Examiners' Report/
Principal Examiner Feedback

Summer 2012

International GCSE Mathematics
(4MA0) Paper 1F

Level 1 / Level 2 Certificate in
Mathematics
(KMA0) Paper 1F

ALWAYS LEARNING

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. 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 for our BTEC qualifications.
Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.
Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere
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

Summer 2012
Publications Code UG032629
All the material in this publication is copyright
© Pearson Education Ltd 2012

General Introduction to 4MA0

There was an entry of almost 42,000 candidates, 10,000 more than a year ago. This comprised over 28,000 from the UK, including over 6,000 for the new Edexcel Certificate and about 13,000 from overseas. The Foundation tier entry exceeded 5,000, an increase of almost 4,000, mainly Certificate candidates, while the Higher tier entry increased by over 20%, the increase, just over 7,000, coming in approximately equal numbers from the two qualifications.

On the Higher tier papers, there were a few questions which challenged even the ablest candidates but, overall, the papers proved to be generally accessible, giving appropriately entered candidates the opportunity to show what they knew.

Introduction to Paper 1F

This paper gave the 5,300 candidates the chance to demonstrate positive achievement. Most of the questions had pleasing success rates but, as the demands of the questions broadly increase through this paper, it was not unexpected that the later questions, probably Question 15 onwards, were not as well answered as the earlier ones. In addition, many candidates at this tier struggle with any questions involving algebra.

Although, as always, some candidates sacrificed marks by failing to show working, most showed their methods clearly.

Report on individual questions

Question 1

All parts were well answered, although, in part (c), 8465 was sometimes wrongly rounded to 8500 or 9000 and, in part (d), 8465 was given as a multiple of 4 surprisingly often.

Question 2

Apart from a few bars drawn between 1900 and 2000 in part (c), errors were rare in the first three parts.

The majority of candidates answered part (d) correctly. 491 $\left(\frac{3440}{7}\right)$ and 2408 (70% of 3440) were the most popular wrong answers, while 24080 (7 × 3440), 0.205 $\left(\frac{7}{3440}\times 100\right)$ and 238, the result of keying in 3400 instead of 3440, also appeared occasionally.

Part (e) was a more demanding question on percentages, although it was still quite well answered. By far the most common wrong answer was 2.1 $\left(\frac{3440}{1639}\right)$ but there were many others, which usually involved the sum, difference or product of 1639 and 3440. The same keying in error as in part (d) occurred sometimes; here it gave an answer of 48.2.

Question 3

All parts had a high success rate but there were some recurring errors, In part (a), 'chord' and 'diameter' appeared regularly. In part (c)(i), answers around 50°, the complement of the correct answer, suggested faulty use of a protractor, while the absence of any answer at all suggested that the candidate did not have a protractor. Answers of 90° and 180° also appeared occasionally. In part (c)(ii), the correct answer 'obtuse' appeared most frequently but 'acute' was also popular. In part (d), the majority of candidates drew an acceptable line of symmetry but, unexpectedly often, this part was not attempted. Many candidates gave 'isosceles' or some recognisable variant in part (e) but 'equilateral' and 'triangle' had considerable support.

Question 4

Apart from the regular appearance of 5 as the answer to part (a), the first two parts were well answered but giving the place value of the 3 in part (c) caused some problems, 'units', 'ones' and 'hundredths' all having a substantial following.

Many candidates ordered the decimals accurately in part (d), the most common misconception being that 0.18 is greater than 0.2.

Question 5

Part (a) caused little difficulty and part (b) was also well answered. Many candidates scored full marks for $\frac{17}{20}$ and, of those who did not, a high proportion scored 1 mark out of 2 for $\frac{85}{100}$.

In part (c), the vast majority of candidates scored either 2 marks for the correct answer of 7 or 1 mark for an answer of −7. Answers of 6 and 8 appeared occasionally, though.

Candidates used a wide variety of 'counting on' methods, often successfully, to find the time interval in part (e), although frequently no working was shown. 2 hours 3 minutes (7 05 − 5 02) was the most common wrong answer and received no credit, although 17 02 − 7 05 did. Much less often, 12 hours 7 minutes (7 05 + 5 02) also appeared. Stating either 9 (hours) or 57 (minutes) was also rewarded. Not all candidates used hours consisting of 60 minutes.

Most candidates demonstrated a sound knowledge of the 24-hour clock in part (d).

In part (f), almost all candidates realised that 15% had to be subtracted from 100% and so errors were rare.

Question 6

The vast majority of candidates found the next two terms in the sequence in part (a) and provided an acceptable explanation in part (b). Markers were tolerant, accepting, for example, 'I missed 3.' In part (c), the 13th term was usually found correctly.

Question 7

In the first two parts, the correct answer was the one which appeared most often but many other answers were seen, notably 1 and 2 in part (a), T and C in part (b)(i) and C, S and U in part (b)(ii).

In part (c), a fair proportion of candidates drew a correct pattern, usually one of the two which had been anticipated, but sometimes with the dots in unconventional positions on the grid.

Question 8

The calculations in parts (a) and (b) were almost always correct.

Part (c) tested algebra, a mysterious topic to many Foundation candidates. This was illustrated by the great variation in the quality of responses. Many wrote an acceptable formula, usually $C = 85n$ or $C = 85 \times n$. Correct expressions with '$C =$' omitted scored 1 mark out of 2, as did a correct formula with n as the subject, $n = \frac{C}{85}$ for example. Many candidates, though, either made no attempt or gave answers such as $C \times n$ or $C + n$, which suggested that they had little appreciation of what was required.

In part (d), a fair number of candidates scored full marks for the correct answer, 22, but many more scored 1 mark out of 2 for 1800 ÷ 85 or an answer of 21. A significant minority, possibly deterred by the wordiness of the question, made no attempt. Others, though, used trial and improvement with a large number of trials.

Question 9

Finding the mode in part (a) resulted in a substantial proportion of wrong answers, especially 6 for no obvious reason and 3.5 $\left(\frac{3+4}{2}\right)$.

In part (b), many candidates gave the range of the number of peas (5) correctly and answers like 1 to 6 and 1-6, which showed some understanding, scored 1 mark out of 2. There were, however, several incorrect answers which appeared regularly. These included 7 (the range of the number of pods), 3 (the mode), 3.5 $\left(\frac{3+4}{2} \text{ or } \frac{1+2+3+4+5+6}{6}\right)$, 21 (1 + 2 + 3 + 4 + 5 + 6) and 29 (32 − 3).

Only a minority of candidates calculated the mean accurately in part (c) and a number of wrong answers appeared frequently. One of these was 13, obtained by summing the products correctly (78) but then dividing by 6, instead of by 25. This scored 1 mark out of 3, if working were shown. Others were 3.5 $\left(\frac{1+2+3+4+5+6}{6}\right)$, 0.84 $\left(\frac{1+2+3+4+5+6}{25}\right)$ and 4.16 $\left(\frac{3+6+5+8+2+1}{6}\right)$. It was also disappointing to see a significant number of candidates with the correct products written in the table but who then made no use of these values in their attempt to calculate the mean. There were some errors in arithmetic. Candidates who made such errors could still receive credit if their method was correct but only if they showed their working, If there is no working, an incorrect answer, even if it is almost correct, will score no marks.

There were many correct probabilities in part (d). In all three parts, the number of peas was sometimes given as the numerator, $\frac{7}{25}$ in part (i), for example. $\frac{1}{6}$ and $\frac{2}{6}$ appeared as the answers to parts (ii) and (iii) respectively, as did $\frac{10}{78}$ and $\frac{47}{78}$, which used products from part (c).

Question 10

In the first part, many candidates found the size of angle x (78°) correctly. When working was shown, it was possible to award 1 mark out of 2 for a correct method, even if there was a slip in the arithmetic. The most frequent wrong answers were 81 and 87.

The second part proved much more difficult. In part (i), the size of angle *y* was often wrong. 102° (180 − 78) was a very popular wrong answer, a consequence of the belief that *SRT* was a straight line. 99° (180 − 81) also appeared regularly. When part (i) was wrong, the reason in part (ii) was unlikely to be correct, although occasionally it was. Even when the size of angle *y* was correct, however, reasons such as 'corresponding angles', 'parallel lines' and 'opposite angles' appeared as often as 'alternate angles'. 'Z angles' on its own received no credit but it was not penalised if it accompanied the correct reason. Any recognisable spellings, such as 'alternative' and 'alternating', were accepted, as was the abbreviation 'alt'.

Question 11

Both parts of this currency conversion question were well answered. The majority of candidates understood that multiplication by 1.45 was needed in part (a) and division by 1.45 in part (b). Reversing these operations was the cause of most incorrect answers. The only others that appeared often enough to be noticed were 320.45 in part (a) and 841.45 in part (b).

Question 12

In the first part, solving the equation $2x + 9 = 1$ had a fair success rate. The correct solution was awarded full marks, irrespective of whether any method was shown or, if a method were shown, whether it was algebraic or trial. The most frequent wrong answers came from errors in rearranging; $x = 4$ came from $2x = 9 - 1$ and $x = 5$ from $2x = 1 + 9$.

While there were many correct, concise, algebraic solutions to the equation $3(2y - 1) = 6$ in the second part, there were also many candidates who could not make a meaningful attempt and quite a number who were unable to make any attempt at all.

Many candidates, though, were at least able successfully to expand the brackets and gain the first mark. The most popular wrong answer was probably $y = 2$, which was either the incorrect solution of $6y = 3$ or the result of simplifying $6y - 3$ as $3y$, so that $6y - 3 = 6$ became $3y = 6$. Much muddled algebra was seen and candidates are still often resorting to a numerical approach.

Question 13

A substantial proportion of candidates answered part (a) successfully. There were many wrong methods, most of them involving 11 (6 + 5), notably 24.54 $\left(\frac{54\times5}{11}\right)$, which appeared frequently. Methods such as this, which included in the working either 54×5 or $54\div6$, even if accompanied by incorrect operations, scored 1 mark out of 2, as did $54\div6$ or 9 on its own. Regular wrong answers which received no credit included 29.45 $\left(\frac{54\times6}{11}\right)$, 4.9 $\left(\frac{54}{11}\right)$, 10.8 $\left(\frac{54}{5}\right)$ and 594 (54 × 11).

