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Principal Examiner Feedback

January 2014

Pearson Edexcel Level 2 Award In Algebra (AAL20)

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Introduction

This level 2 exam paper provided all students with the chance to show what they knew.

Many students were clearly well prepared and scored high marks. These students had a good knowledge of standard techniques, were able to manipulate algebraic equations and formulae with accuracy and showed a good understanding of the topics involving graphs.

Weaker performances were characterised by poor graph sketching and graph drawing techniques and the inability to find and interpret the gradient of straight line graphs in the various possible contexts included in the specification.

Students should expect to be tested on all areas of the specification and will be at an advantage if they have a good knowledge of all topics.

Reports on Individual Questions

Question 1

Many students demonstrated a good understanding of what was required in this question. They could usually write a correct expression though there was some clumsiness and expressions such as $6 \times c + 24 \times t$ and $c6 + t24$ were commonly seen.

The most common incorrect responses included $c + t$ and $c + t = 30$. A significant number of students did not attempt the question.

Question 2

This question was generally well answered. Nearly all students were able to gain some credit for their response to part (a) of this question.

The most common errors included expressions involving $8x$ and/or $-5y$. Most students successfully expanded the brackets in part (b).

The most frequently seen incorrect responses included $6x - 12$, $4x^2 - 12$, $10x - 12$ and $5x$.

In part (c) at least one mark was usually awarded for the term $2p$. A surprising number of students gave the answer $2p + 10p$ which was often then simplified to $12p$. The laws of indices were well understood and the vast majority of students answered parts (d) and (e) correctly.

Question 3

Students are advised to show a substitution into a formula of the values given before attempting to do any working out.

For example, in this question, in part (a), the statement $w = 4 \times 3^2$ would have not only earned students a mark but may also have helped them to clarify the order of operations needed to work out the value of w.

A similar approach may also have helped students to answer part (b) of the same question. There were a variety of common errors in responses to this part of the question. Too many students interpreted $w = cv^2$ as $w = (cv)^2$ in one or both parts of the question. A large proportion of students made errors when attempting to isolate c and either wrote $c = v^2 \div w$ or after substituting values for w and v, wrote $25 = c \times 100$ followed by $c = 4$. The working $25 \div 100 = 4$ was also commonly seen.

It might help students to write $cv^2 = w$, ie to make sure c is on the left hand side of the equals sign before substituting values. They should also be advised not to expect all answers to be integers.

Question 4

A minority of students scored full marks for their response to this question. Where students gained some credit for their response, examiners were often restricted to awarding 1 mark for adding 14 to both sides of the formula. A significant number of students followed this operation with a subtraction of 5, rather than division by 5.

Many other students wrote their answer as $\frac{\sqrt{t+14}}{5}$ losing at least the final accuracy mark for failing to put the square root sign over the whole fraction.

Question 5

Graph sketching is still one of the least well understood topics in this specification. Many students continue to attempt such questions by plotting points and joining them, sometimes with straight line segments and often producing poorly shaped curves. The emphasis of questions set is on knowing the general shape of quadratic functions including symmetry and on showing intercepts of the y axis on any sketches produced. This is a skill which would deliver benefits from practice, both in terms of marks gained and in terms of preparation for further studies in this subject area.

Question 6

This question discriminated well between students of different abilities. Most students were able to make a good attempt at part (a) of the question. They were usually successful in writing down the first two terms of the sequence and could make progress in identifying which term of the sequence –28 was.

In part (a)(ii) it was relatively unusual to see an approach based on solving the equation $5 - 3n = -28$. The great majority of students wrote out terms of the sequence. Though many students gained a correct answer, many others made errors because they did not start the sequence with the first term 2. Some students wrote down sequences with first term 5 or with a common difference of 5.

Part (b) of the question was generally well answered. Nearly all students wrote down the next term in the sequence and over two thirds of students scored at least one of the two marks available for a correct expression in part (b)(ii).

Question 7

Parts (a) and (b) of this question were answered successfully by many students though correct responses were often accompanied by disorganised working, particularly in part (a).

Most students' first stage in part (b) consisted of multiplying out the brackets – working was more clearly structured in some responses to this part though some students could not get any further than expanding the brackets.

In part (c) a significant number of students attempted to multiply both sides of the equation by 5 but forgot to multiply the 7 by 5.

Students who subtracted 7 from both sides of the equation as a first stage in their working were more often successful than those that multiplied by 5.

Question 8

This question proved to be one of the best answered on the paper with a large majority of students completing the table of values and drawing the line apparently without a hitch. It was noticeable however that some students completed the table then made no attempt to draw the line on the grid.

