Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2020

Pearson Edexcel Level 3 Award
In Algebra (AAL30)
Paper 1

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2020
Publications Code AAL30_01_2001_ER

Edexcel Award in Algebra (AAL30)
Principal Examiner Feedback – Level 3

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. These included graph sketching and algebraic manipulation. Students who are yet to reach the borderline often display stronger skills in either graph sketching or algebraic manipulation.

Some errors in arithmetic were seen particularly when dealing with simple fractions.

Report on Individual Questions

Question 1

This question was very well answered.

Part (a) if full marks were not awarded the common mistakes seen was to write $-2y$ or $+2y^2$ instead of $-2y^2$.

In part (b) a lot of fully correct answers were seen. If the answer was not fully correct often on mark was for a partially correct factorisation.
Centres and students are reminded to always factorise fully in for this qualification.

Question 2

Part (a) was well answered by the majority of students and many students gained full marks. Some students, however, failed to correctly plot the line $7x + 5y = 35$. These students could still score 3 marks as they could correctly shade the area represented by two inequalities.

Part (b) was not so well answered as the students gave the three intercept points rather than the points asked for in the question or listed a full range of points not in the required region.

Question 3

Most students scored 1 mark for this question. The most popular answer being $k \geq 3$, from $k^2 \geq 9$, hence a failing to realise that by square rooting there should be 2 answers, ±3. Only a few managed to get the two critical values ±3, of those that did a majority were unable to give the correct inequalities, $-3 \leq k \leq 3$ being a common incorrect answer.

The students that sketched a quadratic curve with intercepts at (–3,0) and (3,0) usually gained the correct answer and full marks.

Question 4

Some students said that the runner moved at constant speed hence implying movement and not realising that the speed was zero. Other students gave the incomplete answer of constant speed without stating what the constant speed was. A proportion of students did state the speed was constant at zero or that the running was not moving for this period of time.

Question 5

This question highlighted that some students knew how to evaluate and use the discriminant and others did not. Those that understood what the discriminant was mostly got the correct answer of –11 and went on correctly to identify that there were no real roots. However a good proportion of students used the full quadratic formula instead and did not isolate the discriminant, these students often left part (ii) blank.

In part (a)(ii) dependent follow through was allowed. Hence allowing the student with arithmetic errors in part (a)(i) to still interpret their discriminant correctly and still gain the mark. Of the errors seen some students described the roots as untrue or not true roots, this is not correct and terminology and so cannot score marks.

On the whole part (b) was well answered. Most students knew that the formula for sum and the formula for the product, however occasionally the use of *a*, *b* and *c* was contradicted providing the marker with a choice and so no mark was awarded on these rare occasions.

The students who rearranged the quadratic to get $10x^2 + 5x - 3 = 0$ usually went on to get full marks. The most common error seen was to apply the sum and product formulae to $10x^2 = 3 - 5x$ without considering the sign changes and getting the sum= $\frac{1}{2}$ and product= $\frac{3}{10}$

Another common mistake seen was to write $-\frac{5}{10} = -2$ and $-\frac{3}{10} = -\frac{1}{3}$, centres are advised to practice basic simplification of fractions.

Question 6

This was a well answered question with most students gaining full marks. A few students only gained 1 mark only for a circle drawn using the incorrect centre, usually (–2, –1).

Question 7

Part (a) was well answered with the vast majority of students scoring this mark.

Part (b) was also well answered by most students. However, a few students wrote $16t^3$ as their final answer hence appearing to ignore the constant term in the simplification. The other common incorrect answer seen was 64^3 which could have been a simple error in writing out the intended answer or a failure to deal with the variable in the simplification. This answer did score any marks.

In part (c) the most common approach was to factorise the numerator and cancel down, which should have given the correct answer on the answer line of $\frac{1}{(x+3)(x-3)}$, however, many students put $(x+3)(x-3)$ or (x^2-9) on the answer line. For those students that showed working the factorisation could score a mark even if the final answer was incorrect. A common error seen was to multiply out the denominator and go no further, this approach did not score any marks.

Question 8

Part (a) was generally well answered with the majority of students gaining the mark.

Part (b) was again well answered. A few students did not use the correct gradient for a parallel line, instead often using the gradient for the perpendicular line, these students could still score the second method mark if their method for calculating C was clearly shown.

Question 9

The level of arithmetic in part (a) prevented some students from gaining this mark. Students should realise ½ ÷ 4 is not a fully processed answer and always try to give numerical answers in their simplest form or the form requested.

Most students scored some marks on part (b) of this question. Generally, well completed with one mark for $\frac{\sqrt{5}}{(5-2\sqrt{5})}$ and many knew to multiply by $\frac{(5-2\sqrt{5})}{(5-2\sqrt{5})}$. Some students had difficulty in getting either the correct numerator or denominator, or cancelling down their expansions. A number used an incorrect multiplier such as $\frac{(5-2\sqrt{5})}{(5-2\sqrt{5})}$. or $\frac{(\sqrt{5})}{(\sqrt{5})}$.

Part (c) was often fully correct. Even when not fully correct the majority of students gained the first mark for the correct first step. Many could isolate terms in *n* on one side of the equation, usually getting $2nt + n = 5t$. Those that could factorise correctly usually gained full marks, however, a considerable number of students failed to factorise and executed the wrong rearrangements, such as $2n + n = \frac{5t}{t}$, $3n = 5$, $n = \frac{5}{3}$

Question 10

Part (a) was well answered and the vast majority of students gained this mark.