In part (b), a minority realised that that the given lengths had to be expressed in the same units. Some of these went on to gain full marks, while others converted incorrectly, 54 m frequently becoming 540 cm. Of the majority who ignored units but demonstrated some knowledge, many scored 1 mark out of 3 either for 36 : 54 (or an equivalent ratio, often 1 : 1.5) or for $\frac{54}{36}$ (or 1.5). A noticeable number of candidates either added 54 and 36 or subtracted; the latter often gave rise to a final answer of 1 : 8, following from 18 in their working, when candidates did not fully understand ratio notation.

Question 14

A fair number of candidates worked out the correct value of *A* in the first part but a much larger number scored 1 mark, which could be gained in two ways. These were an acceptable substitution, such as $2 \times -3^2 + 4 \times -3$, or the accurate evaluation of one of the terms, usually the second term as −12. The first term was frequently incorrectly evaluated as −18, as a consequence of which −30 was by far the most popular wrong answer.

In the second part, most of those candidates who understood what they had to find started by substituting the values of *A* and *x* in the equation. 1 mark out of the 3 available was awarded for $38 = 2 \times 4^2 + 4k$. The final term was sometimes wrongly written as $4 + k$. Some then evaluated the first term as 64 $[(2 \times 4)^2]$ but a significant proportion of candidates obtained a correct equation and solved it to find the value of *k*. A variety of methods was used. Many used formal algebra, while others used arithmetic, inspection or trial approaches, all of which were acceptable.

Many candidates, though, made no inroads into either part of this question.

Question 15

This question proved to be beyond many candidates and it was not unusual to see all three parts unattempted. Even part (a) elicited a range of wrong answers, a high proportion of candidates believing that they had to divide the 125. Consequently, 31.25 (125 ÷ 4) was a popular answer and 62.5 (125 ÷ 2) also appeared regularly.

The candidates who answered part (b) correctly generally used 4 × 3.5 but some used 5 × 3.5 − 3.5. The most common wrong lengths of *CR* were 11.5 (12 + 3 − 3.5), 12 (equal to *AP*) and 12.5 (12 + 3.5 − 3).

In part (c), 4.75 (19 ÷ 4) appeared as the answer more frequently than 3.8, the correct one, possibly because candidates had used the multiplier 4 in the previous part and took it to be the scale factor of the enlargement. 9.5 (19 ÷ 2) also had some support.

In both parts, 3 was sometimes used as the scale factor. In parts (b) and (c), it was not unusual for candidates to use a multiplier method in one part and an 'adding' method in the other. Various creative attempts to apply Pythagoras' theorem were seen and measuring was quite a popular choice of method.

Question 16

In the first two parts, the value of the expression was often given. This received no credit. In part (b), 3^{13} $\left(3^{9+4}\right)$ was another common wrong answer.

In part (c), a small minority of candidates found the correct value of *n*, usually by inspection but occasionally by constructing an equation. The majority, however, could not manipulate the indices and gained no credit on this question. A correct first step of $\frac{5^n}{5^{10}} = 5^3$ could lead to a range of wrong answers, the most popular ones being 7 (10 − 3) and 30 (10 × 3), with some support also for −7 (3 − 10).

Question 17

A large number of candidates successfully used Pythagoras' Theorem to find the length of the hypotenuse. Many scored 1 mark out of 3 for squaring the lengths of the sides and adding the results. An appreciable number displayed a muddled understanding of the theorem; they failed to square the sides before adding, or multiplied the sides, and division by 2 was seen instead of square rooting. The rest employed various doomed strategies. Some simply added the given lengths (9.3 cm). Others found the area of the triangle (10.36 cm^2) or tried to use trigonometry, mainly tangents.

Question 18

Many candidates were unable to attempt this question and some of the regular answers, such as 21, 24, 28 and 28, 56, 84, which were given suggested little grasp of the problem. Some candidates did, however, find the three correct positive whole numbers 1, 3, 8, while others scored 1 mark out of 2 for three positive whole numbers which had either a mean of 4 or a range of 7, more often the former. 1 mark was also awarded for 0, 5, 7.

Question 19

Many candidates were unable to attempt this question and very few candidates showed the correct region. Some candidates scored one mark for either the lines $x = 5$ and $y = 3$ or, less often, for the line $y = x$. The examiners' interpretation of 'line' was generous, two of the boundary lines of a rectangle, for example, being accepted, the other boundary lines being ignored. One common error was confusion between the lines $x = 5$ and $y = 5$ and between the lines $y = 3$ and $x = 3$. Another was drawing the line $y = x$ as a diagonal of the grid, that is, from the origin to the point (8, 6). Answers often included a line joining the points (5, 0) and (0, 3).

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

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com

Order Code UG032629 Summer 2012

For more information on Edexcel qualifications, please visit
www.edexcel.com/quals

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

cea
Rewarding Learning