RECOGNISING ACHIEVEMENT

GCSE

Mathematics A

General Certificate of Secondary Education **GCSE J512**

Report on the Components

June 2009

J512/MS/R/09

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

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General Comments

Centres have obviously been carefully considering their entry policy after last year's first two-tier exam session. This year, there has been a noticeable shift in entry from Higher tier to Foundation tier. Pleasingly, in general, this meant that candidates were entered at a more appropriate tier where they were able to demonstrate what they knew and how to apply that knowledge.

With there no longer being a requirement to complete coursework tasks, centres have had more time to concentrate on teaching the syllabus content. This has reaped benefits when it comes to candidates' performance on the written exam papers – overall, and at all levels, marks were significantly improved and there were many more high scoring scripts.

Work produced was of a very good standard at both tiers. Working was well presented and easy to follow, so that method marks could be awarded even when the final answer was incorrect. In general, candidates had access to the required equipment, including a calculator where appropriate. Whilst descriptive answers are getting better, there are still many candidates who find this difficult. Clear, concise and focused responses are to be encouraged. Geometry questions asking for 'reasons' to back up any answers require an appropriate geometrical fact and not just a description of the calculation used. Though showing some signs of improvement, arithmetic is still a cause for concern. Even at Higher tier, candidates show a lack of understanding of appropriate techniques and the ability to cope with the simplest of processes. There was a mixed response to algebra questions. Particularly at Higher Tier, it must be realised that answers alone will rarely score full marks. Work on shape and data handling continues to be sound.

Centres requiring further information about this specification should contact the OCR Mathematics subject line on 0300 456 3142.

J512/01 Paper 1 (Foundation Tier)

General Comments

There is no evidence that candidates did not have enough time to complete this paper. Only the weaker candidates left questions not attempted, particularly towards the end of the paper. There were many strong performances with the modal score being in the 70s and plenty of evidence that candidates had learnt from last year's paper.

Some candidates lost marks through poor presentation of their work and there were many solutions that were rendered illegible by candidates overwriting numbers on previous numbers. Candidates should be encouraged to show working for all calculations even those that they do 'in their head' as, in many questions, method marks are available.

The two topics that proved most challenging were tessellation and lower bounds.

Comments on Individual Questions

1 Parts (a) and (b) were answered well. Parts (c) and (d) were transposed and in other cases wrongly positioned by weaker candidates. In part (e), M was usually correctly placed. In part (f), the line parallel to AB was usually correctly drawn but sometimes drawn perpendicular or omitted.

2 Most candidates were able to answer parts (a) and (b) fully.
In part (a) an occasional error of miscount of squares was seen, as were answers of 1/11 and 5/7, but the majority of candidates gained full marks on this part.
In part (b), a common error was failing to give the fraction in its simplest form, eg 6/8, losing the final mark. A few candidates gave answers of 2/8 or 1/4, failing to note that the question asked for the shaded portion.
Part (c) was the worst answered part, with roughly half of the candidates not showing an awareness of relative size of a fraction. 0.5/10 was a common answer from weaker candidates.

3 This was generally a high scoring question. Errors were generally seen only in parts (d) and (e). Some candidates did not read the question carefully, or misunderstood the use of the word 'more'. They added the two elements together instead of subtracting them. In part (e), candidates who failed to show working and miscounted lost both marks. However, it was pleasing to see more candidates earning 1 mark by showing their working.

4 A large number of candidates scored 6 or 7 on this question and nobody failed to score at all.
In part (a)(i), almost all responses were correct.
Part (a)(ii) was very well answered but with some candidates misreading division as subtraction and giving answers of 9.
Any errors in part (a)(iii) were usually in the order of operation, such as 11 (2 × 3 first) and 17 from 15 + 2. Also 10, from addition, was commonly seen.
Although part (a)(iv) was well answered a number of candidates who realised that 10 was required after the first operation, then subtracted 1 to get 9. There were also a few random guesses.
Correct answers were often seen in part (b) but a number of candidates thought that Barney must be right. Some of the comments were too vague, simply stating that the rule could be +/−/×/÷. Others were confused with the minus sign, thinking the answer should be -10 or 30.

