OCR
RECOGNISING ACHIEVEMENT

GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education **J926**

OCR Report to Centres

January 2012

J926/R/12J

Oxford Cambridge and RSA Examinations

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General Certificate of Secondary Education

Methods in Mathematics (Pilot) (J926)

OCR REPORT TO CENTRES

Overview

There was a significant increase in entry for all papers from January 2011 and, for most papers, a similar entry to June 2011. The vast majority of candidates were appropriately entered although, particularly for Methods 1, examiners considered that Foundation rather than Higher would have been a better route for some candidates. A good spread of performance was seen on all papers, with marks on the Methods papers being slightly higher than those seen on the Applications papers.

Working was evident in most candidates' responses. Many, in both tiers, made an effort to show logical progression in their work but for many others working was in the form of rough jottings rather than organised presentation. For some questions particularly those requiring an explanation ruled lines are provided. Many candidates assume that this means they must write a paragraph of continuous text whereas they would be better advised to set out their reasons point by point. This was particularly evident in the methods questions involving angle proofs and congruency.

A range of questions addressed the quality of written communication (QWC). Examiners reported some improvement in the quality of communication in questions which focused on explaining how a solution had been reached. However in other questions weaknesses were evident in following mathematical conventions, particularly the use of brackets.
The reports on the individual papers reflect on questions where candidates appeared not to have met the topic. Across the linked pair, they included non-calculator calculations, relative frequency, tessellations, vectors and histograms and not all of these are harder topics for the tier.

Candidates responded well where there was a gradual progression of difficulty within a question and where various topics were assessed within the same context. There was certainly no evidence that candidates were less inclined to tackle later parts of questions.

Some questions specifically assessed the use of mathematical terms, as required by the specification, and a significant number of candidates appeared unfamiliar with terms for algebraic statements and for the parts of a circle. Many questions required explanations and responses often lacked clarity and omitted to refer to information provided or calculated. Questions involving estimation were generally not well answered. When estimating answers to calculations many tried to work out the calculation and then round the final answer rather than rounding their original figures.

There was a wide spread of performance on the various problem solving questions. Candidates generally performed better on questions clearly involving number calculations such as the Christmas cards question. However there was a tendency for some candidates to use an informal method, find an incorrect solution, fail to check back with the original data and then not be eligible for any method marks.

Overall the results are encouraging. For all papers performance was reasonably close to the forecasts at most thresholds. To improve standards further Centres are encouraged to focus on the aspects raised in this report.

B391/01 Foundation Tier

General Comments

This second January sitting of the new pilot specification paper produced a good spread of results covering a wide range of marks, but with fewer marks near to the high end of the range than in the previous summer sitting. The average achievement was just under, but close to, half marks. There were fewer candidates who scored very low marks than in summer. Amongst entries at the top end of the ability range there were no candidates who should obviously have been entered at the higher level instead. Overall the paper seemed to differentiate well with the number and angles questions being very well attempted and the most problems appearing to have been caused by the topics of relative frequency and algebra.

There appeared to be sufficient time for candidates to attempt the whole paper.

Comments on Individual Questions

1 This question was generally well answered. Most candidates had part (a) correct, with the most common error being 315. Part (b) was answered well with a large majority achieving success from a number of different methods. In part (c) a majority of the candidates scored 2 marks, with a few earning 1 mark for an indication of correct method used. Candidates not earning the marks in part (c) quite often had the digit 2 in the tenths column.

2 Part (a) was answered well, with a large majority of the candidates earning the mark. Some stopped at simplifying to $\frac{6}{10}$. In part (b) more than half the candidates earned 0 marks and a large majority showed no evidence of working. A common error was putting the fractions in order of numerator. 1 mark was scored by a small minority for showing two equivalent fractions, usually $\frac{12}{20} = \frac{6}{10}$ or ($\frac{40}{50} = \frac{4}{5}$ and $\frac{12}{20} = \frac{3}{5}$), but very few attempted to express all three fractions with a common denominator.

3 A very large majority earned both marks in part (a) and approximately half of those that did not earned one mark for having a quadrilateral to the left of the mirror line with three of the points correct. In part (b) a majority scored 2 marks and very few did not earn at least 1 mark. It was very common for one mark to be earned for the outer triangle shaded or the inner triangles shaded, but most candidates who did not earn the 2 marks seemed to go wrong when they tried to do one half lengthways of the arms or when they tried to overcomplicate the shading.