Question 9

Most students were able to gain considerable credit for their attempts in answering this question. Well over a half of all students gave a correct response to part (a) of the question. However, a significant minority of students used incorrect inequality signs, the worst scenario seen being expressions such as $2 \leq x < -2$.

Students often used variables other than x. This was accepted where the inequalities were correct. A large number of students omitted any reference to a variable, for example, writing $-2 \geq 2$. This was not awarded any marks.

Part (b) was generally well answered though the notation for representing inclusion or not at the ends of the line segment was sometimes incorrect.

In part (c) over three quarters of all students gave the correct 3 numbers. Some students gave one or two extra values, usually –3 and/or 1. A small number of students did not recognise 0 as an integer.

Part (d) was quite well attempted. However, a large number of students either made no further progress after adding 4 to each side of the inequality or forgot to use the inequality sign in their answer. A small proportion of students used a trial and improvement approach using only integer values for p.

Question 10

Centres and students are reminded that any request to factorise an algebraic expression should be interpreted as a request to *fully* factorise the said expression. Many students lost marks unnecessarily for only partially factorising the expressions.

Students should be advised to check their final bracket to ensure there are no common factors in it. Apart from this, good attempts were seen to all three parts of this question. Weaker students sometimes produced answers such as $22x^2y$ in response to part (a) of the question.

In part (b) the most common incorrect response seen was $ab(ab - a)$, suggesting that students were confusing ab^2 in the expression to be factorised with $(ab)^2$.

Students should be advised to multiply out their answers as a check. In part (c) many errors might have detected if students had done this.

Question 11

This question was one of the least well answered on the paper. Able students sometimes produced fully correct answers to both parts, but this was rare.

In part (a) the overwhelming majority of students showed only a partial understanding of the process needed to work out the gradient of the given line drawn on the grid. Many drew a triangle on the line and realised that they needed to find the "height" and "base" of the triangle. However, a large number of students were misguided in what to do with the measurements – some divided the "increase in x" by the "increase in y", while others gave this pair of numbers as their answer. Some students gave $1.5x$ or the equation of the line as their final answer. These students could only be awarded partial credit for their answers. Other commonly seen incorrect answers included $2x + 3y$, $3 - 2$, $3 + 2$ and -1.5.

Approximately one in every five of all students gave a fully correct equation in response to part (b) of this question. Some students used N as part of their response giving answers such as $N = 4 - x$. Other students omitted the letter x writing $y = -1 + 4$.

Question 12

Students found the first part of this question more challenging than parts (b), (c) and (d).

The most common errors were made by students who divided time (30 minutes) by distance (2 km) and gave 15 as their final answer. They not only showed a lack of understanding of the relationship between speed, distance and time but also failed to change the units of time from minutes to hours.

Parts (b) and (c) were answered well with few students giving incorrect responses.

Almost a half of all students scored full marks in part (d). Some students scored only partial credit because they omitted to represent Olivia's stay in the sweetshop. A large number of students drew a line with a negative gradient to represent Olivia's journey back to the park.

Question 13

This question differentiated well and there was a wide spread in the marks awarded. Part (a) of the question was answered well and many students gave 4 correct values. The graph drawing was less well done. Students sometimes joined points with straight line segments when a curve was required. A horizontal straight line was often used to join (–1, –6) to (0, –6). Students would be well advised to practice drawing maximum and minimum points as smooth curves in this type of situation.

Many students were able to write down at least one correct solution in part (c). A wide variety of methods were seen. They included using the table, using the curve, factorising and using a trial and improvement approach.

Part (d) was answered successfully by only the most able students. Here again, the method of trial and improvement was seen quite often.

Question 14

Part (a) of this question was answered correctly by nearly all students.

It appears that a significant minority of students either failed to read the demand in part (b) of the question with sufficient care, or misunderstood what was being asked. Instead of answering the question, a large proportion of students gave $60 (the total cost of hiring equipment plus one hour of teaching) as their response by reading off from 1 hour on the graph, or $40 ($80 from (a) ÷ 2) or $25, the total cost of a lesson lasting 8 hours(again obtained from the graph) divided by 8.

Part (c) of the question was answered correctly by approximately one third of students. However, a further large number of students gained partial credit for marking (0, 60) on the graph, or, in fewer cases, for drawing a line of correct gradient.

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 expressions, equations and inequalities including factorisation, solving equations and inequalities and rearranging formulae.
- learn how to find and interpret the gradient of a straight line.
- practise your skills at solving a quadratic equation by using a graph.

Grade Boundaries

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