Examiners' Report/
Principal Examiner Feedback

January 2015

Pearson Edexcel International GCSE
in Further Pure Mathematics (4PM0)
Paper 02

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 2015
Publications Code UG040560

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Most candidates were able to produce attempts at the majority of the questions on this paper and seemed to have sufficient time to complete the work they could do. It was rare to see scripts with many blank responses.

Candidates must be careful to include every step of their working, especially in questions such as number 4, where the answers for two of the four parts were on the question paper. Also, candidates must include sufficient figures when using intermediate answers in further working. Working with numbers rounded to 3 significant figures is unlikely to produce a final answer which is correct to 3 significant figures.

It is advisable to quote a general formula before substituting numbers. An incorrect substitution into a previously quoted general formula may gain the method mark - and could allow access to subsequent method and follow through marks. Without sight of the general formula, when the substitution is incorrect the examiner has to conclude that the error is in the formula and award M0.

Question 1

This question was generally well answered by candidates with most having a good understanding of both the sine rule and the formula for the area of a triangle in the form $\frac{1}{2}ab\sin C$.

Question 2

Whilst many candidates produced good responses for part (a) others did not show sufficient working, in particular failing to show clearly that they were using $V = \pi r^2 h$. Most knew what to do in (b) but some made mistakes when finding the derivatives or solving the equation to find a value for *r*. Others forgot to find the minimum value of *S* or failed to give a proper conclusion, with supporting evidence, for the minimum.

Question 3

This four mark question was well done by the majority of candidates although several thought that the discriminant was greater than zero. Of those who obtained the correct answer for part (a) most chose to solve the resulting quadratic equation by factorisation or using the formula rather than noting that the repeated root must be equal to $-\frac{b}{2a}$.

Question 4

Part (a) was often left blank, even though the exact value of $\sin 45°$ was used in (b) and (c). The work in (b) was sometimes fiddled to arrive at the given answer. In part (c), some candidates did not simplify adequately; the final answer should have been simplified to the form of the answer in (b). There was often insufficient working shown in (d). Frequently candidates moved directly from $\left(\frac{\sqrt{3}+\sqrt{5}}{4}\right)\left(\frac{\sqrt{3}-\sqrt{5}}{4}\right)$ to $-\frac{1}{8}$. This would have been acceptable had the answer not been given, but not in this case.

Question 5

Overall, candidates struggled with this question, with a significant number making little progress. Of those candidates who did realise what was required of them many lost a mark by not giving their answers to the demanded accuracy although this was penalised only once in the question.

Question 6

The majority of candidates coped well with the algebra required for part (a); part (b) was more problematic. Those who managed to find appropriate answers for parts (a) and (b) usually used them successfully to find a value for p. Attempts at part (d) were varied. Whilst many realised they needed their answer for (a) and (b), with their value of p substituted, others simply substituted for p in the original equation. Some candidates repeated work they had already done to find the sum and product of the roots of the new equation. Others either forgot to include $= 0$ or forgot to change to integer coefficients.

Question 7

The first two parts of this question were straightforward and were answered well by the majority of candidates. In the third part it was disappointing to see so many candidates obtain a quadratic equation in n even though it should have been clear that there were 9 terms. Many candidates used -14 as the first term of the new sequence. Some candidates seemed unaware that the common difference was still 4 and some thought it was 1, presumably confusing consecutive terms with consecutive numbers. Some realised that the 40th term was required but failed to calculate its value. All of the methods outlined in the mark scheme were seen but the most popular and most successful was the first alternative.

Question 8

As usual, the binomial expansion question was answered well by many candidates. Part (a) could be done using the expansion or Pascal's triangle. Unfortunately some candidates did not give the full expansion but stopped at the x^3 term. Some candidates attempted to apply Pascal's triangle to (b) as well. Part (c) was often omitted. Candidates who had suitable expansions in (a) and (b) generally used them successfully in (d), although sometimes they multiplied more terms than necessary. Many candidates did not realise the connection between parts (d) and (e) and differentiated using the quotient rule. For those who had made errors earlier in the question this was sometimes a good tactic but often the differentiation was incorrect.

Question 9

In part (a) the majority of candidates obtained the correct values for the exact lengths of DE and BE but a significant number applied Pythagoras Theorem incorrectly and ending up with the sum rather than the difference of two squares in their calculations. In parts (c) and (d) most, but certainly not all, of the candidates realised which angles they were being asked to calculate. Most candidates used the cosine rule in part (c) and some also used it in part (d) even though they could just have used the angle sum of the triangle. The most common error in the final part of the question, when calculating the perpendicular height of the pyramid, was to assume that the point vertically below D was the midpoint of BE. Most candidates achieved the method mark for obtaining the base area of triangle ABC correctly.

Question 10

Most candidates could make a good start at this question. The most common error seen in (a) was to change from the gradient of the tangent to the gradient of the normal. Those who had a correct equation of PQ usually equated this to the equation of C and solved to find the coordinates of Q. Part (c) was found to be more difficult. Many candidates failed to realise that the gradient of RS had to be -8 and so equating the expression obtained for $\frac{\mathrm{d}y}{\mathrm{d}x}$ in (a) to -8 would yield the x coordinate of R. "Circular" arguments were often produced for parts (d) and (e) as candidates would assume that S lies on C in order to find its coordinates in (d) and then substitute these coordinates into the equation of C to answer (e). There was little reward given for such work.

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