4 In part (a) a large majority of candidates earned both marks, with the method usually being given. A few made arithmetic errors, but earned the one mark for the method. Part (b) was a question where QWC (quality of written communication) was assessed and a majority of candidates attempted to use the lines provided for explanation, but in many cases just the calculations involved were presented, so the two marks for 62^{o} were earned and not the reasoning marks. Just over a third of candidates earned no marks, and then there was a fairly even distribution of the marks one to four being scored. Many candidates struggled with the notation of naming angles, and for those it was useful that the 28^{o} was quite often marked on the diagram. For the candidates scoring three marks, it was usually the reason that "opposite angles are equal" that was missing. This question part discriminated well, with the higher ability candidates usually scoring higher. Some weaker candidates earned just the one mark for stating the reason that the angles in a triangle sum to 180^{o}.

5 This question was generally well answered. In part (a)(i) a large majority of candidates earned the one mark. Common errors were 310.2, 31.20 and 3.12. Just over half the candidates earned the mark in part (a)(ii), with a variety of wrong answers, of which 3.12 was the most common. In part (b) just over half the candidates earned the two marks, usually for 10 ÷ 1000. A large majority of the other candidates scored one mark for giving the divisor larger than the multiplier. Very few candidates either omitted this question part or did not use the numbers in the given list.

6 Part (a) was well answered, with a very large majority earning at least one mark, and the most common error was to omit 1 and/or 12. Prime factors were given by a number of candidates and this earned them just one mark. Few candidates included extra numbers that are not factors in the answer. In part (b) a large majority of candidates scored zero marks. Many candidates did not show that they knew the meaning of 'multiple' and either chose A, or chose B and then just restated the sentence. Good answers indicated the concept of multiples being infinite, or listed a set of multiples of 12 which was a larger list than the six factors. Some candidates just stated that there are a fixed number of factors, and this was not sufficient to earn a mark. A very small minority of candidates earned one mark for an incomplete reason.

7 This question was very well answered, with almost all candidates earning the mark in part (a) and a very large majority earning the mark in part (b). In part (a) a small number of candidates just wrote a 'Q' over the correct position which was condoned, and the most common error was to plot Q at ($^{-}$4, 2). The most common error in part (b) was to reverse the coordinates, but this did not happen very often.

8 This question had the full range of marks, but with few candidates scoring the full five marks. There were a significant number of 'no responses', particularly in parts (e), (c) and (b). 'Arc' was the term which caused most problems with many drawing compass arcs within the circle. Radius was often confused with diameter in part (a) and segments confused with sectors in part (d). In part (b) a diameter was quite often drawn for the requested chord, and this was condoned for the mark. Part (a) was correctly answered by more than half the candidates, about half answered part (b) correctly, but only a very small minority answered part (c) correctly. A majority of candidates earned the mark in part (d), but well under half scored the mark for 'diameter' in part (e) with no answer being the most common reason for not earning the mark.

9 In part (a) only approximately a quarter of the candidates earned the mark, with good answers indicating that the answer will be the same with the brackets, or without using the brackets. Many candidates stated incorrectly that in BODMAS, addition comes before subtraction anyway. Another common answer was that there was no number outside the brackets so they were not needed or that there was no multiplication or division involved. In part (b) a large majority of candidates scored 2 marks for finding the answers of 6 and 4 correctly and then repeated them using the numbers in a different order along with the answer of 2 which is already given. Errors were made by using numbers other than the 3, 4 and 5 available, multiplying or putting the digits together indicating that the question had not been read carefully. Few candidates managed to find any of the negative results $^-2$, $^-4$ or $^-6$ by using brackets correctly, with very few scoring the full four marks in this part.

10 In part (a) approximately two thirds if the candidates earned the mark, with the most common answer being 35.2 × 55, but with some candidates giving 1936 ÷ 35.2. The most common error in part (a) was to show an estimate of the answer by rounding. Part (b)(i) was answered correctly by a large majority with the most common wrong answer being 3800. In part (b)(ii) only approximately a third had the correct answer where a common error was 3870 and place value was also often not maintained in the rounding. There were fairly few correct answers to part (c) with many candidates attempting to multiply the given values and then give an accurate answer or then try to round that answer. The convention of rounding to significant figures was certainly shown very often. 7744 was a reasonably common answer which did not earn the mark.

