Examiners' Report/
Principal Examiner Feedback

Summer 2012

International GCSE Mathematics
(4MA0) Paper 2F

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

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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 2F

With a considerable increase in the size of entry at foundation level, it was clear from many responses that candidates were unaware of many of the requirements associated with questions set on International GCSE papers. A typical example of this was decimal treatments of fractions, which always receive no credit (Q20).

Overall the paper was deemed accessible, with an appropriate mix of questions catering for a broad range of abilities. Probably the biggest source of unnecessary lost marks centred around joining this exam without appropriate geometrical equipment (Q12) or choosing wrong terminology to describe transformations (Q15) or angle theorems (Q10). It is also worth bearing in mind that as an international paper, references to imperial units will not be used. In question 4 too many candidates forfeited marks by offering responses such as “pounds” and “feet” for units of weight and height.

Report on Individual Questions

Question 1

In part (a) a majority of candidates correctly judged the fraction of the shape that was shaded to be 3/12. Some lost half their marks by failing to simplify this to ¼, or making an error in cancelling down. A follow through was allowed in converting their (wrong) fraction to a decimal but this was rarely needed.

Both components of part (b) proved accessible and a majority gained full marks.

Question 2

In part (a) an overwhelming majority of candidates chose the appropriate word to describe the outcome of the spinner landing on green, red or a letter beginning with b.

In part (b) candidates usually scored either two or zero. It was anticipated that identifying the position of B would be easier than deciding on the position of Y, as a more sophisticated positional judgement was required for the latter, but in many cases B ended up in a random position.

Question 3

The use of the word 'both' in the wording of the question led most candidates to select two numbers in each part of this question. Generally the question was well answered. In part (c) some did not recognise 2 as a prime number and substituted in another value (usually 9).

Question 4

A number of candidates scored no marks by failing to select an appropriate <u>metric</u> unit. Therefore 'pounds' and 'feet' were common incorrect answers offered in parts (ii) and (iii) and these responses scored no marks. Abbreviations for the correct answers were accepted.

Question 5

Parts (a) and (b) were well answered and many went on to correctly identify the position of S. A cross, dot or even the correct rhombus was sufficient to gain this mark in part (c). The area of the rhombus defeated many. A common error was to multiply two lengths QP and QR together, and reach an answer of 10.24 (from 3.2 x 3.2). No credit was given to candidates who produced the wrong shape in part (c) and worked out the area of their wrong shape. The mark scheme was fairly generous in that any value from 5 to 7 inclusive (or 8) was assumed to have come from either an educated guess, or through counting squares, and was awarded one mark. Part (e) was very poorly done. Most candidates had no idea that an algebraic equation was required and what form it should take.

Question 6

In part (a)(i) any description of a prism was accepted even if the cross-section was incorrectly described (e.g. hexagonal prism). Part (b) presented the biggest hurdle on this question and was the source of most lost marks.

Question 7

Careful students produced all six factors of 20. Others lost marks by omitting some factors (usually 1 or 20) or occasionally adding non factors to their list. It was relatively easy to gain one mark by writing down two or more factors with no errors.

Question 8

Part (a) proved accessible to the majority and it was pleasing to see a relatively high success rate for part (b). The concept that multiplying by two will always produce an even result was the idea behind awarding marks. Therefore responses such as “all the numbers in the list are odd”, or “there are no even numbers”, without further incorrect elaboration gained the available mark. Weaker candidates referred back to part (a) in their comments and suggested that changing the 4 to a 5 would result in the wrong answer, (i.e. 35 not 34).

Question 9

This was a well answered question. In a minority of cases candidates missed off adding the cost of the lemonade (and scored no marks). Misreads in mistaking the number of cinema tickets (other than 1) gained the two method marks and lost the accuracy mark. Some candidates lost two marks by failing to subtract the total from $30 to find the change.

Question 10

It was anticipated that part (a) would score highly. Weaker candidates lost marks by attempting to measure angle x or giving inadequate reasons for it being 62°. Responses such as ‘it’s on the other side of the X’ or ‘it’s a mirror angle’, was deemed insufficient. ‘Opposite angles’ was the minimum requirement. In part (c) the number of various steps required, (calculating x and y correctly, subtracting this from 180 and then subtracting again from 360) defeated most.

Question 11

In part (a)(ii) truncating rather than rounding to 2 decimal places led to regular incorrect answers of 8.46 Both components of part (b) were more demanding. In part (b)(i) common mistakes were to cube 30 or take the *square* root. In rounding from the correct answer of 3.10723 . . . many chose to round to 2 decimal places rather than 2 significant figures.

Question 12

Evidence of construction by drawing arcs was the minimum requirement to gain any marks. Hence triangles of an accurate size with no construction arcs scored zero. Many candidates forfeited two marks by not possessing the correct geometrical equipment. One mark was to be gained for an arc of 4 cms from A or an arc of 10 cms from B. As a consequence some diagrams which did not address constructing a triangle at all, gained half marks.