5 This was generally well done with even the weakest candidates managing to score quite well.
There were very few mistakes in parts (a)(i) and (ii), although weaker candidates used some very long winded methods
In part (a)(iii), division by 10 led to some errors, generally from choosing to multiply instead of divide.
Division by 100 was the most difficult part of this question with nearly half of all candidates getting this wrong. 2r40 was seen a number of times.
Correcting numbers to the nearest 100 and 10 was done quite well in part (b) by all but the very weakest candidates. Typical wrong answers were 4700 and 5000 for part (b)(i) and 2990 for part (b)(ii).

6 In part (a), most candidates recognised the range was from 4 to 19 but a final answer of 15 was seen less often, with answers often left as 19 − 4 or 4-19. Wrong answers included finding the mean, mode or median.
In part (b), involving 5 and/or 6 was generally understood, but difficulties were experienced in knowing how to use them with answers of 5, 6, 11, 5.6, 56 and 5, 6 all seen. A number of candidates showed calculations for the mean or gave the mode as the answer.

7 Part (a) was often well done with some mixing up of angle types giving reversed answers. There was some evidence of random guessing among weaker candidates.
Most candidates had no problem with part (b). Some candidates appeared to estimate rather than measure the angle using a protractor; presumably because they did not have one. Only a few candidates measured the angle ‘the wrong way round’, getting an answer of 120°.
Parts (c)(i) and (c)(ii) were answered well numerically, but many candidates used a calculation as their reason or failed to use the key words, eg straight line, point, etc.

8 In part (a) the correct answer was seen often without working. Long multiplication remains a mystery for many candidates with £16.50 a common wrong answer. Other methods included the grid method, writing down 50p 35 times or finding separate costs for 30 and then 5 candy canes, the latter of which was often written as 25p instead of £2.50. Better candidates were aware that 2 candy canes were worth £1 so that the answer would be £35/2. There was often no recognition that their cost of the candy canes was unrealistic, with values such as £1.75 seen.
Subtracting £17.50 from £20 also caused some problems with answers of £3.50 and £2.49. Many candidates failed to write down their subtraction thus losing a mark as their answer was not clearly a subtraction from £20. A number used addition to reach £20 rather than a subtraction, or failed to subtract their cost from £20. A wrong answer with no working gained no marks. However, many candidates scored 2 marks for a clear strategy despite little correct arithmetic.
The most successful candidates in part (b) were those who realised that 30% of 100 was 30 so 30% of 50 would be half that value. Many found 10% then multiplied by 3, fewer attempted 50 × 30/100. Some tried to find 50%, then 25% and add a bit on to give 30%. Weaker candidates were confused with the method, with working such as 3/50 and 50/3 seen. A few candidates confused pence and pounds giving an answer of 0.15p from 30/100 × 0.5.

9 Most candidates were able to answer part (a)(i), although $7y^2$ was a common wrong answer.
The negative proved to be a problem for many candidates in part (a)(ii), with answers $6w$, $2z$ or $-4z$ common. Many candidates attempted to combine w and z to give wz.
There were many incorrect answers in part (b), indicating that weaker candidates did not understand that $2j$ meant $2 \times j$ or did not know how to substitute for j and k, giving $14j + 15k$. Another common error was to put in the numbers without multiplying, ie 27 + 53 = 80.

10 A large number of candidates had no idea of the concept of tessellations and scored zero marks in part (a). Some candidates did not even attempt this question part. The weakest candidates often drew a variety of different and spaced out polygons on the grid. Better candidates repeated the shape and had some of the idea of needing to cover the space but could not cope with the diagonal.
In part (b)(i), many candidates got 120, but very few gave the correct units for volume, with cm, cm^2 or no unit at all being the most common. 120^3 was seen several times. A few gained the method mark for indicating their intention to work out 4 × 3 × 10 often leading to 70 or 17.
The most common answer to part (b)(ii) involved 4, 3 and 10 again, though there were many varied correct answers with some candidates showing their creativity here.

11 In part (a), it was quite common to see 14, even when candidates wrote 7 × 7. Not knowing their times tables led to answers of 56, 42 and 50.
Candidates were more familiar with powers than roots in part (b), with $\sqrt{100}$ often given as 50, 25 or left as 100. However, 2^4 was often seen as either 8 or 32.
There were many different types of errors in part (c). The most common was subtracting the smaller digit from the larger giving 3.32. Also, candidates did not seem to know how to subtract when the number of decimal places was different.
Few candidates seemed sure of the method required to do the calculation in part (d). Many were unsure which number, 5 or 6, to divide by (some tried both). Wrong ideas, including 78 − 5 and 78 − 6 were seen, as were answers only.

12 This was answered well by the majority of candidates, with a high proportion scoring full marks. Where marks were lost, candidates had often worked answers out ‘in their head’ and made basic arithmetical errors that had a knock on effect on other answers. They obviously did not understand the principle of using a two-way table to check their figures. Those who only scored one mark generally got it for '19' and '43'. Many candidates did not use the working lines above the table and made difficulties for themselves by working within the table and crossing out and overwriting.

13 Part (a) differentiated well with most candidates scoring at least one mark and many scoring two or three marks. Those candidates who opted for a bar chart generally scored more highly. Those who attempted a frequency polygon almost always lost a mark because the ‘Waiting time’ was not labelled as a continuous scale or their plots were not at mid-interval time values. The majority of candidates did their frequency scale vertically, but some did it horizontally.
The more able candidates got part (b) correct but there were many random attempts.
The stronger candidates scored well in part (c) but the weaker ones did not score at all. Quite often marks were lost because of poor addition even amongst better candidates. ‘Waited 6 minutes or more’ caused a few problems. Some included the 4-6 group and so had a numerator of 20, others had only the 6 to 8 group and so had a numerator of 6. Not many candidates attempted to express probability in an unacceptable form.

14 Most candidates scored the first mark in part (a) for 0.53 with very few trying any other form of notation. The second mark was often lost by candidates who showed a calculation which demonstrated that they understood perfectly what they had to do but they did not explain it in words.
Candidates either understood what part (b) was looking for and gave the answer (with a few stating that the game might not be played) or they showed a complete misunderstanding and mentioned the team's ability etc. Some stated that $1 - 0.7$ is not 0.3 (including some who got 0.53 correct in part (a)). A few even stated, ‘Lizzie is right’.

15 In part (a) the 6 and 8 values were usually correct with (-1, -1) the common mistake. Points were generally plotted well in part (b), but many candidates did not draw the line, or attempted a freehand line.
Many candidates omitted part (c) with others just marking the point (0, 5). Few answered this correctly.

16 In part (a) most candidates got to 30 (though $6y = 28$ or $5y = 29$ were common errors) and the majority went on to reach 5. There were also many embedded answers seen ie $6 \times 5 - 1 = 29$.
In part (b) the majority of candidates substituted the given answer rather than solving the equation algebraically. Some lost marks by not evaluating to 17 ie $18 - 1 = 8 + 9$. Those candidates who tried to solve the equation were often correct, but many failed to deal with the signs. $13x$ was seen frequently.
It was very common in part (c) to see $x = 4$ even after $x/2 = 8$. Embedded answers were often spoilt with a final answer of 5 on the answer line.

17 Weaker candidates left part (a) blank. The most common working was $60 \times 3 = 180$, $60 \times 7 = 420$ giving an answer of 180. Some candidates knew to add 3 and 7 and divide into 60, but could not complete the method.
Part (b) was the worst answered question on the paper with few candidates scoring. Rarely did candidates recognise what was being tested here leading to many answers like 0, 0.01 or 1.

18 In part (a) the formula for the area of a triangle was not known by many candidates. Spurious methods included 5 × 5 × 3, 5 × 3 and counting squares (rarely correct) as well as attempts at finding the perimeter, eg 5 + 5.5 + 3. Some candidates gave *h* as their measured sloping side or thought *h* was 6.
Part (b) was also not well answered. A few candidates scored at least 1 mark for a reflection, but others gave their answer as a translation. A number reflected in the *y*-axis or the *x*-axis.
Candidates were often more successful with the rotation in part (c) than the reflection in part (b). Errors include rotations of 180 degrees, anti-clockwise rather than clockwise rotations or incorrect placing of one of the vertices.

19 Generally only the more able candidates scored well on this question.
Though there were some good answers in part (a) there were also lots of poor attempts. There was not much evidence of factor trees or ladders. 1, 4, 10 and 20 were often offered as prime factors.
In part (b)(i) many candidates picked up their only mark for this question by 'spotting' 2 or 4.
Generally there was a poor understanding of LCM in part (c). Most candidates chose the lowest common factor with even some of the most able candidates giving answers of 2 or even 1. Full marks were rarely scored. Transposing HCF and LCM occurred but was very rare.

