Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2021

Pearson Edexcel Awards
In Algebra Level 3 (AAL30_01)

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Introduction

This level 3 examination paper provided all students with the opportunity to succeed in this qualification. It was accessible to students.

Students were given the opportunity to display a wide range of skills and techniques. These included graph sketching and algebraic manipulation. Good students displayed a full range of skills whilst students who are yet to reach the borderline often display stronger skills in either graph sketching or algebraic manipulation.

Arithmetic errors were seen particularly when dealing with summing a larger set of numbers. The use of the correct formula would have reduced the computation to a more manageable level.

Reports on Individual Questions

Question 1

This question was very well answered.
Part (a) if full marks were not awarded the main errors made by students were, they obtained the correct terms $6x^2 + 9x - 2x - 3$ but failed to simplify correctly often resulting in either $-11x$ or $-7x$.

Part (b) was not as well answered as many students only squared one aspect giving the end result as $7x^2$ or $49x$. This gained a method mark but lost the accuracy mark. It was pleasing to note that most of the students could deal with the negative aspect of the power and very few answers of $\frac{1}{49x^2}$were seen.
Part (c) was well answered with many gaining full marks. The most common incorrect response was $2y^3$ or $8y^2$

Question 2

This question was very well answered with almost 70% of the cohort scoring full marks. The drawing of $3x+2y = 9$ caused problems for some students but most clearly understood the requirements of the question and answered it accurately.

Question 3

This question was generally well answered. Most students could draw the circle and the parabola correctly although it was disappointing to see that a number of students did not use a pair of compasses to draw the circle. The reading off of the values from the intersection was well answered although a small minority only gave the two x-values. As this was a solution to simultaneous equations both the x and y values were required.

Question 4

Over 75% of students gave a fully correct answer for this question.
However in part (a), the most common error was to write $(y–x)^2$ as the incorrect answer.
In part (b) most students who understood factorising a four-term expression by grouping did very well on this question, although some stopped at the $2y(3x–4)+3(3x–4)$ stage.
For those who tried other methods, mainly trial and error the outcome was much less successful.

Question 5

The question was generally well answered with most gaining at least 2 marks.
Many students realised the need for a common denominator and often could form one equation.
The final mark was often lost when they decided to simplify the correct solution by some form of inaccurate cancelling.

Question 6

This was the first question on the paper that gave a wide spread of marks. The modal mark was 5 out of 5 but 0 and 3 were the next most popular mark allocations.

The main issues seen were the coefficient of 2 on the x^2 term which caused problems for many students either because they used $2(x–6)^2$ or because they had trouble working out the final constant term accurately.
In part(b) the question clearly stated "Hence" and so candidates were expected to solve the equation by completing the square using their solution from (a).
Many ignored this instruction but those that did follow the instruction to use the required method were usually successful.

Question 7

In part (a) the responses from the students were very mixed some gave an initial table to show their values of '*y*'. This gave rise to errors particularly when substituting the vales of –2 and 4 into the given equation. Most students could correctly work out the values of y for the values of x from –1 to +3 and correctly plot these. This gained two method marks but obviously not the final accuracy mark as that was only for a smooth correct curve through the correct points. A mark was also available for the students drawing a suitable set of axes. Marks were lost here when, predominantly the y-axis, did not cover the full range of values.
It is important if a range of values for x is given that students do cover the full range. Some lost marks because they simply ignored the end values of x.

In part (b) the majority of the cohort understood to rearrange the equation and equate it to 2; eg $(x–1)(x+1)(x–3) = 2$ and this gained a method mark, or they drew a line across at $y = 2$. A few students even used an appropriate translation of the curve to find the required values.

However, the reading off from the intersection of the graph and $y = 2$ was not always accurate and so final accuracies marks could not be awarded. Additionally, some students only gave one solution which was not sufficient for all the marks.

Question 8

Part (a) was generally well answered with the majority of students gaining the marks. However, students should be reminded that when asked for the value of something they should give their answer either as an exact decimal or as a fraction in its lowest terms.

Part (b) was accessible to most students although the most common error here was to omit the ± sign in front of the square root sign when writing the final answer.
Students should be reminded that if $y^2 = f(x)$ then $y = \pm\sqrt{f(x)}$

Part (c) pleasingly this part was very well done. The most common error was the incorrect removal of the denominator of $5n$ usually by arriving at $5mn = 2k + k$. Others could not correctly factorise to isolate k and so did not go beyond $5nm = 2k+5nk$.

Question 9

Overall students received a variety of marks for this question. The modal mark was 6 out of 6 but the distribution of marks was quite even, and most students received part marks for this question.

In part (a) many students gained a mark for obtaining the two critical values of ± 3 but then failed to represent the inequality correctly. A common incorrect answer was to give the answer as a single inequality e.g. $-3<x<3$ or $-3>x>3$, neither of which are correct for the final mark.

Part (b) was generally well answered although yet again the final accuracy mark was lost from incorrect cancelling or not realising that the question required the answer to be written in the form $\frac{p\pm\sqrt{q}}{3}$. Many students gained two marks for $\frac{4\pm\sqrt{40}}{6}$. A popular incorrect answer was $\frac{2\pm\sqrt{20}}{3}$, indicating the inability to extract the factor correct from within the square root sign correctly.

