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Principal Examiner Feedback

January 2014

Pearson Edexcel Level 2 Award In Algebra (AAL30)

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Principal Examiner Feedback – Level 3

Introduction

This level 3 examination paper provided all students with the chance to show what they knew.

Whilst some students were well prepared others indicated their surprise at certain content areas. Centres are advised to ensure all students are fully prepared for this level 3 examination.

Good students were able to display a range of skills and techniques whilst weaker performances were characterised by poor graph sketching, inaccurate arithmetic and failure to answer the question asked.

Students should expect to be tested on all areas of the specification and will be at an advantage if they have experience of all topics stated in the specification.

Reports on Individual Questions

Question 1

Many students demonstrated a good understanding of what was required in this question. The first three parts were well answered. However in part d, many students tried to divide by w twice arriving at an answer of 1 instead of w. The inability to add fractions also led to incorrect answers.

Question 2

A significant number of students were able to state the gradient as a third. However some failed to divide by 6 and gave 2 as the gradient whilst others could not isolate the gradient and gave an equation as the answer. The gradient alone is required for full marks.

In part b, the incorrect writing of fractions led to some students losing marks, $\frac{1}{5x}$ is not the same as $\frac{1}{5}x$. Students should be encouraged to write fractions clearly and to show working

Question 3

The first two parts of this question were well answered. A few errors in signs were seen but a general understanding was evident in most students work.

In part c, centres should ensure students realise this is a level 3 paper and a full factorisation is required. Far too many students felt it sufficient to remove just a constant from each term when in fact the difference of two squares was required.

Question 4

The majority of students did not score full marks on this question. Many were unable to deal with the fractional element of this question and even those that did then failed to square root correctly.

A common error was for students to just give the positive square root. Centres should remind students that when square rooting **both** roots need to be given, i.e. ± is required for a fully correct answer.

Question 5

Students **must** use the quadratic formula if the question states this. Centres should encourage students to state the formula prior to substitution. Generally most students did try to use the formula, some miss-stated it and others then failed to deal with the value of b being negative 6. The arithmetic involving negative numbers was challenging for far too many students and this question was a good example of poor arithmetic affecting the number of correct answers seen.

Question 6

There was a great variation seen in this question. Most students could identify a quadratic and cubic graph but the others proved to be less identifiable. The exponential was often misplaced leading to either the circular or reciprocal being also misplaced. Recognition of graphs is a discriminator at this level.

Question 7

This question combined both fractions and algebraic manipulation and proved challenging for some students. Students must be able to add fractions correctly for this qualification. The fact that $2x$ was a factor of $6x^2 - 4x$ was seen by many students and they chose to use this in their method. Others multiplied the first fraction by $6x^2 - 4x$ and the second by $2x$ prior to adding, this led to the need to cancel more terms in the final simplification.

If students want to deal with the numerator separately to the denominator and then combine at the end this is acceptable but workings should be clear.

Again far too many students failed to arrive at the final answer due to errors in arithmetic and particularly dealing with negative signs.

Question 8

This question proved to be one of the best answered on the paper with a large majority of students able to draw the lines correctly and shade the required region. Some errors were seen in shading usually including the areas below zero for both x and y values. The other main error occurred when drawing the line $3x + 2y = 6$

Question 9

Many fully correct answers were seen. Students were able to read the points from the graph and use the formula appropriately. Some used the correct points and then found the area of each individual trapezium before adding these areas to get the total estimate, this is an acceptable method.

The most common error seen was to omit one of the points or use the wrong scale when reading from the y axis. Occasionally students confused addition and multiplication within the rule and so arrived at incorrect answers.

Question 10

Part a of this question is another example where students could manipulate the algebra but did not always answer the question asked. Many factorised correctly but left this as the final answer rather than going on to solve for x.

In part b many students found the critical values and drew appropriate graphs but they could not use inequalities correctly. This is an area in which centres could help students improve their understanding. Some students ignored the inequalities and treated this question as an equation.

Even in these solutions errors were seen when dealing with fractions, students seemed to feel the answer should be a proper fraction and often gave $\frac{3}{5}$ as the answer to $3p - 5 = 0$

Question 11

Many students could use the discriminant and arrive at an answer of $\frac{9}{16}$, however often only one mark was awarded as few students went on to deal with the inequality correctly. This question is further evidence that students need to study the use of inequalities in more depth.

Part b was answered better than part a. Many students gained two marks, the common error in this part was the inability to deal with negative numbers.

Question 12

A good number of students could complete the square successfully, others were able to score the first mark for partly processing the question.

Curve sketching remains an area for development with many students having to set up tables and plot points rather than having an understanding of the characteristics of known curves. Far too few students made the connections between the three parts of this question and did separate working for each part.

Question 13

Students should be encouraged to be accurate when sketching around asymptotes and not overlap the sections of the graph. When stating the equations of the asymptotes students can write them in the answer space or label the graph, both options are acceptable.