J512/02 Paper 2 (Foundation Tier)

General Comments

Candidates were generally well prepared for this paper with most able to attempt a good range of questions. As expected, weaker candidates generally did not attempt questions towards the end of the paper and those who did scored few marks. Most candidates appeared to have had enough time to complete the paper. Some candidates clearly did not have a calculator. This paper is written with the intention that a calculator must be used on certain questions and those who did not have a calculator available for their use were at a significant disadvantage. A clear method was shown by many candidates, but some showed no working at all. There were four questions where several steps were required to find the answer and those who just gave an answer failed to score the method marks that many other candidates gained. Conversely, on some questions, a few candidates were showing multiple methods that included all the different combinations of multiplying and dividing the data given. This was particularly true in question 20. In these cases only the method that led to the candidate's answer was marked.

Comments on Individual Questions

1 Most parts were well answered. A small number of candidates confused odds and evens and the meaning of the terms difference, factor and prime and cube numbers were not understood by all.

2 This question was completed correctly by nearly all candidates. Only the very weakest did not know how to attempt part (b).

3 The answers 75% and 53/100 were nearly always correct but the fraction and decimal equivalents of 9% were less well known with a few candidates giving answers of 9/10 or 1/9 and/or 0.9.

4 There were many errors on this question, imperial units were common especially 'miles' in part (a). The size of the unit was also a problem, with answers such as the capacity of a cup of tea being 200 litres.

5 Nearly all candidates named the solid shapes and the kite correctly. A few were unclear about the differences between parallelograms, trapeziums and rhombuses.

6 This question was very well answered. Some candidates did not label their points and a small number reversed the coordinates.

7 Part (a) was reasonably well done. Common errors were to double rather than square 2.11 and some truncated or rounded the answer. Weaker candidates did not have a clear idea as how to find three fifths of 220 and methods that were shown were often not relevant.

8 Most candidates scored well on both parts of this question. Only the weakest candidates had confused answers with the number patterns and most clearly identified how the sequence worked.

9 The table was nearly always filled in correctly. Most candidates are now aware that probabilities need to be a fraction, although some ratios were still seen. Many candidates identified that there were 5 ways of obtaining an eight, but some did not appreciate that there are a total of 36 possibilities and different numbers for the denominator of the fraction were seen. A fairly common error was to give the probability for ten or more (rather than greater than ten) in part (c).

10 Candidates had a clear understanding of this question and many obtained full marks. A small number decreased rather than increased the temperature by 3 degrees in part (d), giving an answer of -8°C.

11 Some candidates measured the angle in part (a). Those who calculated the angle often found the correct answer, although there were some errors including failing to spot the right angle and not using 90 degrees for the Tomato sector. There were many different approaches to part (b), repeatedly halving to find one eighth was often successful. Some candidates did not have a clear idea how to attempt this and used some form of estimation to obtain the answer; an incorrect answer of 4 was often seen.

12 Only more able candidates obtained full marks. Many did not appreciate that a fraction was required in the answer. Few used the more elegant fraction method for finding the solution with most computing from 600. A common error was to deduct Anna's 150 and then find a third of the 450 left. This question was an example of where candidates may have earned more marks by showing a full, clear method for their solution.

13 Part (a) was generally well done using a variety of methods. Answers were sometimes given in embedded form which was acceptable, but candidates sometimes became confused when working with this technique and gave an incorrect answer even though a correct embedded form was seen in the working. Although there were many correct answers in part (b), there is still a significant number of candidates who do not understand what is meant by an expression or how to use the variable given to give a sensible answer in the context of the question. Inappropriate formulae and equations were often given in these cases as an answer.

14 Most candidates knew how to find the missing angle in the triangle in part (a), but the multistep approach needed in part (b) was beyond the weaker candidates. Many found the missing angle in the quadrilateral, but then could go no further. A small number gave the answer as 80 (180 − 100) because angles on a straight line add to 180 degrees, showing a complete misunderstanding. Candidates generally gave a sensible reason for their answers, but there were still some who explained how they carried out their calculation rather than referring to a particular property. In part (b) many candidates either only gave one reason or did not refer to the shape as a quadrilateral or 4-sided shape.

15 There were many correct answers in part (a), although some candidates, having found that 75g of flour were needed for 6 buns, failed to add it on to the original 150. Only the more able candidates understood how to proceed to convert a fraction to a percentage in part (b). A very common error was to demonstrate that 25/175 was 1/7 or to show that 175 ÷ 25 = 7 and then give an answer of 7%.