Part (c) was not as well answered as the previous two parts with common incorrect answers using only one of their critical values or writing $x <. \frac{2\pm\sqrt{10}}{3}$ and not dealing with both of the numbers in the solution.

Question 10

The question was very well answered with the majority of students gaining full marks.
When full marks were not awarded in part (a) the most common error seen was 3^3 being incorrectly evaluated as 9.

In part (b) most candidates scored the first mark for substitution into their inverse cubic formula. Pleasingly most could then go on to give the answer in the required form but there were some would didn't know that the cube root could be expressed as a power of $\frac{1}{3}$

Question 11

A well answered question by the majority of the students. Most gained one mark for the correct factorisation to obtain $(2x - 3)(x - 2)$ some then failed to give the correct values for *a, b* and *c.* The most common incorrect answer, from correct factorisation, was to state $a = 2$; $b = -3$ and $c = -2$, careful reading of questions is required.

Question 12

The majority of students recognised the fact that a hyperbola graph was required however only a small number of students scored full marks on this question. Many did not correctly show the position of the 2 asymptotes. Students should also be reminded that to complete a sketch the asymptotes and the crossing point on the *x* axis should be labelled. Many "correct" graphs drawn where unable to score the final mark due to lack of labels, particularly at the interception with the *x*-axis.

Question 13

The modal score for this question was 4 out of 4 marks.
Most of the students were able to give the correct substitution eg $2x^2 - 6 = 6x - 6$ or $2x^2 - 6 - 3(2x-2) = 0$ and gain the first mark. However, the rearrangement to get a correct quadratic of $2x^2 - 6x = 0$ was not so well done and so no more marks were gained. Incorrect rearrangements such as: $2x^2 - 6 = 6x - 6$ became $2x^2 - 6x - 12 = 0$ were seen.
Some students who did obtain the correct quadratic of $2x^2 - 6x = 0$ failed to find BOTH solutions and hence gained no further marks. Students should be reminded that if *x* is a factor of a quadratic equation eg $2x(x-3)$ then $x=0$ is a solution of that quadratic equation, too many students ignored this solution and only gave one value for *x*.

Question 14

Part (a) of this question was well answered by many students and once they knew that equal roots came from looking at $b^2 - 4ac = 0$ and so were able to go on and score full marks. Unfortunately, there was a sizeable number who used inequality signs rather than =0 and could not give the correct condition two equal roots and so scored no marks.

Almost three quarters of the cohort got both marks in part (b) of this question however some did mix up the sum and the product and so scored no marks. Exact answers were required, and students should not be afraid to leave answers as fraction in their simplest form unless a decimal answer is requested.

Question 15

Generally, a well answered question with over half the students scoring full marks. The main error seen was for students to find the gradient by the difference in the x over the difference in the *y* i.e. the reciprocal of the gradient. However, most of these students did recover to gain the second method mark by correctly substituting 'their' gradient and the correct point to find the value of the constant *c*.
Part (b) was also well done where the students gained the mark for the correct gradient following through their gradient in part (a), provided the gradient given in part (a) was a calculated figure.

Question 16

Just over half of the students scored full marks on this question. For part (a) the most common approach was to use $a+(n–1)d$ though there were many who tried to write out the first 10 terms often with arithmetic errors creeping in. The other common error was to use $12n + 6$ rather than $12n – 6$ for the nth term.

In part (b) quite a few students incorrectly used $a = –11$. The required formulae were recalled with varying degrees of success and so some students could proceed no further. Surprisingly, given this is a non-calculator paper a very popular approach was to evaluate the first 20 terms and then total them, this was sometimes correct but often had arithmetic errors seen. As this is a level 3 qualification students should be able to use the required formula, as the more efficient approach.

Question 17

Careful reading of the question would have been helpful to many students. This marks awarded for this question were spread very evenly over the full range available.

Parts (a) and (b) were well answered. However, for part (c) too many students did not draw a tangent and only read off the point (3, 7.2) and then gave the gradient as 7.2 ÷ 3 = 2.4. Of those students that drew a tangent some struggled to read the scale correctly.

In part (d) the area asked for was clearly defined but students still used 6 strips instead of 5 or used 5 strips but for the whole area under the curve. The specification does require knowledge of the trapezium rule, but students do still split the shape up and find individual areas and then add these together.

Sometimes these approaches are equivalent to the trapezium rule but at other times they are not, no marks are scored unless the required points are given, and an equivalent method is used. Just summing rectangular areas is not an acceptable approach.
Students would be best to approach this question with knowledge of how to use the trapezium rule.

Part (d) was well answered with only a few students stating acceleration as the incorrect answer.

Question 18

A well answered question with part (b) being marginally better answered than part (a). Those who knew in part (a) that it was a reflection in the *x* axis usually scored full marks. The main error seen was to reflection in the *y* axis.
In part (b) the vast majority realised a translation of 2 units was required and most produced the correct answer. Some translated to the right or 'up' the grid. A few combined translations were also seen.

Question 19

The vast majority gained at least one mark for the correct method to rationalise by multiplying top and bottom by $3 - 2\sqrt{5}$. A few students then failed to expand the denominator correctly finishing with x^2+9 being a common incorrect answer. A considerable number of students then failed to gain full marks as they did not simplify the answer fully.

In summary centres are advised to:

- practice papers without calculators to develop and practice arithmetic skills
- ensure students know the formulas that are required for this specification
- teach the basic shape of the graphs required for this specification.

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