OCR
RECOGNISING ACHIEVEMENT

GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education **J926**

Examiners' Reports

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J926/R/11J

Oxford Cambridge and RSA Examinations

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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Methods in Mathematics (Pilot) (J926)

EXAMINERS' REPORTS

Chief Examiner's Report

This was the first occasion when centres were able to enter candidates for this 'linked pair' GCSE and only paper 1 was available. Not surprisingly, only a few centres entered candidates, with the majority opting for Methods in mathematics rather than Applications of mathematics. One centre entered both. Performance on the papers varied from centre to centre and some candidates appeared not to have covered all of the topics in the relevant specification.

It is recognised that the methods papers were a little light on 'low demand' questions and the applications papers a little light on 'high demand' questions. This was taken into account when grade boundaries were set at the award.

All papers included at least one question assessing the quality of written communication. In this session, most of the QWC questions focused on presenting solutions in a clear, structured manner. A key reason for candidates not scoring full marks was their failure to state clearly what their calculations represented. (eg in 381/02 Q2d stating hardcore A alongside £111.15 and in 391/02 Q7 stating volume alongside 1200 (with units)). Candidates should not assume that the provision of lines (eg 391/01 Q5) implies that these lines need to be filled with words. The lines were provided in some of the QWC questions in order to help candidates present their work clearly.

All papers included questions which expected candidates to be able to interpret and analyse problems and either use mathematical reasoning to solve them (methods) or generate strategies to solve them (applications). Candidates did not find it easy to interpret problems and even questions where the content demand was relatively low, (eg 391/01 Q5 and 381/01 Q9bii)were not well answered. Questions involving solutions of number problems (eg 391/01 Q9 and 381/01 Q6) were generally more successfully answered.

Candidates will undoubtedly benefit from greater exposure to these new style questions and past papers from this and other specifications provide a rich source of examples. It may be profitable for students to work together and to assess their work using the marking guidelines.

The methods papers included questions which required candidates to understand and use Venn diagrams and set notation, topics which have not been included at GCSE level for a number of years. Candidates generally understood the use of Venn diagrams but they were less secure in using the associated set notation.

B391/01 Foundation Tier

General Comments

This was the first sitting of this new Methods in Mathematics GCSE with a fairly small number of candidates entered. Candidates did not appear to be as well prepared for this paper as for previous foundation level papers, although it is hard to draw conclusions from such a small entry. No doubt centres were exploring how best to enter their candidature, and may have used this paper as a trial run. Most candidates gained few marks from the second half of the paper.

A question of written communication, (QWC), was included for the first time. When it comes to QWC at this level, candidates will be expected to communicate via sums, brief verbal descriptions or simple algebra – their aim should be to make clear what they have done, and the outcome. Some questions may involve interpretations of data or explanations of geometry, and these will require a more verbal response.

Teachers may find it helpful to know that questions 1, 3, 4, 7 and 11 contained elements of AO2 and questions 2, 4, 9 and 10 contained elements of AO3. The new assessment criteria has meant that more questions require candidates to think about a problem rather than use simple recall.

Comments on Individual Questions

1 Most candidates were able to score some marks on this low level question on large numbers, with part (d) causing the most problems. This final part did demonstrate that some candidates had real problems with a basic sense of large numbers, with some suggesting that thousands of ordinary lorries would be needed to carry the same load as the specialist lorry.

2 Although this question was a good differentiator between candidates, it was to be hoped that knowledge of basic angle vocabulary, and the ability to estimate the size of angles would have caused fewer problems. Some candidates were able to gain a follow through mark for part (b)(ii) for at least realising that if Douglas turned in the opposite direction, he would have to turn through (360 – 'his original angle')º

3 Venn diagrams have not been a part of GCSE Mathematics in recent years, but centres can expect to find this topic approached in a variety of ways. Questions can be about the placement of set members (as here), or of the number of members of sets. They can also encompass probability questions. For this question, candidates answered part (a) very well, but few were able to understand or recall the notation used in parts (b) and (c). Some appeared to recognise the notation 'R U C', but gave inadequate descriptions. 'Romance and crime' did not score.

4 This question on probability words and on probabilities totalling 1 again produced a good spread of marks. Candidates had to think through the situation slightly more than in similar questions from older style examinations, but many rose well to this challenge. As expected, candidates found part (d) the most difficult part.

5 This question was the one that assessed quality of written communication, QWC, (as identified by the asterisk). Almost half of candidates were unable to gain any marks on what was typical of the sort of question that has been set previously as a multi-step problem. Good answers often showed some experimentation, but as long as candidates showed the necessary sums and totals, they gained full marks on this occasion. Some

candidates could not find a way into the problem and assumed that the presence of lines meant that they had to write extensive verbal answers. These descriptions were more to do with carpentry than mathematics.

6 This was yet another good discriminator. Part marks could be gained in each part if candidates could correctly order 3 of the four decimals or fractions. Despite this being the type of low level question that has often occurred in previous GCSE papers, almost half of candidates were unable to score more than 1 out of 4.

7 Giving the coordinates for part (a) was something that was generally well done. Parts (b) and, especially, (c) were less well answered. Some candidates drew lines parallel to AB that did not go through C; others simply went for drawing a horizontal line.

8 This question was poorly answered except by the strongest candidates with many struggling to interpret the problem. A common approach was to focus on the perimeter resulting in incorrect answers such as 40 by 30 for the rectangle. A few candidates were able to pick up a follow through mark in (b)(ii), by using whatever they had given in part (i) as the side of their square.

9 Part (a) was answered correctly by the majority of candidates, but part (b) was beyond the capabilities of weaker candidates. Some candidates gained a mark by satisfying one of the two criteria.

10 Stronger candidates were able to gain some or all marks here. Candidates should be encouraged to use the correct notational conventions for multiplying and dividing within expressions. It was not uncommon for candidates to be let down by their inability to do the arithmetic in part (b), where their answers would sometimes be out by a factor of 10. The fact that virtually no candidates had cancelled down the problem to leave $40 \times 50 \div 100$ might reflect upon a weakness in the development of a variety of approaches to tackling mental arithmetic.

11 This was another fairly traditional style of question that almost half of candidates were unable to tackle. The commonest mistake amongst those who did gain marks was to give y values of 5 and 7 – maybe spotting the x coefficient, 2 and jumping to an over-hasty conclusion.

12 Some candidates were confused by the phrase 'positive difference' and omitted zero values entirely. Weaker candidates sometimes appeared to be randomly placing numbers in the table, or only inserted a few entries. Part (b)(i) caused the most problems. Some candidates still fail to use the correct notation when giving probabilities.

13 Only the strongest candidates gained marks here, and very few gained above 2 marks – these were usually for 'reflection' in part (a), but with no line given; then for an enlargement, scale factor 3, drawn without any reference to the centre at (6, 2).

14 More able candidates could often multiply out a bracket, but confused their signs in part (a). One would have expected (b)(ii) to be a source of marks as another frequently assessed topic. However the majority of candidates could not correctly use index laws.

B391/02 Higher Tier

General Comments

The paper differentiated well, and was challenging. Consideration should be given to entering candidates later in their course as preparation on some topics seemed somewhat very limited.

On this non-calculator paper, basic arithmetic let many candidates down. The inability of many candidates to do the basic 4 operations led to fairly substantial loss of marks.

Parts of Questions 3, 5, 7 and 10 required candidates to interpret and analyse problems and use mathematical reasoning (AO3). These parts were not well answered. It is hoped that centres and candidates will get more used to these types of problems and candidates will become less thrown by novel contexts.

It should be pointed out that probability is the only aspect of data handling covered by the Methods specification and hence it is almost certainly going to be tested at each session. Since conditional probability is included and this is a non-calculator paper, practice in 'cancelling' fractions in multiplication of probabilities would make the arithmetic easier for candidates.

Comments on Individual Questions

1 The sample space in part (a) was well done by many candidates but many others found this basic skill too difficult. Many made errors and a significant number omitted the whole of part (a) or only filled in some of the boxes. Those who made a reasonable attempt at the sample space were often able to pick up some marks on the later parts. In part (b)(ii) some candidates appeared to gain the marks somewhat fortuitously as the answer ½ appeared after poor answers to part (a).