16 The candidates who had good calculator skills generally scored well in parts (a) and (b). Most errors came from carrying out the operations in the wrong order; 26.25 was a common incorrect answer for part (b), resulting from finding the square root of 36 and adding to 4.5 squared, as opposed to adding 36 to 4.5 squared and then finding the square root. Part (c) was very poorly answered, suggesting that most candidates had no idea as to the meaning of 'reciprocal'.

17 Part (a) was attempted by most candidates with varying degrees of success. There were some good explanations comparing running water in and emptying by referring to the steepness of the lines, but most attempted a numerical explanation. Many of these were inaccurate and failed to obtain the mark. Some candidates did not realise that some form of comparison was necessary and only discussed running water into the bath. Part (b) was done less well with common incorrect answers of 3 and 5. More candidates had correct answers for part (c), 38 was a common incorrect answer. Few candidates could convert cubic centimetres into litres in part (d).

18 Most candidates knew how to plot the points on the scatter graph and the majority were accurate in this process. Many recognised a positive correlation and lines of best fit were usually successful, although a few could have improved their attempts by taking more care with their ruler. Those who had a reasonable line of best fit generally were successful in part (d), although some read from the horizontal instead of the vertical axis.

19 This question was poorly done with many candidates only getting the units mark or none at all. Attempts were generally confused with some using πr^2 to find the circumference. Few appreciated that you had to add on 24 to find the total perimeter.

20 Although many of the more able candidates had some idea of how to find the cost of the petrol, methods were often confused and generally inaccurate. Many attempted some sort of trial and improvement method to obtain an answer to 8 ÷ 0.22 and some rounded figures inappropriately. This lead to candidates achieving method marks, but rarely going on to obtain the marks for accuracy.

21 Weaker candidates did not attempt this question and there were some who did not appreciate that you had to subtract x from x^3 as opposed to some constant number. However, there were a fair number who were well prepared for this type of question and set out their method clearly and logically. Some failed to give their answer correct to one decimal place, often giving 2.31 as an answer, and many failed to justify why 2.3 rather than 2.4 was the correct answer.

J512/03 Paper 3 (Higher Tier)

General Comments

Candidates seemed better prepared for the exam this year. Work was completed to a higher standard with improved presentation and showing increased understanding of the material covered. Very few students have been entered at the wrong tier. Pleasingly, there were many high scoring scripts; few scored below 40.

Graph work is becoming more precise with greater care being taken over presentation. Working stayed within the confines of the question part, essential for on-line marking.

There is still concern over the standard of basic arithmetic. For example, a significant number of candidates failed to work out 75 − 15 correctly. Though work on percentages is generally sound, work on fractions continues to be a serious cause for concern. Even at Higher tier, non-calculator arithmetic needs regular practice. Centres also need to spend some time directing candidates on the layout of their answers to the more unstructured questions. For many, currently their presentation is too haphazard and difficult to follow.

Candidates had sufficient time to complete the paper. There was no evidence of work being rushed or questions being omitted due to time pressures.

Comments on Individual Questions

1 This question was well answered by the vast majority of candidates. Very few made any arithmetical slips.

2 There were many correct answers to this unstructured question. Of those with only a partially correct answer, most got at least one of the prices correct. Some of these found the reduction in the shop price but then added and others found the postage and packing charge and subtracted. The most worrying feature of many answers was to give £75 − £15 as £50.

3 Candidates used a range of methods for their diagrams in part (a). Bar charts, frequency polygons and cumulative frequency diagrams were all used, with varying degrees of success. Frequency polygons were the least successful where candidates failed to plot points at the middle of the intervals or failed to join points with straight lines. Many candidates were reluctant to use a continuous scale for the horizontal axis. The modal class was usually correctly given though ‘4 up to 6’ was an incorrect alternative for those candidates who chose the middle group of the waiting times. The probability was mostly correct in part (a)(iii), with errors occurring in the frequency total or the inclusion of the ‘4 up to 6’ group in the total for 6 minutes or more. Candidates could correctly identify at least one problem with the survey question.

4 There were equal numbers of candidates who solved the equation and those who showed that $x = 2$ satisfied the equation. Many did both. Though there were many correct answers to part (b), a significant number made slips in their working. Some started correctly and found that $x/2 = 8$ only to give $x = 4$. Other candidates made an incorrect first step when, trying to multiply through by 2, they failed to include multiplying the 3. This led to a common wrong answer of 13.