11 Most candidates had the correct total in part (a), with the most common error being 25. Parts (b)(i) and (b)(ii) were answered correctly by approximately half the candidates, and candidates with the correct answer to part (b)(i) often had the correct answer to part (b)(ii) as well. A common error in part (b)(i) was to give 25/30 or 23/30. In part (b) some of the weaker candidates just gave the number of toys in the category, or answers that were not probabilities, such as ‘unlikely’. It was a common error in part (b)(iii) for 14 to be given as the numerator, and only a very small minority of candidates had the correct answer in this part.

12 This question was common with the Higher Tier paper and it caused candidates the most problems on the paper, with even the stronger candidates having very low success rates in all parts. The term relative frequency did not seem to be familiar to the majority of candidates. The most common values in the table were 0.8, 0.6, 0.24 and 0.36 or 8, 6 etc. In part (b) very few referred to the sample size in the reason for the answer, commenting instead on the fact that the “values didn’t add up to 1” ,” they are hard decimals to deal with etc” or making comments as to whether the values were likely to be correct for one or more of the categories. Approximately a third of candidates omitted to answer part (b) and this was by far the highest omission rate on the paper. Of the very small minority of candidates who scored one or two marks in part (c), few did this through using the answer to part (b) with the majority using a ratio method and ‘starting again’ with the problem. In part (c) some confused ‘estimate’ with take a rough guess, misunderstanding the concept. Other errors were to divide 3200 by 80 or take 80 from 3200.

13 This was the other question that was common with the Higher Tier paper and the majority of candidates scored zero marks in both parts. Answers to part (a) showed many misconceptions even for the stronger candidates. The majority of errors arose from candidates combining the number parts with the x parts and so often ended up with $8x – 4 + 3 = 7x$ and $2x + 5 = 7x$. Some candidates tried to treat this expression as if it was an equation. For candidates that achieved some success, it was usually one mark for $8x - 4 + 6x + 15$ with up to one error or for $6x + 15$ given. In part (b) approximately a quarter of the candidates gained some marks. A small number of candidates correctly reached $7x = 1$, but many of them came to a halt there or gave an incorrect final answer. Common errors in the manipulation were to subtract $2x$ from $5x$ and to add 3 to 4. It was clear that many candidates were not familiar with solving linear equations.

14 Nearly half the candidates gained full marks for this question, mainly through trial and error methods. Almost none showed any use of algebra in working out, so candidates were scoring either full marks or no marks apart from a few that had the special case of 4, 8, 15. Many candidates were not checking their answers fulfilled the rules required when incorrect values were given.

B391/02 Higher Tier

General Comments

The paper differentiated well with marks across the whole range. On this non-calculator paper candidates again showed weakness in handling basic calculations. This was particularly evident in the early parts of the paper where it would be expected that grade C and D candidates would be looking to score highly.

All candidates appeared to have sufficient time to complete the paper. Sufficient working was usually shown although in just a few questions answers appeared with no or little coherent working making the award of part marks impossible.

Fortunately the number of very low scores was small but there remain a number of candidates for whom entry at Foundation Tier would be a more rewarding experience.

Comments on Individual Questions

1 In part (a) just under half were able to cope with the division but for many their division technique let them down. 1 mark could have been gained despite having the decimal point in the wrong place or by changing the division to 294 ÷ 14 and some were able to achieve this.

In part (b) there were two common errors: sign errors in dealing with $5(-2)^2$ and more often multiplying 5 by -2 before squaring.

2 In part (a), although over half realised there was just 1 plane of symmetry, a wide variety of answers were given by other candidates.

In part (b)(i) most found some of the areas but only a minority coped with all 5 faces and the arithmetic required. A common error was not halving for the triangular faces and weaker candidates sometimes calculated the volume.

In part (b)(ii) the majority knew that it was necessary to multiply their area by 0.02 but here too the arithmetic proved too difficult for some.

