Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International Advanced Level
In Pure Mathematics P1 (WMA11) Paper 01A

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General Comments

This paper proved to be a good test of candidates' ability on the WMA11 content and plenty of opportunity was provided for them to demonstrate what they had learnt. Marks were available to candidates of all abilities

In general presentation was very good. The candidates often showed all the work required using appropriate mathematical notation. However, some candidates demonstrated an over-reliance on calculators, for example when solving quadratic equations, when the warnings in the question were to 'show all stages of your working' and 'not to rely on calculator technology'. This was particularly evident when equations are solved on a calculator and the corresponding factorisation written down incorrectly. This was particularly evident in question 5(b)(ii) and question 6.

It was also evident that calculators were used to rationalise denominators in question 4(ii) when this question also had the warning not to use calculators.

Question 1

This question tested the candidates' knowledge of transforming functions. In general, it was answered very well. For many candidates it was a high scoring question, with a significant number of candidates scoring full marks. Candidates lost marks for a variety of reasons, with no single mistake standing out as notably more common than others. When marks were lost, this included:

- applying the transformation to the x coordinate in part (a)(ii)
- neglecting $k = 5$ as a solution, neglecting $k = 3$ or using y rather than k in part (b)
- giving the solution $(-5, 0)$ in part (c)

Question 2

This question, assessing understanding of modelling and simultaneous equations, was very accessible for the vast majority of the candidates, with most scoring 6 or 7 marks out of 7, often concisely. For those that did not score full marks, this primarily occurred due to missing units in part (b)(i).

In part (a), the vast majority of candidates wrote correct pairs of simultaneous equations, with square roots processed and arrived at correct solutions for *a* and *b*. In a small number of cases, *b* was given as 1.5, because of a sign error when rearranging the first equation.

In part (b)(ii), most candidates arrived at the correct answer by squaring the value of $\sqrt{t}$, however, a significant number of candidates square rooted, rather than squaring and consequently lost both marks. Rounding was good, and even where answers were rounded upwards to 137, candidates had generally ensured that they gave the unrounded value first.

Question 3

This question, assessing transformations of trigonometric graphs, was answered well by majority of the candidates, with the best candidates scoring full marks. The question did serve to discriminate quite effectively, with a good spread of marks present with many gaining 1,2 or 3 marks and relatively few scoring 0.

In part (a), $-3\cos x$ was by far the most popular correct option, with $3\sin(x-90)$ being the other main correct option seen. Of the incorrect options, there were many answers of $3\cos x$ offered, with relatively few answers containing sin functions. A minority of candidates used θ or t as the argument and scored M1A0 provided the function was otherwise correct. A few candidates gave expressions in terms of $f(x)$ such as $-3f(x)$ and scored 0 marks.

In part (b), more candidates scored the mark for stating 8 roots in (i) than for 5 roots in (ii), indicating that the subtleties of how frequently maxima/minima occur was lost on some candidates. Some listed roots rather than give the number of roots, but this happened on very few occasions. 4 and 6 were popular incorrect answers for part (b)(ii).

Question 4

Part (i) proved to be quite challenging for candidates with a full range of possible marks equally distributed. There was disappointing manipulation of indices with many students failing to recognise that all terms could be written as powers of 2. The most common error was to write $\frac{8^{1-k}}{4}$ as 2^{1-k} but there were many other poor attempts at this part. Although this question was non-calculator quite a few students resorted to logs to answer the problem. Unless it was clear that their working, usually in base 2, could be done without a calculator marks were forfeited. Some candidates solved the problem using powers of 4 or 8 or even $\sqrt{2}$.

In part (ii), the majority of candidates started off correctly and gained the first 2 marks. There were two approaches with cross-multiplying and then collecting x terms on one side and constants on the other or the candidates rationalised the left-hand side first before proceeding to make x the subject. The most common error after this was by not showing the rationalisation of the denominator thus losing the last two marks. A significant number of made sign slips when manipulating terms or failed to separate x's and constants.

Question 5

This was a straightforward integration and differentiation question, with a more challenging final part which required equating the derivative to 3 and then manipulating it to be able to solve the resulting equation. In this question there was a calculator warning "Solutions relying on calculator technology are not acceptable"

Most candidates seemed to do well in parts (a) and (b)(i), with many attaining full marks for these two parts. Common mistakes involved arithmetic with negative numbers where the method was correct, but the final result was not. A small number of candidates also forgot to include the "+ c" in part (a).

Candidates seemed to find part (b)(ii) more challenging, with fewer able to attain full marks. Although many recognised that the equation was a hidden quadratic and successfully rearranged it into a polynomial, a notable number did not meet the criteria for awarding the method mark for solving a quadratic equation. Many jumped directly from the quadratic equation to the values of x^3 from a calculator which lost them the final three marks.

Question 6

This question, assessing the intersection of curves and solving cubic equations via non-calculator methods, served as a good discriminator. Confident candidates that took care to follow the guidance in the question, showed full working and generally scored full marks. Otherwise, the question enabled the overwhelming majority of candidates to score 2-4 marks. Some candidates divided by x and as a result lost the solution $x = 0$ but were still able to score 4 marks out of the available 5.

Unfortunately, many candidates did not progress from a correct cubic expression to the three roots by non-calculator methods, proceeding to merely list the roots at this point (or indeed, at the quadratic stage) rather than indicate a correct method. The most popular method, where it was indicated, was factorisation into two brackets, although many candidates presented brackets that did not show consistency with the three-term quadratic (or cubic) that preceded them, for example, writing $6x^2+16x-32=(3x-4)(x+4)$ or $\left(x-\dfrac{4}{3}\right)(x+4)$ indicating that they had worked back from the calculator solutions.

Some candidates used the quadratic formula, with varying degrees of success. There was a minority of candidates that simply quoted the quadratic formula and then immediately wrote down answers that matched the results from an equation solver facility on their calculator, without actually showing the substitution – these candidates did not score the ddM mark.

There was a significant number of errors in processing the original cubic expression, mainly concerning missing powers on x^2 terms, which occasioned difficulties later on as the resulting quadratic became more unwieldy. Weaker candidates assumed that they were finding the roots of the given equations of the curves and failed to score any marks.

Question 7

This question assessed a range of topics, including reciprocal graphs, transformations, intersections and the discriminant, and allowed strong candidates to show off a range of skills and helped discriminate between candidates of all levels. Many answers to this question were impressive and it was not uncommon to see candidates scoring at the upper range (7-9 marks).

In part (a), virtually all candidates presented sketches of discontinuous curves. The intention was clear where asymptotes were concerned, and most sketches were passable. Very few curves overlapped or crossed the asymptote and although some seemed to curve away again, this was usually to a degree that was deemed to be a slip of the pen. Here, the most common error was to fail to label the asymptote or simply annotate –6 on the axis. $x = 6$ was also seen with surprising frequency. The y intercept was generally correctly given. There were instances of $\left(\frac{1}{6}, 0\right)$ which was still accepted provided it was marked in the correct place, but these were relatively few.

In part (b), nearly all candidates set the line equal to the curve and multiplied up by the denominator, although some introduced an extra $(x + 6)$ which caused them problems further on. The discriminant was attempted with some variations of the b term, which still scored the dM mark. While some candidates proceeded to write the given final line following incorrect work (and hence lost the final accuracy mark), most provided a coherent and correct proof. There was the occasional slip, often involving a missing m, somewhere along the way, but only from a small minority. There were instances of candidates using the = sign throughout their discriminant work, only introducing the „ sign in the given answer. These were penalised the final accuracy mark if there was no justification for this change.

In part (c), a small but significant number of candidates went straight from the given quadratic to the inequality, showing no intermediate work and this was penalised due to the calculator warning in the question. Most however opted for factorisation, followed by the formula, with relatively few explaining their solution from a sketch. Quadratics were nearly always correctly factorised, but many candidates then selected the inner range for the inequality. There were also some isolated cases of x, rather than m, being used to define the inequality, which scored M1A0 provided the outside region for their roots had been selected.

Question 8

The majority of candidates were able to score full marks in part (a) although some made errors in finding the gradient and others used an incorrect point in finding the equation of the tangent. A small number found the equation of the normal.

In part (b), candidates seemed to either do very well on this part scoring all 4 marks or very badly. The majority began correctly using the general form, $y = ax^2 + bx + c$ and substituting the given points to find the three unknowns by solving simultaneous equations. A few failed to write out the equation of the curve after finding the values of a, b and c. The most common error was assuming that the equation was of the form $y = x^2 + bx + c$ which had too few variables and gained no marks even if they recognised that $c = -6$.

Part (c) was answered well with most candidates being able to find the appropriate inequalities for their equations and therefore scoring both marks. Some failed to include y and instead used an incorrect R in their inequalities. The most common mistake was not including $x < 0$. Some were penalised for inconsistent use of inequality signs with a mixture of strict and non-strict signs.

Question 9

In this question, solutions working in degrees were rare. It was a little more common to see work involving right angled triangles in parts (a) and (b).

In part (a) the vast majority of students gained both marks here with just a few using wrong values when substituting and few rounding to insufficient accuracy e.g. 1.53. Most used the cosine rule but a few used right angled triangles.

In part (b) most candidates scored the M mark but not the A mark as they went straight from a correct sine rule equation to 0.236 with no intermediate step. As this is a given answer an intermediate stage was required. Some used the answer to part (a) and cosine rule to show the given value.

The responses for part (c) were mixed bag with candidates scoring the full range of available marks. Some found the area of the triangle but not the sector. Others found the area of the sector but not the triangle. Even more common was the use of the wrong angle, some just using the angle of the minor sector and others subtracting from π instead of 2π. There were also some rounding errors when adding the areas together. The value 7.4 could come from several incorrect methods which usually scored no marks. Incorrect units lost the final A mark.

In part (d) the wrong angle was used quite frequently again in this part as well as candidates forgetting to add part of the shape. Most scored the M mark for finding the arc length but then made mistakes in adding the parts together. The majority of students that scored full marks in part (c) seemed to then go on and score full marks in part (d).

<u>Question 10</u>

This question required the understanding of $\mathrm{f}'(x)$ notation, coordinate geometry and integration. There was a range of marks awarded for this question, with many achieving full marks and others gaining none.

In part (a), most candidates recognised that the gradient was $\frac{4}{5}$ and many went on to find the correct equation of the line. Errors tended to result from incorrectly determining the y intercept. A significant number of candidates struggled with part (b), with many incorrectly setting up the equation (e.g. by equating $\mathrm{f}'(x)$ to $-\frac{5}{4}$ or -3 rather than $\frac{4}{5}$.
Despite this, the majority attempted part (c) with many achieving several marks even when they had an incorrect value of k. A common error arose when trying to determine the constant of integration, which some neglected to include. A number of candidates also used an incorrect coordinate to calculate its value.

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