General Certificate of Education

Mathematics 6360

MPC2 Pure Core 2

Report on the Examination

2010 examination – June series

Set and published by the Assessment and Qualifications Alliance.

General

The new form of Question Paper/ Answer Booklet was used to good effect with candidates' work being better organised than on some previous occasions. There was sufficient space for almost every candidate to set their work out (even with corrections). A few candidates did not seem to appreciate that extra blank pages 18 and 19 were available to answer the last question as these candidates used supplementary sheets, leaving pages 18 and 19 unused.

In general the paper seemed to be answered well with no obvious indication that candidates were short of time to complete the paper. There was a smaller proportion of candidates than in recent series scoring very high marks on this exam but equally there seemed to be a smaller proportion of candidates scoring very low marks than previously.

Teachers may wish to emphasise the following point to their students in preparation for future examinations in this unit:

- When asked to show or prove a printed result candidates should be aware that sufficient working and detail must be shown to convince the examiner that the solution is valid. Care should be taken to ensure that the final line of solution matches the printed result and, if the printed result is then to be used in a later part that the printed result is quoted accurately.

Question 1

This opening question provided a confident start for most candidates, with correct answers often seen to parts (a) and (b)(i). However, part (b)(ii) was answered relatively poorly with a surprisingly large minority simply not knowing the correct formula for the circumference of a circle (or an arc-length with angle 2π). The most common wrong answer for those who recalled the correct formula for the circumference was '$x = 42.7$', obtained by poor use of the calculator in evaluating $\frac{22.7}{2\pi}$ as $\frac{22.7}{2}\times\pi$. Even some of the best candidates lost marks in this opening question while getting high marks elsewhere.

Question 2

This question on sequences was generally answered much better than similar questions in previous years. There were many correct answers to part (a), although replacing u_1 with 2 encouraged a number of weaker candidates to replace u_2 with 3. A majority of candidates did write an equation in L in part (b), although there was a significant minority who were keen to incorrectly consider use of the sum of an infinite geometric series formula instead of just replacing both u_{n+1} and u_n by L in the given formula. Some other candidates who gave the correct equation '$L = 6 + \frac{2}{5}L$' could not rearrange this equation to obtain $L = 10$.

Question 3

Full marks were awarded to more candidates in this question than any other question on the paper. Part (a) was well answered, with a pleasingly large proportion of candidates remembering to write down sufficiently accurate values to convince the examiners that evaluations of the rearranged sine rule had been carried out to justify a final statement matching the printed result requested in the question. Part (b) was less well answered with a non-included angle, either 11.5° or 115° being used instead of 18.5° with lengths 6 and 15 in the area formula $\frac{1}{2}ac\sin B$.

Question 4

The sign of p was often awry, although that of q was usually correct. This was not penalised again in part (b)(i) where a lack of simplifying the coefficients and signs in the expressions was a greater source of mark loss. It was also disappointing to see a significant minority of candidates integrating the term $+\frac{1}{x^6}$ instead of the printed term $-\frac{1}{x^6}$. However, in general, most candidates showed that they understood how to integrate x raised to a negative power.

Most knew how to evaluate a definite integral in part (b)(ii) but very few could maintain the numerical accuracy needed for the final mark. Those few candidates who just wrote down the value of the definite integral, presumably from a calculator, without showing how it had been obtained from the previous part (Hence) were awarded no credit. Some candidates, having correctly obtained '-1.7' for the value of the definite integral, went on to write 'Area = $1\ .7$' as their final line of solution. This was not penalised and such candidates were awarded both marks.

Question 5

Many candidates correctly showed the printed value for r in part (a)(i) by forming and solving the equation '$\frac{10}{1-r}=50$'. Those who used verification methods rarely scored both marks. Most candidates correctly found the second term of the geometric series, but a significant number of candidates in part (b)(i) tried to 'guess' the answer for the common difference instead of using the formula for the n^{th} term of an arithmetic series and ended up with the wrong answer '$d = 0.5$'.

The final part of the question, which involved understanding of the sigma sign, was better answered than in previous papers but still the majority of candidates failed to obtain the correct value. The most common wrong answer was 820, obtained by using $\frac{1}{2}n(n+1)$ with $n = 40$, presumably from scanning through the formulae booklet.

Question 6

Most candidates coped with the negative fractional powers well, differentiated correctly and found an equation of a normal, although there were a few equations of tangents presented as final answers to part (b)(ii). A common arithmetical slip in part (b)(ii) was '$\frac{1+\sqrt{1}}{1}$' incorrectly evaluated as 1. The expression for the second derivative was often correct in part (c)(i). Part (c)(ii) was discriminating. The most popular approaches were to either put $x = 1$ in $\frac{\mathrm{d}^2y}{\mathrm{d}x^2}$, or to equate $\frac{\mathrm{d}^2y}{\mathrm{d}x^2}$ to zero and solve, for which no marks were scored.

A significant number of candidates did, however, earn some credit by making a more general comment on the sign of the second derivative but many lacked rigour and, in particular, assumed the second derivative has to be negative for a maximum, overlooking the possibility that the second derivative may be zero at a maximum.

Question 7

This question, which tested trigonometric-graphs, identities and equations, was better answered than similar questions in some recent series. In part (a) most of the graphs presented had the correct shape with intercepts given, although the intercept $y = 1$ was occasionally omitted and those on the x-axis only expressed in degrees. Part (b)(i) usually had enough to justify the given result which was then generally used in part (b)(ii). The most common error in the final part was to omit the second answer for x. It was not uncommon to see weaker candidates writing 'identities' such as '$\cos 2x \times \cos 2x = \cos^2 4x$'.

Question 8

Parts (a) and (b) gave the opportunity for all to pick up marks, with the majority giving the two decimal place answer required in part (b). Many candidates scored just one of the two marks in part (c). The translation approach was the more popular, but the fact that the vector needed to be $\begin{bmatrix} \frac{3}{4} \\ 0 \end{bmatrix}$ was too subtle for most, as was the scale factor of $\frac{1}{8}$ for those using a stretch approach. Similarly in part (d), needing $4(x-1)$ rather than $4x-1$ defeated the majority. However, this caused no undermining of confidence as many answered part e(i) well, with sufficient justification to support the given answer.

It should be noted, however, that answers which simply started with '$k = \frac{8 \times 5}{4}$' with no evidence of using correct log laws could not earn credit. In part (e)(ii) most candidates knew they had to solve '$\frac{5}{4} = 2^{4x-3}$' and started by taking logs, but then resorted to calculators rather than establish an exact result (with numbers hinted at in the previous part). The best solution, given by some, was to multiply both sides by '2^3' and then take logs, to the base 10, of '$10 = 2^{4x}$', which led directly to the result.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.