3 Although many candidates gained full marks for part (a), the arithmetic again defeated a considerable number. Weaker candidates seemed unaware of what relative frequency was and a number divided by 100 instead of 200. Very few candidates referred to the number of trials in their answer to part (b). Part (c) could be answered either from the original data or using the relative frequency from part (a) and the majority of the successful candidates used the original data.

4 In part (a) a considerable minority multiplied both the numerator and the denominator and most candidates were successful in their initial multiplication but some made errors in converting to a mixed number in its lowest terms. A number seemed not to notice this instruction. In part (a) there was a fairly even split in the number doing both calculations in one step with a single common denominator and those doing the calculation in two steps. Candidates were successful with both methods but here too numerical errors and errors in converting to the mixed number in its lowest terms were common. It is comforting to note that fewer candidates are simply adding and subtracting denominators and adding and subtracting numerators.

5 A large majority were able to gain full marks with this AO3 question but it was usually through an instinctive grasping of the correct answer rather than any formal method either numerical or algebraic. This made the awarding of any method marks extremely rare and candidates stood or fell by their answers. A significant number reversed the first two answers.

6 In part (a) a large majority gained the correct answer although $8p^7$ was relatively common. Fewer could gain full marks in part (a)(ii) but nevertheless most were able to gain part marks. Many, however, having multiplied the brackets out correctly made errors (often in signs) in combining the terms.

In part (b) the majority were able to get part marks but many made errors, usually of sign, in isolating the *x* terms and the numbers and a significant number could not progress from $7x = 1$ to $x = \frac{1}{7}$.

7 Venn Diagrams are one of the distinctive topics on this specification and candidates are still somewhat uneasy with them. This, together with the fact that this was a question which required thought rather than routine filling in of subsets meant that scores were fairly low on this question. Nevertheless a minority of candidates were able to achieve at least one of the correct answers. Few valid trials were seen on the Venn diagrams other than the ones providing the correct answers.

8 A very large majority were able to gain some marks on this question and most scored at least 2. Just a few seemed to be choosing randomly.

9 The majority of candidates tried to perform some form of division to do this question. Unfortunately numerical errors often led to the wrong conclusions. In part (b), if they were trying to explain using their divisions they needed to get to the recurring stage which proved too difficult for most, some even dividing the wrong way. Incorrect statements like ‘the denominators are odd’ were fairly common. Just a few knew the rules regarding the denominator only having prime factors of 2 and/or 5 or that the denominator was a factor of a power of 10 for the fraction to terminate.

10 Part (a) was very well done with the majority gaining both marks and only a small minority having the values completely out of order. It was usually the fractions that proved to be the problem. The outcome for part (b) was very pleasing as a large majority were able to gain at least 2 marks for the correct order or only one out of order. There was some pleasing surd work done although many seemed to know the order by instinct or possible estimation. $5/\sqrt{5}$ or $\sqrt{5}/2$ were often misplaced.

11 Very few were able to gain full marks for this QWC question. Part marks were sometimes obtained for the correct statements with reasons omitted or for spotting ’opposite angles in a cyclic quadrilateral’ but few were able to make both statements with a reason for each and a conclusion. A few candidates used single letters to denote angles which was acceptable for A, B and C but not for either angle at D. Unfortunately few candidates are aware of what constitutes a formal geometric proof.

12 Although a large majority gained the marks for the correct probabilities for the first selection, only a minority gained the mark for the second selection. This was usually due to putting branches with non zero probability after a first selection of white. This was despite the question clearly stating that no second selection could be made after a first selection of white. The probability calculation in (b) proved beyond almost all. Many multiplied 1/10 by 1/9 or added probabilities which should have been multiplied or vice versa.

13 Very few candidates knew the techniques needed to answer this question. Just a few were able to write $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ but even fewer could proceed to the right answer.

B392/01 Foundation Tier

General Comments

A good spread of performance was seen on this paper and the vast majority of candidates had been appropriately entered. Candidates generally appeared well prepared for the paper and many excellent scripts were seen. Most candidates made a good effort to show their working. This was particularly apparent in Q4 which meant that few candidates dropped marks for poor communication in this question which also assessed QWC. However there was a tendency for candidates to record their working as a series of jottings, sometimes scattered across the working space.