For this question correct graphs were often seen but appropriate labels were not always given.

Question 14

The concept of simultaneous equations seemed to be well understood by many. Most students tried to eliminate one of the variables but rates of success were variable. The first error seen was the misuse of brackets and squaring, for example $2x^2$ was often seen instead of $(2x)^2$, this immediately led to inaccuracies and incorrect answers.

If $12x^2 = 3$ was seen the next error was in finding x^2, often $3 \div 12$ was not processed or simplified to a quarter. It was surprising to see that a significant number of pupils did not simplify fully to gain the fraction in its simplest form and so then square rooted and missed the answer of x being $\pm\frac{1}{2}$, in turn this lack of simplification led to some interesting equivalent ways of writing ± 1. Full numerical manipulation should be encouraged.

Accuracy marks were again missed on this question due to only positive square roots being given.

Question 15

Part a was well answered.

In part b many students were able to multiply out the brackets but $-\sqrt{3} \times \sqrt{3}$ was not always evaluated correctly and $4 + 3 = 7$ was a common incorrect answer.

Centres should give students plenty of opportunities to manipulate surds and roots as this is a key skill for this qualification. Although rationalising a denominator is also a GCSE skill, many students failed to multiply appropriately.

When students were able to rationalise not all left the answer in the form requested.

Students should be encouraged to check the question for format requirements.

Question 16

On the whole students were able to gain some credit on this question. Many gave the correct first term and common difference. Some were able to state a correct formula for the summation of the series but then were unable to substitute the values in correctly often trying to give n a value as well. A few mistakes were seen in the formula used. Simple errors in arithmetic also led to lost marks.

Question 17

Again varying quality was seen in this question. Many students gained credit for part of this question and this was a good discriminator at this level.

Students were often able to set up a proportionality statement and then use k as a constant, substitution to evaluate k was also often seen. The reasons marks were lost were for using the wrong power of x or evaluating 3^3 as 9 and thus finding the wrong value of k or giving a final answer still using the proportionality sign not the equals sign.

A basic understanding was often seen but simple errors in calculation or terminology led to final incorrect answers.

Question 18

A well answered question. Students should use a pair of compasses to answer this construction question and a few circles of radius 3 were seen.

Question 19

This question which was again affected by a lack of ability to manipulate negative numbers. Many students were able to calculate the correct y values for x being $0,1,2,3$ but not $-1,-2$ and -3 others were able to calculate for x being $-2,-1,0,1$ and 2 but not ± 3, getting these answers the wrong way round. Another area for improvement is the labelling of the axes, some students put no scale on the axes and gave no table of points or even sets of coordinates used, without any of this it was difficult to see accuracy in the graph. This is a 'draw the graph' question and students are expected to give scale to the question.

In part b some students did draw an appropriate line and read off the points of intersection, this method should be encouraged as follow through will be applied. Although three intersections were often seen only two were stated, three were required for the mark.

Part c was only attempted by the most able students and was perhaps the hardest part of the paper. A few drew the required line but others ignored the instruction to 'use your graph' and plotted a new cubic graph, again three answers were required but often only one was given. Students did not score highly on this question.

Question 20

Part a was well answered.

In part b many method marks were awarded but accuracy was affected by the lack of use of scale. Some students thought that there are 10 seconds in a minute and obviously this led to loss of accuracy, others wrote $12 \div 120$ but gave a final answer of 10 not 0.1 a very basic error at this level.

In part c, some correct answers were seen, many attempted to calculate the area under the graph but had errors in calculations. Others tried to apply constant acceleration over the whole journey or calculate 'spot' distances at 1 minute, 2 minutes and 3 minutes and then add these numbers. One candidate questioned why this topic was on the paper thus showing that they were not aware of the full requirements of the specification.

Question 21

This question required knowledge of fractions and the square root of 64. Some candidates gained full marks, many others gained 3, giving only 8 as the answer not ± 8

However some failed to add the fractions correctly, often they were able to deal with the left hand side correctly to begin with but then manipulations were inaccurate for example $9\,(10 + x)$ was given as $90 + x$ or $(10 - x)(10 + x)$ was given as $100 - 20x - x^2$ or $100 - x$, these seem simple mistakes in comparison to the standard of the understanding shown.

Another slip was often seen near the end of the solution with $100 - 20x - x^2$ achieved but candidates then wrote $680 = 5x^2$ and so lost the final mark again through calculation errors.

Summary

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

- ensure you have a good understanding of all topics in the specification.
- make sure you can manipulate algebraic expressions with skills in standard factorisation and multiplying out brackets.
- learn how to deal with negative signs in both numerical and algebraic manipulation.
- always give both roots when square rooting from x^2 = ...
- practise your skills at both curve sketching and drawing graphs, be able to do both to an appropriate accuracy.

Grade Boundaries

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