2 Most had some idea of how to fill in a Venn diagram but many errors were made, 1 often appeared in the wrong region as did 3, 4, 6 and 9. It appeared that the notation n(set) was not known by many candidates as many answers appeared to have no connection with their diagram. Candidates often listed the set instead of giving the number of members. Weaker candidates seemed not to know the notation $A \cap B$.

3 In part (b) many drew a 3 times enlargement but very few used the centre correctly. Many used (6, 2) as a vertex of the image. In part (b) the better candidates realised that the x coordinate of the centre of rotation was 3 but most could not state the correct mirror line.

4 In part (a), only better candidates recognised that a sample of 10 was insufficient to estimate probability. In part (b)(i) many candidates were able to give 9/200 although some gave simply 9. In part (b)(ii) many gained partial credit for 1/5 but only the best candidates knew to square 1/5 to get the answer.

5 Part (a) was answered quite well although some candidates added the numerators and denominators. Better candidates did (b) well but middle and low ability candidates often did not know what to do. Some candidates lost a mark for not completing their counter-example.

6 In part (a), most gained one mark for making a fair attempt at expanding the brackets but many produced + 10 instead of -10. Even those who did get -10 often failed to simplify the expression.

Some candidates treated it as an equation and managed a 'solution' for x. Most better candidates got (b)(i) right but most weaker candidates gave $x5$. Part (b)(ii) was done better although some coped with the multiplication but not the division. A number multiplied and divided the indices. In part (c), many candidates had no idea what was meant by factorisation. Of those who did, many only extracted the factor 2 not the 4 in part (i) and a number only factorised partially in part (ii). Some candidates tried factorising into two brackets despite this not being in the specification for this unit.

7 This was the QWC question on the paper, indicated by the asterisk, and candidates were expected to set out the work logically and to make it clear what they were doing. Thus the correct answer did not necessarily gain full marks. A number worked out 20 × 10 × 6 and 40 × 20 but did not identify these as the volume of the block and area of the base of the tank. Many made no further progress, often subtracting 800 from 1200 despite the different units. The calculation 1200 ÷ 800 was very rarely seen.

8 Many established the angle x as 40° but many failed to state 'angles in a semi circle and even fewer stated 'angles in the alternate segment'.

9 In part (a) most candidates were successful. The normal valid method for part (b) was to write the numbers as ordinary numbers and subtract but unfortunately the subtraction totally defeated most and some of those who were successful forgot to convert back to standard form. Only a handful of candidates changed the numbers to the same power of 10 (e.g. 143 × 107). Most candidates seemed to miss the word estimate and tried to use 2.998 × 105 instead of 3 × 105. Only a small number recognised that a division was required.

10 The best candidates answered well, usually by drawing vector triangles. Some made sign errors but gained partial credit. Many simply wrote down column vectors for p and q.

11 Most candidates seemed ill prepared for a surd question. Some gained a mark for $(\sqrt{3})^2 = 3$ but many gave 9 or left $\sqrt{9}$. Only a handful of candidates attempted to use the expansion of two brackets for $(2 + \sqrt{3})^2$ with even the better candidates thinking this was 4 + 3.

12 In part (a), very few candidates identified the equations $9x + 3y = 10$ and $3x + y = 7$ as the two with the same gradient and even fewer were able to state the gradients. Some good candidates stated the gradient of each as $-3x$ and on this occasion this was condoned. In part (b) the equations $y = 2x - 5$ and $2y + x = 3$ were very rarely identified as the two perpendicular lines. Those good enough to do so often got the explanation correct.

13 Quite a large number of candidates started correctly with $\frac{13}{52} \times \frac{12}{51}$ but the arithmetic defeated them. This was mainly because the candidates failed to do any 'cancelling' before attempting the multiplication which would have saved them a lot of work. A number added the probabilities. Nevertheless a significant number of the better candidates did this correctly and it was the best done of the last three questions.

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