The questions requiring candidates to perform money calculations, fractions and percentages of amounts and to solve simple proportion problems were generally well answered.

A significant number of candidates continued to confuse area and perimeter, evidenced in Q6 and Q7, and volume and surface area or edge lengths, seen in Q12. Many candidates misinterpret fitting one shape into another 2D shape as in Q9a, often just fitting shapes around the edge or performing a calculation involving the two lengths. Candidates continue to be unfamiliar with tessellations with many simply trying to avoid leaving gaps in their pattern in Q7. Candidates were less successful than might have been expected in questions such as 1c, 12 and 13 which involved recall or use of mathematical language and notation.

Candidates were well equipped with rulers and calculator.

Comments on Individual Questions

1 Most candidates were able to complete the first two sequences and to describe the term to term rule for P. Some described the rule incorrectly as ‘add 3’ rather than ‘subtract 3’ and a few appeared to be attempting a position to term rule. Just over half the candidates found or recognised 16 and 25 for sequence R and not all of these gave the correct description ‘square numbers’. Errors included prime numbers, square roots, multiples and descriptions of how they made their sequence.

2 Almost all candidates were able to make a good attempt at the numerical parts of this question and many correctly explained that the largest number needed to be in the middle of layer 1. Candidates were less successful in using algebra in part (c). The majority of candidates expressed the terms in layer 2 as additions but a significant number of candidates who had recorded d + e and e + f in layer 2 then wrote the total in layer 3 as $d + e^2 + f$. Many gave a creditworthy explanation in the final part although they tended not to refer to the algebraic expressions in their previous response.

3 Almost all candidates gave the correct coordinates for the given points and the midpoint of line AB. The majority were then able to find the midpoints of CD and EF. The latter was the least successful as candidates had to calculate the coordinates rather than reading from the grid but most still managed to work out at least one coordinate.

4 Almost all candidates scored at least one mark in this question and over a half scored full marks. Working was usually shown, generally including some reference to the type of card. Some candidates organised their working very clearly but others presented their calculations in a very random fashion.

A common error was not working out how to purchase exactly 36 cards. Candidates presented their alternative solutions clearly usually stating the number of boxes and the total number of cards bought. Some candidates appreciated that exactly 36 cards were required but achieved this by buying full and part boxes. Again, this scored part marks as long as candidates' methods were clear.

5 The first two parts of this question were very well answered. In part (a) a few candidates gave their answer as a fraction. Decimal form is required when questions are set using decimals, and similarly with fractions, unless otherwise stated. On this occasion a part mark was awarded. In part (b) some candidates truncated their answer which was accepted on this occasion but when a solution is an exact decimal the general rule is that this should be the form of the answer. A large majority of candidates gained full marks in (c) but some used decimals or percentages rather than fractions and a few of these found 87% of £400 rather than 87.5%.

6 Most candidates were able to work out the missing lengths and over a half proceeded to find the area of the shape or at least the area of one of the rectangles. A substantial number of candidates worked out the perimeter of the shape and some simply found the product of all the lengths.

7 Only about half of the candidates appeared to recognise the features of a tessellation pattern and the others simply drew more L shapes without any gaps.
In part (b) the majority gave the correct perimeter but again some found the area of the shape so 3 was a common incorrect answer. More able candidates drew the correct enlargement and others worked out that the longer sides were of length 6cm. About half the candidates succeeded in drawing an L shape with perimeter 24cm but not necessarily an enlargement.

8 About three quarters of the candidates correctly found the size of angle a but a substantial number gave 98° having included 34 in the 'sum of angles on a straight line'. More able candidates often recognised that angles a and b were equal and then worked out angle c from using the sum of the angles of a quadrilateral. A substantial number of candidates assumed that angles b and c were equal.

9 In part (a) only about a quarter of candidates worked out that 150 tiles fitted onto the board. Many worked out that 10 tiles would fit along one side and 15 along the other but they generally then gave an answer of 25 or, less frequently, 50. Some found the area of the board but they then generally divided by 2 rather than 4. In part (b) about a half were able to divide their number of tiles using the given ratio. A common error was to divide the total number of tiles by 4 rather than 5.

10 In part (a) a large majority of candidates were able of work out the percentage, often finding 10% then doubling this amount. A substantial number of candidates wrote 10% = £1.75. A few candidates apparently confused 'off' and 'of' and gave an answer of £700.