5 Again, both parts were usually answered correctly. Weaker candidates tried to divide 60 by 3 and by 7 in part (a). In part (b) a correct lower bound was the most common answer though a lot of 145 answers were seen with candidates rounding to the nearest 10.

6 Though most candidates knew how to find the area of the triangle, a lot chose the vertical height to be 6 rather than 5 (leading to an answer of 9) or failed to divide by 2 (leading to an answer of 15). There were many correct reflections in part (b) though some candidates used one of the axes or the line $y = 3$ as their mirror line. The rotation in part (c) was also done well with a majority of correct answers. Some rotated in the wrong direction or about the wrong centre.

7 Nearly all candidates recognised the two inequality signs and could interpret their meanings in part (a). Some gave a single digit answer of 4 or 5, presumably referring to the number of integers covered by the inequality. It was pleasing to see fewer candidates solving the inequality as an equation in part (b). Representing the solution on a number line was done well; a large number of candidates correctly used an open circle to indicate that the 2 was not included in the solution. However, even after a correct inequality, less able candidates were unable to correctly show this on the number line and often had the line drawn in the wrong direction.

8 Most candidates realised that $5n$ featured somewhere in the expression and many of these could correctly place it in an expression for the sequence. The fact that the difference was negative seemed to put off some. In part (b), weaker candidates ignored the hint about n^2 given earlier in the question. These usually gave an answer of 27, the next value in the sequence.

9 The correct use of a factor tree led many candidates to the correct answer in part (a). Though there was some confusion between HCF and LCM, most knew to list the two sets of factors in part (b)(i) and list the two sets of multiples in part (b)(ii) as a method to finding their answers. As expected, there were quite a few wrong answers of 2 and 4 in part (b)(i) and 960 in part (b)(ii).

10 Though there were many correct answers here, a number of candidates seemed unfamiliar with the term 'relative frequency'. The majority realised that 129 had something to do with the answer but a lot did not know how it should be used. Of those trying to give the correct fractional form for the answer, some could not correctly add the four values. Very few could not give an acceptable reason in part (b).

11 Again, there were many correct answers to this question. Some candidates used the formula method and others plotted points on the grid. Those using the grid method were often less successful and ended up with only one of the pair correct.

12 Multiplying out brackets caused little problem for the majority of candidates. Factorising was less successful with some only taking one factor and less aware candidates trying to add or even multiply the two terms. There were a lot of correct answers to part (c)(i) though 3 and 0 were also often seen. Better candidates scored well with the rest of part (c) but $6x^2y^4$ and $4x^2y^5$ were common partially correct answers to part (c)(ii) and 7^8 was the common wrong answer to part (c)(iii).

13 Geometrical reasons were few and far between. Even when candidates realised that a written explanation was needed, it often centred on the diameter and chords rather than ‘angle in a semi-circle’ and tangent and line to the centre rather than ‘tangent perpendicular to radius’. There were many who just presented a calculation. In part (b) many candidates assumed lines to be parallel and gave incorrect answers. Few got part (b)(i) correct; more were successful with part (b)(ii). Part (c) was done well by nearly everyone. It was of concern, however, that a large number thought that 4 × 2.5 was 9. Weaker candidates either added the difference and gave 7 or thought that there was a ‘double and add one’ relationship between the lengths of the sides.

14 There was a mixed response to this question. Many candidates knew the correct approach and performed the calculation flawlessly. Even those who appreciated the need to express each fraction as ‘top heavy’ often failed to multiply them correctly. Less well informed candidates just multiplied the whole numbers and the fractions separately.

15 Few candidates plotted the points incorrectly and all knew to join their points by straight lines or a curve. Though there were many correct answers for the median, some either gave 30 (the middle of the age axis) as their answer or used 30 and their graph to get an answer of 105. In part (c) many candidates described the steepness of the curve or referred to there being 8 over 35 rather than finding the number over 40 from their graph.

16 Invariably two pairs of brackets were used to factorise the expression though not always with the correct numbers. Some candidates failed to go on and find values of x. Very few candidates completely solved the equation in part (b). Reducing the equation to $x^2 = 4$ and then to $x = 2$ was the common response. Rarely was the negative root found. Candidates who could evaluate the square of the bracket in part (c) usually went on to give a completely correct solution.

