Principal Examiner Feedback

January 2017

Edexcel Award in Algebra
Level 3 (AAL30)

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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.

Good students were able to display a wide range of skills and techniques. However many students failed to consider both negative and positive square roots for expressions.

A small number of students continue to lose marks through avoidable arithmetic errors. Students should be encouraged to check their final answers.

Reports on Individual Questions

Question 1

Part (a) was well answered. The majority of students correctly factorised. Answers that were incorrect failed to understand the term factorise.
Again part (b) was almost always answered correctly. A few students stopped at the first stage and did not factorise fully.
The last part was usually partially correct, with the most common answer being $2p^2(p^2\text{-}9)$, some other partial factorisations were given and infrequently the correct answer was seen. Students should be encouraged to always factorise fully any question set. The difference of two squares is frequently not noticed.

Question 2

A significant number of students gained full marks on this question. Drawing the line $y = \frac{x}{4}$ proved the most difficult for those who did not get full marks.

Question 3

Part (a) was well answered and part (b) was answered even better than part (a). The answers in part(c) were more variable. Almost all students scored at least one mark but this was sometimes for a and at other times for n.

The correct expansion for part 3(d) was often seen, however the simplification of the 4 terms was not always correct. Common errors seen were getting $-4y^2$ or simplifying $-20y - y$ to $-19y$.

In part (e) the factorisation was nearly always correct, occasionally some gave $(u-2)(u+2)$ as the factorisation. However the most common error was in the cancelling of the brackets; often just $(u-2)$ was given as the final answer.

Question 4

In part (a) a few students did not bring the 7 across to form a quadratic equation with 0 on its own but on the whole the question was well answered. Some students chose to use the formula to solve this quadratic equation, others tried to use the method of completing the square; these methods were less successful than factorisation.

For part (b) most students made a competent start but some did have trouble with the signs of the coefficients. Others were able to quote the correct formula. Of those who substituted correctly, some could not give the answer in the required form. Unfortunately many left their answer with 6 as the denominator or with $\sqrt{76}$ incorrectly simplified.

Question 5

There were many correct answers throughout this question.
In part (a) careless errors or leaving the equation in the wrong form were the main reasons for losing marks.

In part (b) many students tried to work with the gradient from part (a) and -1, but some students were not able to deal with the arithmetic required. Others correctly identified the required gradient but did not deal with the fact that the line went through the origin. Some students left *c* in their final equation. When (a) was in the correct form, (c) was usually correctly answered.

Question 6

In part (a) (i), almost all students were successful.

In part (a) (ii) those students that took the 4 across first were far more successful than those who tried to multiply by 100 first, as these students often forgot to include the 4 in the multiplication. Few students scored all three marks as many failed to use the ± sign when square rooting. This is required for accuracy on this level 3 qualification.

Only a few students did not score 2 or more marks in part (b). Many correct answers to part (i) were seen. Some students eliminated *y* from part (ii) incorrectly giving it a numerical value this made the question impossible, others arrived at $y + 4 = (x + 3)^2$ but then failed to isolate x. Of those that did isolate x many again failed to use the ± sign when square rooting.

Question 7

Almost half the answers seen were fully correct. Some students struggled to cope with the positive values of *x*. Some gave these answers as 2, 4 and 8; another common error was to evaluate 2^0 as 0.

Many of those who were incorrect in the first quadrant were able to gain marks in part (c) because they used *y* =5 and gained two marks for correctly reading off their value of x.

Question 8

Part (a) was a relatively well answered question, with most students realising that they needed to use the discriminant, although not all realised the need to equate it to zero.
Very disappointingly at this level the main mistake seen was $9 = 36c$ followed by $c = 4$

Part (b) was not so well answered; many students realised what was needed for this question but then made quite a few errors with the signs of the coefficients.

Question 9

A very well answered question. On a few occasions the students forgot to state that the point was outside the circle.

Question 10

Part (a) was almost always fully correct. Pleasingly, $n + 3$ was rarely seen.