Question 13

All parts, with the exception of part (b)(iii) scored well. In part (b)(i) the removal of the multiplication signs was all that was required. In part (b)(ii) gathering up the terms fully to reach $8m$ gained the available mark, though some inexplicably left their answer as $10m - 2m$. Part (b)(iii) defeated most, answers of a^6 or $2a^6$ or a^9 were the most common incorrect answers.

Question 14

This proved to be a good question in discriminating candidates. The more able students saw that the ratios were directly linked to the angles in part (a)(i), though many left their answers either unsimplified (e.g. 60:90) or partially simplified (e.g. 6:9). A common approach in part (a)(ii) was to pursue a step method. Jumping from 50° to 160° required 3 steps of 50° (3 x 0.7 = 2.1) and then something extra to bring it to 160°. Weaker candidates often added 0.1 onto 2.1 (presumably from 10°) and scored one mark from the three available. In part (b) an occasional mistake was to multiply 1.2/4 by 100 rather than 360. Just attempting 4 ÷ 1.2 was a more common calculation seen but was not enough to score.

Question 15

Some candidates failed to spot shapes P and Q were triangles with a stem (a flag) and treated the question as a transformation of triangles. No penalty was incurred for this. Therefore in part (a) a rotation of 90° about (1, 1) gained full marks (treating P and Q as triangles) as an alternative to the more popular transformation of a reflection in the line x = 1, (treating P and Q as flags). Most candidates lost all the available marks by either using the wrong terminology ("shape P is *flipped* onto shape Q") or stating non-single transformations (it's a reflection and moved to the left by 4 units). Flags and triangles were dealt with in a similar way in part (b). A triangle or a flag in the correct position gained full marks. A correct triangle or flag in the wrong position but facing the correct way gained one mark. Part (b) was a better source of marks than part (a).

Question 16

At foundation level this question proved to be a challenge. The more able candidates who were able to spot the correct method usually went on to score all 4 marks. Many candidates simply chose to find the mean average of 18 and 16.5 (17.25) and scored no marks for this incorrect method. The distribution of marks awarded was typically either 4 marks for a fully correct method or (more usually) zero marks.

Question 17

The first three parts all scored very well. In a minority of cases weaker candidates missed out the horizontal line running from (1400, 39) to (1600, 39) (presumably because Bhavik was not moving) or drawing a diagonal from (1400, 39) to (1715, 0) (presumably for the same reason). Times were required to be written in the same (24 hour) clock notation as the horizontal axis, or pm stated with 12 hour clock notation to gain full marks. Part (d) proved the most demanding element of the question. A numerator of 39 (km) was required as a starting point to gain any marks. Some latitude was given over the choice of denominator to pick up method marks.

Question 18

This question was a good source of full marks by a majority of the candidates. More astute candidates played safe and wrote down the numerator (7.92) and denominator (1.65) to safeguard some credit if their final answer was wrong.

Question 19

Most candidates gained some marks in both parts (a) and (b) by either obtaining three terms with correct signs or four termswith ignoring positive and negative signs. Gathering up terms correctly proved to be a more demanding process and many failed to deal effectively with the expansion of the second bracket in part (a).

Question 20

It was clear in both parts to this question that many candidates lacked the experience of past papers in dealing with fraction manipulations without the use of a calculator. Many resorted to a decimal treatment and this work always gains no credit. In part (a) the most successful attempts involved inverting the second fraction and changing division to multiplication. Then either cancelling had to be shown to have taken place, or the numerators and denominators had to be multiplied out to reach an improper fraction equivalent to 1 5/7.

In part (b) candidates who knew how to proceed by the conventional route of starting with two improper fractions often went on to gain all three marks. Unconventional methods were catered for in the mark scheme.

Question 21

The orientation of the triangle caused some problems with some opting to use sine rather than tangent. In a minority of cases multiplying by 34 caused some candidates to end up calculating tan (72 x 34). Incorrect rounding was not penalised provided a decimal number rounding to 105 was seen in the body of the script.

Question 22

An algebraic treatment was required to gain any marks. In practical terms this meant reducing the system to one equation and one unknown. Many failed to spot the simplest method was to subtract the given equations to reach 2a = – 4. In very rare cases the correct answers were obtained either by inspection or trial and error and this gained no credit.

Question 23

This was a well answered question in that most candidates gained at least two marks by either a factor tree method or a division ladder. Fully correct factor trees or division ladders (with or without 1's) secured two of the three marks available. In all cases factors were required to multiply to reach 300 to gain any credit.

Question 24

Answers which resulted from extra numerical processes on 67 were not penalised. This was to take into account the numerous attempts (correctly or incorrectly) to find the mean average. Multiplying incorrectly by zero in the fourth interval (eg 7 x 0 = 7) resulted in one method mark and the accuracy mark being withheld.

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