Only the stronger candidates were generally successful in part (b). Many candidates simply worked out the difference in the lengths. Some candidates worked out 1% of 25cm and then attempted to 'work up' to 4cm. Although users of this method demonstrated sound understanding, errors often arose in their calculations.

11 Most of the candidates correctly completed the table but some simply added on 15 and so when d = 10 gave C = 80. In part (b) almost all candidates recognised that they needed to plot the points and the majority then drew a straight line through the points. In part (c) most candidates showed their working so although less than a half scored full marks many others scored part marks. Some candidates failed to appreciate that to find the cost for Reliable Motors they needed to either read from the graph or substitute in the formula and common errors were to multiply 8 by either 15 or 35. Some failed to work out the cost for 1 day for Harry's Hires, preferring to find the cost for 6 days and then to attempt 8 days but errors often arose. Other errors included stating that the cost for 1 day was £33 and working out the cost for 7 days rather than 8.

12 The majority of candidates worked out 96 and a substantial proportion gave the correct units. Common errors were to add the lengths or to attempt to find the surface area of the cuboid.

13 Very few candidates appreciated what was required in this question. Many seemed confused by the angle notation and often gave answers involving capital letters added together. The requirement to write expressions involving x was ignored and most answers involved answers in a number of degrees.

14 A majority of candidates correctly worked out the two terms in part (a) and a substantial number found the correct number of terms in part (b). More able candidates tended to use a trial and improvement approach substituting in the expression whilst weaker candidates generally listed the terms. Unfortunately errors sometimes arose in the latter method.

15 In part (a) many candidates simply measured the diagram to find the diameter of the circle with just a few of the most able candidates using Pythagoras. In part (b) about a quarter of candidates worked out the circumference but a similar proportion omitted this part. Many of the remaining candidates attempted a calculation involving πr^2, πr or $2\pi d$.

16 Most candidates correctly worked out the height of 10 books, generally by first working out the height of one book. The majority were then able to proceed to part (b) and work out the number of books, with almost all candidates realising that they needed to round down the answer to their division.

17 About a quarter of the candidates worked out that 250 was the biggest number that could be made but only about a half of these used correct mathematical communication. Statements such as 1 × 4 = 5 × 5 = 25 × 10 = 250 did not score full marks. About a third of candidates failed to score in this part, generally because they simply found one number under 100. Some assumed that they could only use an operation once.

B392/02 Higher Tier

General Comments

The majority of candidates coped very well with the paper and there was little evidence that anything other than a significant minority had been entered at an inappropriate level, with very few scoring less than 20 marks. It was clear that sufficient time had been allocated to enable the paper to be completed and there was no evidence that questions towards the end of the paper were not being considered. The higher level questions were tackled well and very few failed to score part marks with the notable exception of question 16(b) which proved to be the least successful question on the paper.

It is apparent that schools are preparing their students effectively and the overall quality of responses was good, displaying a high level of knowledge and understanding of the topics being assessed. There was plenty of evidence that students are being encouraged to show their working as there were few examples of answers with no method shown. A choice of answers was rarely evident and it was unusual for marks to be withheld as a result of multiple responses being offered.

Presentation of work was generally adequate but not outstanding. In particular, responses where candidates were expected to set out their method without any guidance were often less than clear. It would be beneficial if candidates were familiar with the use of technical instruments and "freehand" processes. As all scripts are now scanned it is quite common for responses that have not been erased properly to appear as clearly as the required answer. The residue left by erasers should also be removed during the examination in order to prevent any ambiguity when considering the position of dashes, decimal points, etc. Most candidates appeared to have the appropriate equipment, including calculators.

Two questions required candidates to show good quality written communication (7 and 10(b)). In question 7 it was possible to select appropriate responses from a number of trials and this seemed to make the marks more accessible. However, in question 10(b), candidates were expected to clearly identify, and display, three key elements and this obviously caused more of a problem. Many responses showed some understanding of the problem but lacked the ability to present the argument effectively. This inability to present facts with proper explanations was also evident in question 14 on congruence.

