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GCSE

Mathematics A

General Certificate of Secondary Education **GCSE J512**

Reports on the Components

June 2010

J512/R/10

Oxford Cambridge and RSA Examinations

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GCSE Mathematics A (J512)

REPORTS ON THE COMPONENTS

Chief Examiner's Report

General Comments

Candidates continued to perform well at both tiers of entry. Centres have prepared their candidates appropriately and not only covered the required content but also helped them to develop strategies to apply their knowledge to unstructured questions. There were fewer cases of candidates being entered for the wrong tier of assessment.

It was pleasing to see candidates showing full working with their answers, allowing credit to be awarded even when the final answer was wrong. At both tiers, scripts showed candidates getting to grips with the work right up to the very last question. It must be emphasised to candidates that answers should be legible to ensure marks can be awarded.

Candidates' best work, once again, was on handling data and shape and space questions. Drawing and construction continued to be done carefully and accurately. Though algebra work improved, many candidates were still unfamiliar with some of the correct processes and procedures. Basic arithmetic, even addition and multiplication, caused a problem to many candidates at both tiers. It does appear that further practice is needed here so that candidates can perform calculations confidently without recourse to a calculator.

J512/01 Paper 1 (Foundation Tier)

General Comments

Generally, candidates remained focused throughout the paper and the standard of work was high with no apparent lack of time. Weaker candidates left some questions unanswered. Even though there were questions in the middle of the paper which weaker candidates did not understand or attempt, they continued to find parts on later questions which allowed them to achieve marks. Question 13(a) seems to have been the most frequently left with 'no response'.

Candidates should be encouraged to show some working for calculations even those which they do 'in their head' as, in many questions, method marks are available. However, candidates were a little more willing to show their working this year but the standard of presentation and spelling made some responses difficult to mark. Some candidates, who attempted subtractions in their head, gave the numerical difference of respective digits, regardless of order, so 61 – 23 became 42.

Candidates need to be aware that formulae for area and circumference of a circle are not provided on the formulae sheet.

Many candidates appeared not to have access to a ruler and protractor. Candidates need to write clearly and to cross out and replace wrong answers rather than try to write over the top of a wrong digit.

Comments on Individual Questions

1 This was an accessible first question and over 80% of candidates scored 4 or 5 out of 5. The most common mistakes were confusing trapezium with parallelogram and hexagon with octagon.

2 This question was generally well answered.
Most candidates gave the correct order in part (a) but there were occasional miscopies of numbers seen, especially the 0s in 12 000 and 100 000.
Part (b) was mostly correct apart from a few very weak candidates who gave answers such as 47, 67 and occasionally 58.
Weaker candidates often had too many zeros in part (c)(i). The most common wrong answers involved candidates misreading "eighteen" and writing 208 112, 280 112 or 2 180 112. Part (ii) was well answered but a few candidates gave an answer of 173 800 or 174 000. In part (iii) a few weaker candidates gave answers such as "forty thousand....." or "....seven hundred".

3 In part (a) many candidates scored both marks with good solutions showing tally marks in groups of 5. A few of the weakest candidates put in the tallies but no numerical values. A sizeable minority of candidates were unaware of what a frequency table should look like, placing frequencies in the tally column, writing frequencies as fractions out of 30 or attempting to produce a cumulative frequency table.
The mode was often given correctly in part (b). However, common errors were 11 (the frequency associated with the mode showing that candidates did not relate the modal result with the actual dice) or 4 (the most common frequency value).
Part (c) was more often correct than part (b) showing that candidates understood the context even if they did not understand the statistical terminology. The erroneous '11' in

part (b) almost always led on to correct identification of '6' as the number on two dice faces, implying candidates understood the results of the dice-throwing experiment. As in part (b), '4' was a common error.

4 Most candidates gained the mark in part (a) with only the very weakest giving odd numbers. Some gave more than three even numbers.
Quite a few candidates did not gain full marks in part (b), even though they had gained the mark on part (a), suggesting they knew the difference between odd and even. Candidates should be advised to try an example to see if their answer is correct. Most common errors were odd + odd = odd and odd × odd = even i.e. mixing up the × and +. Some candidates got all three answers wrong.
In part (c) most candidates got the correct answers to parts (i) and (ii) but then did not go on to get both marks in part (iii). Some managed to get 81 as the sum but did not find its square root; a common error was to divide by 2. The better candidates did not understand 'the sum of' and continued as in part (b) giving 'odd' or 'even' as their response.