Part (b) proved a little more difficult with arithmetic errors occurring when students tried to give the correct simplified answer. However, many scored 2 marks for the correct un-simplified answer. It was pleasing to see that very few students gave an incorrect formula for the quadratic formula.

Students who solved a quadratic equation usually gained full marks in part (c) whether they used the formula or factorisation. The most common error occurred when students initially equated $(x + 3)(x + 3) = (x + 3)$ and then cancelled out an $(x + 3)$ giving rise to either $x + 3 = 0$ or $x + 3 = 1$. This approach was either arithmetically incorrect or lost one solution and only gave one solution hence no marks could be awarded.

Part (d) was well answered by many with just a few students writing $x + 4$ instead of $x - 4$.

Question 11

This was well answered by the majority of students. For those that did not score both marks many substituted in the correct values for a, n and d usually got to 6×1240 but a surprising number did not get the answer of 74400, making simple arithmetic errors when evaluating this simple multiplication. Other common mistakes were $120 - 1 = 199$ and students using $d = 15$ instead of 10.
Part (b) saw a variety of approaches. Some set up an equation $a + (n - 1)d = 1000$ and of these students gained full marks. However, some changed the 1000 to a number greater than 1000 and then solved. Common numbers used were 1001 and 1005. This then caused some confusion over the value of p.

A common approach to this was by trial and improvement finding 97th term = 985, 98th term=999 and 99th term=1005, giving 99 as the answer. The correct answer was achieved by most. Trial and improvement is only awarded marks if the answer is fully correct. This approach is therefore not recommended and any slip in arithmetic will result in an incorrect answer and zero marks being awarded.

Question 12

This question was generally well done. In part (a) students were able to correctly rearrange the equation and give the correct gradient answer of $-\frac{4}{3}$.

In part (b) students were usually able to use the perpendicular gradient rule correctly, irrespective of their gradient in part (a) hence gain the first two method marks.

Many students had the correct gradient went on to give the correct equation in the required form and scored full marks for this part of the question.

Question 13

Students who applied the trapezium rule to the area under the graph from $t = 0$ to $t = 16$ usually gained full marks. Many calculated the area using a combination of triangles and rectangles which was also awarded marks. Some students got the required area by applying the trapezium rule to the area under the graph from $t = 4$ to $t = 16$ and adding to that the area of the triangle from $t = 0$ to $t = 4$. Centres are advised to ensure that students understand the trapezium rule as this is the most successful method seen.

Some students got one reading from the graph incorrect, but were still awarded the first 2 marks if they used their incorrect value correctly in finding the area. The other most common error seen was to forget to use the strip width of 4 in the area calculation.

In part (b) most students were able to gain one mark for drawing the tangent at $t = 12$, with many getting the correct gradient within the range or follow through from their triangle. Only a handful of students calculated the gradient incorrectly by dividing the base of the triangle by the height. Some students were unable to achieve the final mark because they were unable to change a decimal divided by a decimal into a number. It is important that when students are positioning their triangle to find the gradient that they select appropriate height and base lengths to make the division easier.

In part (c) many correct answers of acceleration were given.

Question 14

This question was not answered as well as other questions on this paper. Students do find manipulation of surds and fractions challenging.
Many of the students only gained 1 mark in part (a) for correct writing $(\sqrt{2})^5$ as $4\sqrt{2}$ or $(\sqrt{2})^3$ as $2\sqrt{2}$ or similar. Unfortunately they then unable to deal with adding the fractions and often gave the final answer incorrectly as $\frac{3}{(7\sqrt{2})}$.

In part (b) a variety of approaches was seen and the full answer of 3 was seen but many students only worked through part of the question, even students who wrote $\frac{2\sqrt{5}+\sqrt{5}}{2\sqrt{5}-\sqrt{5}}$ could not go on to simplify to $\frac{3\sqrt{5}}{\sqrt{5}}$ and then 3.

Question 15

Part (a) of this question was well answered but part (b) was not.
Only a few students gave the wrong initial proportional relationship. The students that did give the correct relationship but did not give the correct answer usually stated, incorrectly, that cube root of 27 was 9.

In part (b) students often drew either a straight line $y = mx$ from (0,0) or an exponential shaped curve.

Question 16

The question was not well answered. In part (a) students gave sin $x = \frac{2}{5}$ but could not then read the horizontal scale correctly or just gave one value.

In part (b) some papers were left blank. A very small minority attempted to sketch the transformed curve but the scale proved to be difficult for some to use. Another error seen was for the students to combine 0.7 and 20.

There were some correct answers seen for part (c). A mark was given for an attempt at a stretch parallel to the *x*-axis. However many students translated the graph in the negative y direction.

Question 17

A good number of students solved this correctly, however, a common error was to use the wrong substitution e.g. stating 4*y*=4*x*– 10, and then $4y^2 = (4x-10)^2$.
Another error seen, was to use the correct substitution of ($\frac{y = (2x-5}{2}$) and then make a mistake with the squaring out or forgot to multiply by 4.
Most students that got the $8x^2 - 20x - 100 (= 0)$ managed to factorise correctly and get the correct solutions.

Question 18

Curve sketching still poses a challenge for some students whilst others produce fully correct diagrams.

For those diagrams that were not fully correct some students were awarded marks for using the correct intercept on the y-axis or the correct asymptote being drawn. Some drew the correct shape of the curve and were awarded a mark for this. The most common error seen was to draw the graph of $y = \frac{1}{x}$ and this did not score any marks.

Summary

Based on their performance on this paper, students should:

- practice arithmetic with fractions and then algebraic fractions
- learn the difference between sketching a curve and plotting a curve
- practice using surds in calculations.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom