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Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel Level 2 Award
In Algebra (AAL20)

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Introduction

The paper provided students with the chance to demonstrate their knowledge and skills. They found they had enough time to complete the paper.

Most students presented their work clearly and in a well ordered manner.

In general, it seems that students were realistically entered for this level 2 qualification with the majority of students obtaining a creditable mark.

Many students had a good knowledge of standard techniques and were able to manipulate equations, use formulae with accuracy and draw graphs. The main areas where centres might seek to help students improve their performance were in simplifying expressions such as $(5x^2)^3$, checking factorisations by expanding answers obtained, solving equations where the unknown appears on both sides of the equation or where division signs are involved and solving linear inequalities.

The performance of weaker students was characterised by poor graph sketching and the inability to manipulate algebraic expressions and equations.

Reports on Individual Questions

Question 1

This question was generally well answered. All students were able to gain some credit for their responses.

In part (a), a large majority of the students who sat this paper scored both marks. A small number of students made errors involving signs. These students often gave one of the answers $9b - d$, $9b - 5d$ or $9b + 5d$.

More than three quarters of students gained at least 1 of the 2 marks available in part (b)(i). The answers worth 1 mark, which were commonly seen, included $5x^6$ and $125x^5$. The answers $5x^5$, $15x^5$, $25x^5$ which were worthy of no credit, were also commonly seen.

A large majority of students scored both of the marks available in part (b)(ii) and in part (b)(iii).

The expansion of the brackets in part (c) was done very well. The most commonly seen incorrect answer was $12a + c$.

Question 2

Students usually completed part (a) correctly, expressing their answer in the usual concise form rather than using a multiplication sign. There were, however, too many students who were entered for this level 2 examination that could not write the simple expression needed here. $n = 3$, $n = 3n$ and $n = £3$ were often seen.

Examiners were usually able to award some or all of the marks in part (b). Some students gave an expression (usually $5t + 6j$) instead of an equation. Incorrect equations seen included $t + j = 108$.

Many students unnecessarily involved £ signs in their answers to both parts of this question. Examples seen included $£5t + £6j = £108$ and $5t + 6j = £108$. Students should be advised that symbols for units of measurement should not be included in expressions or equations.

Question 3

Responses to this question showed that most students were able to recognise and sketch the general shape of a quadratic curve. Many students clearly knew exactly what was expected and sketched a parabola, placed symmetrically about the y axis and with the y intercept marked and labelled at (0, 5). Few students tried to plot and draw a graph. Examiners were generous in rewarding a sketch intended to be a parabola though some students would benefit in further practise sketching this shape. A number of weaker students drew a straight line.

Question 4

A large majority of students gained full marks for their answers to this question. Weaker students made errors in the calculation of their values, particularly when x was negative. They appeared not to be concerned when their graph was not a straight line. A few students did not draw the line over the full range of values for x, ie from -2 to 5.

Question 5

This question was answered well by many students, though some correct factorisations of the expressions in parts (b) and (c) were only partial factorisations. 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 answers. Some 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 6

Students could nearly always generate the second and third term in the sequence defined in part (a). Errors seen usually involved careless arithmetic.

Part (b) was quite well answered though a significant number of students failed to take into account that the terms of the sequence were decreasing and used a difference of 3 to write an expression involving $3n$ instead of the correct $-3n$.

Part (c) was also well answered. The most common errors in part (c)(i) usually arose where students generated a sequence of numbers. The sequences 5, 7, 9, 11,.... and 7, 12, 17, 22,.... were seen quite often together with the resultant incorrect values of 33 and 77 respectively for the 15^{th} term. The first of these sequences appears to have been generated by students substituting $n = 0$ to get the first term of the sequence. The acceptable reason cited most commonly in part (c)(ii) was that 87 is the 41^{st} term of the sequence.

Question 7

This question attracted a good number of fully correct answers.

Students found the substitution in part (a)(i) to be straightforward and nearly all students obtained the correct answer.

Part (a)(ii) provided more of a challenge for some students and errors when dealing with signs were often seen. The incorrect answer -29 was common.

Part (a)(iii) was not answered well with many students unable to handle the solution of the equation $24 = 6 - 3p$. A common incorrect answer seen was 6, with students "losing" the negative sign when subtracting 6 from both sides of the equation. Full marks to this part were awarded to less than half of the students taking the paper.

The relatively straightforward 'change the subject of a formula' in part (b) was often completed successfully. Weaker students were usually unable to complete a first correct step correctly.

Question 8

Nearly all students gave a correct response to part (a) of this question.

Although a good proportion of students were also able to get part (b) correct, there were many students who could not complete all the stages in the solution of the equation which consisted of terms in *n* and constant terms on both sides of the equation. Parts (b) and (c) acted as good discriminators with about a half of students scoring the full 6 marks available. Students should expect to have to deal with equations involving fractions somewhere in this paper and it was disappointing to see many students could not action a first correct step in part (c). This would most likely be multiplying both sides of the equation by 4. Some students gave an answer of $y = \frac{4}{17}$ instead of $\frac{17}{4}$, making an error in the last stage of solving the equation.

There was a significant, yet small, minority of students who showed little working or did not record each step in a clear and organised way in this question. Students are advised that both sides of an equation should be shown at each stage if method marks are to be earned, when a final answer is incorrect. For example, in part (c) "4 × 5 = 20" earns no marks whereas "4*d* + 3 = 4 × 5" or "4*d* + 3 = 20" would earn the first method mark.

Question 9

Questions involving inequalities usually discriminate well between students of differing abilities. This question was no exception.

Most students gave a correct response to part (a) of the question although a common incorrect response was $x = 3$.

In part (b), a good proportion of students were able to get as far as $-3y > 6$ but no further without making an error. Only a small minority of students were able to go beyond finding the critical value, −2, to give the correct solution $y < -2$. By far the most common error seen was that of failing to use the correct inequality sign after dividing $-3y > 6$ throughout by−3. The incorrect answer $y > -2$ usually followed.

Some students did not attempt this question.

Question 10

This question also discriminated well between students of different abilities. Most students showed a good understanding of the notation involved.

Students often scored both marks in part (a). The most common error was for students to confuse < with $\leqslant$ and vice versa. A number of students gave the answer as $-4 \geqslant x > -1$, showing confusion with the direction of the inequality signs.

In part (b) students usually correctly used a circle at −2 but sometimes drew a line segment starting at −2 and ending at 5.

Part (c) was answered well, though the incorrect answers of 4 and 12 respectively appeared on a good number of scripts.

Question 11

Part (a) of this question was answered correctly by just less than half of students sitting the paper. Too often students gave equations for the lines which involved both of the variables x and y. "L = 1" was also frequently seen as was $x = 1$.

Part (b) of the question was answered quite well. Students were perhaps helped by the provision of a scale where 1 cm represented 1 unit on each of the axes. Some students showed 2 ÷ 4 in the working space for part (b)(i), but then went on to state 2 as the gradient on the answer line. Those students who gave an incorrect gradient in part (b)(i) could sometimes be awarded marks in part (b)(ii) if they made no further errors in finding the equation of the line.
"M = $0.5x$ + 2" was quite a common error seen in this part of the question.

Question 12

Finding the gradient of the graph (part (a)(i)) presented a challenge to all but the most able students sitting this paper. Some students who attempted to find the gradient did not take into account the scales on one or both of the axes. Students who changed time units to minutes were given full credit for an answer of $\frac{1}{3}$. Examiners were surprised that most students could not explain what the gradient of the line represented (part (a)(ii)). A key concept stated in the specification is an understanding that the gradient of a distance-time graph represents speed.

In part (b), a large number of students would have benefited from reading the question more carefully. The requirement to find how long Pablo was cycling was often interpreted as how long it took to get to Coulton's house; that is the stop on the way was not considered. An answer of 150 minutes was awarded one mark.

Students often drew the first line segment in part (c) correctly, but fewer students were able to represent Pablo's journey home accurately. It seemed that many students could not use the given speed to calculate the time it would take for Pablo to cycle home or to draw a line with gradient 16.

Most students scored at least one mark for a time within an acceptable interval in part (d), though relatively few students scored both marks.

Question 13

Many students completed the table of values correctly, plotted points accurately and joined their points with a smooth curve. Only occasionally did students lose marks for joining their points with straight line segments. Where errors did occur, they usually involved the calculation of y values for negative x values. It is disappointing that some students who make errors do not realise that something must be wrong when they do not get a smooth quadratic shaped curve. Students should have a good understanding of what to expect here.

A good proportion of students were able to score both marks in part (c) for using the graph to solve the equation by reading off the two points of intersection of the curve with the x axis.

Question 14

Students were able to match the statements with the appropriate graph and most students scored full marks. When there were errors, this was often due to an incorrect placement of the letters C and B.

Summary

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

- practise writing down algebraic expressions and formulae from situations expressed in words, taking care not to include symbols for units.
- make sure you can calculate the gradient of a straight line taking into account the scales on the axes.
- practise solving equations which involve fractions and equations where the unknown appears on both sides of the equation.
- make sure you change inequality signs when you divide or mutiply through by a negative number.

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