Comments on Individual Questions

1 Responses to the opening question involving percentages showed a very high level of understanding. Both parts (a) and (b) were well answered and mostly correct. There were some candidates in part (a) who went a step too far and subtracted 15% from the original amount to get an answer of £18.36 but this was condoned by isw on the mark scheme. The few incorrect responses in (b) could basically be divided into two groups. There were those who had an understanding of percentages and arrived at a value involving the figures 13 in various forms. Some of these used this as their answer (eg £13 or 13p) while others gave us further (incorrect) processing that included £7.80 and £19.50. Another group failed to grasp the idea of percentages at all and included those who simply subtracted 2 to get £6.52.

As expected, the least successful part of the question was (c), although the majority of candidates understood the method required and coped well enough with the arithmetic to arrive at a correct response. Unsuccessful attempts tended to include either 25/29 or (29 – 25)/100.

2 Most candidates showed a good understanding of sequences and scored highly throughout this question. The very small minority who failed to score in part (b) usually failed to grasp the relevance of the difference of 3 between the terms and gave the formula as $n + 3$.

3 In part (a) most candidates understood the need to use Pythagoras for their explanation and usually went on to score all three marks with only a very small number using the theorem incorrectly. Very few of those who produced a right angled triangle failed to make an attempt at the process. A small minority joined the points A and B before using a ruler to measure the length of 3.6 units and openly stated their use of the accurate drawing provided.

Part (b) was well answered by a large majority of candidates and it was nice to see evidence that they understood the difference between area and circumference.

Only a very small minority gave $\pi \times 8$ or $\pi \times 8^2$ with a similar number failing to offer any response at all.

4 It was encouraging to see so many candidates expanding the brackets correctly in part (a) although some of these were let down by an inability to re-arrange the resulting equation. The simple re-arrangement in (b)(i) caused very few problems but the more difficult problem in (ii) proved to be more challenging. Fractions presented on more than two levels (eg A/½h) should be discouraged.

5 Another generally successful question with a large majority scoring full marks in both parts. Marks lost in part (b) were often as a result of rounding up to 9 rather than truncating to 8.

6 Again a highly successful question. Marks lost in part (a) were rare but usually came as a result of rounding to 28 in (i) and giving an incorrect number of zeros in (ii). Almost everyone seemed to understand the need to cancel both parts of the ratio although a small number gave the answer as a fraction.

7 This was the first question where the quality of written communication was assessed and the number of candidates who were able to express their response correctly was definitely in a minority. However, almost all candidates managed to score at least one mark either for correct trials leading to answers below 200 or for multiplying all the given numbers. Good arithmetic was generally evident but there was often a lack of understanding regarding the use of brackets. Marks were often redeemed by use of a written explanation regarding order of operations.

8 In part (a) it was pleasing to note that candidates were using the rules for angles on parallel lines to form correct equations involving x and y and the majority managed to obtain full marks here. The best responses involved good use of simultaneous equations from angles on a straight line and alternate angles or the simplification of a correct equation in y from the interior angles.

Those who obtained full marks in part (b) displayed a high level of skill in handling some quite difficult fractions (although calculators that are able to perform these functions are quite common now). It was far more often that 4 marks were awarded for the correct use of decimal values throughout the question. The use of a heptagon caused some problems when dividing by 7 but there was a fairly even divide between those using the sum of interior angles and those using 180 – exterior angle. A significant majority used the fact that the triangle containing angle d was isosceles.

9 It was quite surprising to see so few candidates using tangent as a single function with a large majority preferring to use a more complex approach involving sine and cosine rules. A significant number used Pythagoras to find the length of PR (15.6 cm) but many either failed to progress further or made a poor attempt at trigonometry (usually sine rule with 90° as one of their angles). The best candidates presented their work well and made their method clear but many lost marks due to a failure to use the correct degree of accuracy in their final answer. This was a very straightforward question testing basic trigonometry but many responses were far too complex resulting in conceptual and arithmetic errors.

10 The better candidates clearly understood the need to use algebraic methods in their proofs but there was still a significant number who simply gave a numeric example and consequently failed to score. Part (a) was more successful as there was less of a requirement to identify the separate workings for the square and the rectangle. It was pleasing to note that there was little confusion between area and perimeter and that many students were able to correctly expand the brackets created when giving the area of the rectangle in part (b).