17 Strangely, a considerable number of attempts were related to the volume of the cuboid. Those who attempted to use Pythagoras’ theorem often only worked in 2-D. Many found the diagonal length of each side without appreciating that they needed the space diagonal of the cuboid. Where two steps of 2-D Pythagoras were used, candidates often approximated the value of their square roots. Some failed to compare their calculated length with the length of the rod.

18 Weaker candidates produced a jumble of unlabelled working which was difficult to mark. Many of these used areas and even lengths as the required volumes of the two objects. Even when the correct formulae were used, many had difficulty in simplifying their expressions. The sphere formula was particularly problematical for many candidates. Most obeyed the instruction not to substitute a value for π; those who did use a value struggled with the ensuing decimal calculation. Repeated addition instead of division was often employed in the final step of the calculation.

19 Only the better candidates knew to draw the line $y = x - 1$. In most cases the lines drawn were $y = -1$, $x = -1$ or $y = x$. Even after a correct line was drawn, few went on to give the x-coordinates of the points of intersection. Many candidates just stopped and others gave both the x and y values usually as a coordinate point. Part (b) was poorly answered, if attempted at all. Few appreciated that a rearrangement of the equation was needed.

20 Work on conditional probability is improving. Most candidates started with a tree diagram; though a number went on to add the fractions on the branches instead of multiplying them. Where products were obtained, some candidates cancelled their answers down and thus made the subsequent addition more complicated. A large number of candidates failed to realise that the first pupil was not replaced before a second one was selected.

J512/04 Paper 4 (Higher Tier)

General Comments

Overall the standard was high with a significant number of very good papers where candidates had been well prepared. There were many high scores from candidates who displayed an excellent knowledge of the topics showing full and accurate working throughout. It was pleasing to see that the majority of candidates were able to attempt all questions in the paper although there was some evidence that a minority of candidates appeared to have been inappropriately entered for the Higher tier. There was no evidence that candidates were short of time on this paper.

Although many candidates did not show working on the earlier questions, presentation of work was, on the whole, very good. Clear working was shown so that marks could be awarded even when the final answer was incorrect. Answers requiring an explanation of the mathematics used were less well answered.

Comments on Individual Questions

1 Part (a) was generally correct. In part (b) the majority of candidates gave a correct answer, though this was given to varying degrees of accuracy. Common errors included 25% of 175 = 43.75% and 175/25 = 7.

2 Part (a) was almost always correct. Part (b) was generally correct with only a few candidates square rooting 36 first. Part (c) was more challenging, and highlighted that candidates either did not know what a reciprocal was or did not know how to calculate 1/0.16.

3 Parts (a), (b) and (c) were usually correct. About half of the candidates gained the mark in part (d). Common errors included square rooting or cube rooting or dividing by an incorrect power of 10.

4 This was generally answered well with only a few candidates using 3.3 hours or dividing by 210 minutes and not converting their final answer to hours.

5 Many candidates successfully enlarged the triangle, although using ‘rays’ rather than the grid did lead to some inaccurate plotting of one or two vertices.

6 Parts (a) to (d) were generally answered successfully, although a number of candidates persist in ensuring that a line of best fit passes through the origin. Part (e) required mathematical reasoning, interpretation and a written explanation that was not always clear and precise.

7 Part (a) was well attempted with full marks frequently given. Part (b) proved more difficult with some confusion over circumference and area, radius and diameter. The common mistakes were to add 12 instead of 24 or to use one semicircle and then add 24. Frequently 2 marks were awarded for the curved section and the units.

8 In part (a) the size of the angle was often correct, but the reason proved more difficult. Too many candidates used ‘z angles’ in place of alternate angles. In part (b) candidates were generally awarded full marks.

9 This question proved more difficult for some candidates, particularly setting up the equation. Part marks were often awarded for a correct solution with no equation seen. Common mistakes were to divide by 8 and then 4, (working with perimeter instead of area) or to square root before dividing by 8.

10 There was a mixed response to this question. Many candidates answered the question competently, scoring full marks. Some candidates lost marks for premature approximation resulting in a final value outside of the range or not converting their answer to pounds, unworried by 8 gallons costing £4505. A common mistake was to multiply by 0.22 instead of dividing.

11 Candidates usually obtained full or nearly full marks on this question, with full working shown. The most common reason for losing a mark was not to show numerically why they had chosen 2.3 instead of 2.4.