Part (b) was found to be more challenging. Some students tried trial and improvement, others stated the wrong formula, often forgetting the 2 of $2a$. Others tried to write out all the terms, adding up the sum as they went along but often this failed because of arithmetic errors. For those students who correctly substituted values into the formula and arrived at $1000 = (n \div 2) \times (8n)$ many could not then reach the required value of n. Some students gave their answer as $n = \sqrt{(250)}$; not realising that n, as a number of terms, has to be an integer.

Question 11

This question was well done on the whole, although acceleration was sometimes given as the answer to part (a).

Question 12

A good proportion of fully correct answers was seen, although arithmetic errors were made. Occasionally some students used h as 1 rather than 2 and some forgot to add 0.1, the last figure, multiplying by it instead.

There were however a few students who did not follow the instructions given and split the area into 8 strips. Students should be encouraged to make sure that they answer the question set.

Question 13

Part (a) was another well answered question; the most common error was to get as far as $12 < 7x$ and then write $7x < 12$, possibly a need to have x on the left hand side of the inequality. This led to a loss of the final mark. Most students left the answer as an improper fraction; some wrote it as a mixed fraction while others tried to write it as a decimal. All these were acceptable but conversion to

a decimal is not necessary. Centres should discuss with students the use of fractions as numbers in their own right.

For part (b) most students identified the critical values but not all were able to give the correct inequalities. The most successful way for students to arrive at the correct inequalities was to sketch a graph and interpret this.

Question 14

A variety of answers were seen for the sketch; many students labelled the *y* intercept correctly but did not draw the correct graph. Students need to be encouraged to mark intercepts and to present smooth curves. Sketches are requested and so tables of values are not necessary. The use of tables of values often leads to line segments being drawn and no labels.

Question 15

In part (a) many students gave a fully correct answer. Where errors were seen the most common two were, multiplying the denominator and numerator by just $\sqrt{7}$ or by $(3 + \sqrt{7})$.

In part (b) (i) students seemed more challenged. Many were able to expand the first bracket but combining the two brackets proved more difficult perhaps because of the signs or having to deal with the squaring of a square root. Some students just ignored the square root sign and used 5 instead. Some students compounded errors and arrived at the correct answer, only a fully correct method can score full marks.

Some students did not try to simplify and again this could not gain full marks. Multiplying square roots was also a problem with $2\sqrt{10} = \sqrt{20}$ often seen.

Part (ii) was answered in line with part (i) and again squaring was not always accurate.

Question 16

Many fully correct graphs were seen. The most common error was merely to plot the first section ordinate at 2 (from the acceleration) as opposed to using it as the gradient. Occasionally the *y*-axis was labelled as distance. Constant speed was often shown correctly, even on incorrect axes.

Most students could use their graph to find the total distance travelled in part (b), although a few students just read off the y-axis value for $t = 3$.

Question 17

Part (a) of this question was well done. Most students coped with the inverse and the square root. However some students failed to use an equation and even though they found the correct value for *k* they also used a proportionality sign. The most common incorrect approach was to say that $p = k\sqrt{n}$.
In part (b) many correctly sketched graphs were seen but there were some straight lines and a few arcs of circles.

Question 18

This was usually fully correct or completely incorrect. Over half the cohort scored both marks on this question.

Question 19

For the last question on the paper it was pleasing to see so many correct answers. For those students who correctly found both the *x* values and both the *y* values, the values were then correctly paired.

Substituting $x = -3 - y$ was far more successful than using $y = -3 - x$ for two reasons. Firstly expanding the latter and incorporating the negative sign outside the bracket proved the biggest stumbling block with many students failing at this stage, whereas with the other way there were no such hurdles. Secondly the equation produced in y was simpler to solve than the one in x. Students should be encouraged to consider the different ways through a problem and compare the complexity of each approach.

Summary
Based on their performance on this paper, students should

- be encouraged to use both positive and negative square roots
- practice basic skills involving the squaring of the square root of numbers
- distinguish the difference between sketching and plotting graphs
- recognise the difference of two squares when factorising
- give answers in the correct form required by the question

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