11 A simple selection of words from a list caused few problems in parts (a) and (b) as the majority of candidates could identify an equation and an expression. However, part (c) caused far more problems and only a very small minority managed to give “identity” as their response. There was certainly a greater element of guesswork in this response.

12 Overall, a highly successful question that clearly differentiated across all levels of ability. Very few candidates failed to score at all and the expansion of double brackets in part (a) produced some very good results. The majority understood the need to multiply the terms in the brackets and the most common errors were either to add “unlike” terms when simplifying or to combine the $^{-}2$ and +1 to obtain $^{-}1$ at the end of their expansion. Part (b), although seemingly less complex, produced a very low number of completely factorised responses with the majority of candidates scoring one mark for partial factorisation – usually $2(x^2 – 4)$.

In part (c) it appeared that more candidates preferred to use the formula rather than to factorise. Problems with substitution in the former method generally arose from an inability to cope with $^{-}7$ as the coefficient of x. Many calculations started with $^{-}7$ instead of 7 with correct “follow through” work leading to answers of $^{-}3$ and $^{-}0.5$. The other common error arose from an inability to process $(^{-}7)^2$ properly. A very small number tried to obtain a solution by “completing the square”. This was quite a difficult process given the terms involved in the quadratic and only one of these responses led to correct solutions.

13 The majority of candidates scored full marks on this question with many others picking up a mark for either obtaining 45/99 or being able to subtract 0.3333... from 0.45... to obtain 0.121212... The most common error resulting in a failure to score any marks at all was to evaluate 0.45 – 0.3.

14 This was one of the least successful questions on the paper in terms of marks scored. There were some excellent responses giving the required lengths and angles with appropriate reasons. However, although many candidates understood some of the requirements for congruence they rarely managed to give a full set of statements with appropriate reasons. A large majority failed to score at all usually because they gave a lengthy, “wordy” explanation that contained none of the key facts. Some candidates simply tried to explain congruence by the use of terms like “symmetry” and “reflection”.

15 Problems involving direct and inverse proportion usually create many problems so it was quite pleasing to see that many candidates clearly understood the process even though the presence of a square root made it slightly more complicated. There was still a significant minority who failed to score in both parts often due to the fact that they failed to introduce a constant term (*k*) in part (a). Evaluation of *p* in part (b) frequently failed as a result of finding the square root of 20 (leading to an answer of 4.47...) instead of squaring to 400. Weaker candidates often embarked on a process of trial and improvement with little success.

16 This question was notable for the large contrast in scores for the two parts of the question. In part (a), although about half of the candidates failed to score at all, the remainder often showed a good understanding of the process for finding the length of an arc and successfully calculated the correct answer. A small minority found the area of the sector (25.13… cm) and a similar number used the cosine rule to find the length of a straight line (7.71… cm) that would connect B and C.

Part (b) was easily the hardest question on the paper with most candidates failing to score at all. The main problem was a failure to understand that the length of the arc in (a) was equal to the circumference of the base of the cone in (b). Only a very small minority started the problem by dividing the length of the arc by 2π and various values for the radius of the base were evident. Figures used included 8.38 (from a) and 3 (half of 6 - assuming an equilateral triangle). One of the most common errors was to use 80° as the angle at the top of the cone and then attempt to find the angle by using cosine or sine rules.

17 Although only a very small minority of candidates managed to produce a correct, acceptable curve, it was pleasing to note that many understood the nature of the shape required. Many failed through an inability to understand, or calculate, the position of the turning points and intersections on the *x* axis. Straight lines and poor quality curves were evident but it was obvious that many candidates had attempted to calculate, and plot, points on their curve.

18 Part (a) provided an encouraging start to the problem of the pyramid. The large majority of candidates scored both marks for finding the volume (a relatively simple substitution) with the most common error being to use the length of the sides of the square base (4 cm) rather than the area (16 cm^2).

Part (b) proved to be more challenging. Although many responses showed an understanding of the scale factor for length as 2 (usually evidenced by height = 3.75), there were very few indications that this was being converted to SF = 8 for volume. The most successful calculations usually came from $^1/_3 \times 2^2 \times 3.75$ but it was more likely that 4^2 would be used as the area of the base of the small pyramid that had been removed.

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