - 3)$ if your intention is to subtract $(x - 3)$ from $4x$.
- practise solving equations from the graph of a quadratic function.
- practise changing the subject of a formula particularly when there is more than one term on one side of the = sign.
- practise how to find the gradient and equation of a straight line graph.

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