12 There was a mixed response to this question. Candidates that followed the suggestion to list all possible outcomes usually were successful, particularly when choosing a two-way table rather than a tree diagram. For other candidates their approach to a solution was not always clear. A significant number of candidates achieved one mark for ten correct outcomes with not as many showing the 25 possibilities.

13 In part (a) candidates generally scored highly. A common mistake seen was to add 90% on to the 4m to get an answer of 7.6m. In part (b) about half of the candidates had the idea that they had to repeatedly multiply the previous value by 90%. A reasonable number achieved the correct solution. The most common mistake was to repeatedly subtract 10% (0.4 m) each time.

14 Part (a)(i) was generally correct with part (a)(ii) less so, the common error was to select f^2gh. Part (b) required an explanation of dimensions and was not well answered.

15 Part (a) was very well answered with nearly all candidates able to draw the box plot accurately. Part (b) was not well answered as candidates generally gave vague statements with no statistically useful information. Part (c) proved more challenging still and identified those candidates that really understood how to interpret and apply information about quartiles presented in a box plot.

16 Although part (a) was sometimes omitted, the majority of candidates who attempted this question knew the standard method to multiply to achieve equal coefficients. However, a significant number of candidates were unable to add or subtract to eliminate one of the variables. If this step was done correctly then the correct solution was usually found. There was a mixed response to part (b) where candidates often achieved full marks or no marks. The common error was to multiply both sides by *r* as the first step.

17 A number of candidates omitted some or all parts of this question indicating that they had little or no knowledge of trigonometry. The majority of candidates who attempted part (a) used the sine ratio correctly, although a minority used Pythagoras to find the third side and then used either cosine or tangent ratio. In part (b) there were again a significant number who chose to find the side AE and then use Pythagoras. Fully correct alternative methods were always awarded marks where working was shown, but candidates need to be aware of the danger of premature rounding leading to loss of accuracy in the final answer. Candidates who could apply the appropriate formula invariably scored full marks in part (c). In part (d) if the cosine rule was used then the numbers were generally substituted correctly, but not always calculated correctly.

18 In part (a) a high proportion of candidates could write down a correct expression using Pythagoras and gained one mark, though brackets were quite often omitted. Difficulties arose in multiplying out the squared brackets. A significant minority of candidates attempted part (a) through substituting numbers for n. Part (b) was sometimes omitted, but the majority of candidates could identify that the answer was odd, and justified this with a numerical example for n. However, a number of candidates did give a well reasoned general argument using odd and even numbers to gain full marks.

19 All parts of this question were answered quite well. Part (b)(i) caused difficulties for some candidates who attempted to rearrange their equation to give an equation with t as the subject. Part (b)(ii) was often correct even if the previous question part had been omitted or an incorrect response had been given.

20 The majority of candidates that answered part (a) correctly were able to gain full marks in part (b). The common error in part (a) was to give 120 ÷ 10 = 12.

21 Although more able candidates scored full marks, many were unable to write down each algebraic step correctly. Some candidates concentrated on either the numerator or denominator. Some candidates who were able to manipulate algebraic fractions made errors in multiplying out brackets. Some candidates were unable to express a quadratic equation in a usable form to find a solution. However, candidates who were able to arrive at a quadratic equation were given credit for a correct attempt to solve it.

Grade Thresholds

General Certificate of Secondary Education
Mathematics A (J512)
June 2009 Examination Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
1	100			73	61	49	37	25
2	100			71	59	48	37	26
3	100	72	56	41	25			
4	100	66	51	35	23			

Specification Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	200				144	120	97	74	51
Percentage in Grade					31.8	23.8	15.5	11.9	9.5
Cumulative Percentage in Grade					31.8	55.6	71.1	83.0	92.5

The total entry for the examination was 24985.

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	400	169	138	107	76	48	34		
Percentage in Grade		13.6	22.4	26.3	25.5	10.2	1.4		
Cumulative Percentage in Grade		13.6	36.0	62.3	87.8	98.0	99.4		

The total entry for the examination was 16618.

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	5.5	9.1	10.7	29.3	18.3	9.8	7.1	5.6
Cumulative Percentage in Grade	5.5	14.6	25.3	54.6	72.9	82.7	89.8	95.4

The total entry for the examination was 41603.

Statistics are correct at the time of publication.

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