5 Candidates scored well in parts (a), (b) and (c) with only a few answers of 0.34 or 3.4 in part (b) or a fraction in part (c). Part (d) proved to be the most difficult part of the question. Some candidates started with 12/100 but only the better candidates simplified correctly to score 2 marks. 1/12 was a common wrong answer.

6 There were some arithmetical errors but candidates were able to earn 2 or 3 of the 4 marks if they made their method clear.
The majority of candidates answered this question correctly. There were very few who made no attempt to answer the question, or who gave the answer only or who forgot the correct way to write money and gave the answer as £8.5.
The adults cost was usually calculated correctly with mistakes being made in the cost for the children. Some candidates did not take sufficient care in reading the question and thought there were 2 or 4 children and others were unable to correctly calculate 3 × 4.5. There were some problems in carrying out the subtraction £26.50 – £18 with either the 50p being ignored and a calculation of 26 – 18 written down or the 50p was subtracted at the end i.e. £26 – £18 – £0.50 = £7.50. A number of candidates reversed the order of the subtraction but usually reached an answer of £8.50. A few did not understand the question and simply found 6 + 4.50 = 11.50 and then calculated 18 – 11.50 (or 11.50 – 18) which made the family ticket more expensive.

7 Part (a) was well answered by many candidates and answers were mostly presented in a logical way.
Part (b) was less successfully answered. Correct final answers were mostly of the form $\frac{1}{9}$, although a minority of candidates misused notation and gave probability as 1:9, 1 in 9 etc. $\frac{2}{6}$ (or $\frac{1}{3}$) was a common wrong response.
In part (c) a very large variety of responses were seen, ranging from those that were short and to the point to paragraphs that never touched on issues of relative frequency.

8 Part (a)(i) was well attempted by most candidates. Weaker responses included 5*c* – 2*d* in part (ii). 4*g* was often seen in part (iii).
Part (b)(i) was often correct. There were a few answers of 10 in part (ii). Weaker candidates struggled with correct notation and often gave their answers in an embedded form such as 9 × 5 = 45 and then wrote 45 on the answer line.

9 Part (a) was answered well. Only a few candidates drew a horizontal line and therefore did not earn the mark.
In part (b) most candidates realised that the letter required was "H". However, some failed to draw two lines of symmetry and some added diagonal lines as well. Occasionally, "S" or "E" was selected with an attempt to identify two lines of symmetry.
Part (c) was answered well with the most popular correct answers of "S" and "H" taken from the name given in the question; other answers included "N", "Z", "O" or "X". The most common wrong answer was "E".

10 There were many correct solutions in part (a), However, a significant minority of candidates doubled 9 rather than squared it, or left the answer as 9 × 9.
8 and 32 were common wrong answers in part (b).
Part (c) was well attempted and many candidates earned full marks. The best responses showed the work in two stages: 40 ÷ 8 then 5 × 3.
In part (d) those who used the 10% method fared better than those attempting 0.3 × 70.
In part (e) many candidates did well, with traditional, grid and 'Chinese' methods all used. The use of the traditional method did lead to more errors. The grid method was the most popular and gave a good outcome. The obvious wrong answer was 1408 from 70 × 20 + 2 × 4.
Many candidates knew about powers and picked up one or both marks in part (f). However, 10 + 10 + 10 and 2 + 2 + 2 were regularly seen, as was 12^3.

11 Most candidates, even those who had struggled with or omitted Question 10, were able to score in part (a), and gave their answer in the form 30 (minutes).
50 min was a common error, presumably stemming from the misconception that there are 100 minutes in an hour.
Part (b) was also successfully answered by most candidates. It was very rare to see an X in the completely wrong section of the graph. Those candidates who had drawn carelessly did not earn a mark.
The vast majority of candidates gave the correct response to part (c)(i). A few gave 14, the upper reading without subtracting the lower reading. However, part (ii) was only answered correctly by the better candidates. Many gave no indication of knowing how to calculate the answer. Some unsuccessful candidates recorded a d/s/t triangle but used it incorrectly, resulting in multiplication rather than division. Some candidates wrote 12/20 but proceeded to calculate 20/12.
In part (d) a minority of candidates focused on the relative steepness of the lines. Most successful candidates correctly identified the relevant times and distances or correctly compared them without specific numbers.

12 Most candidates had some understanding of the stem and leaf diagram and were able to pick up some marks.
Part (a) was done quite well. Wrong answers included 5 and 61.
Part (b) was answered very well.
In part (c) a number of candidates left the range in the form 23 – 61. Some failed to subtract correctly with 42 being a common wrong answer.
In part (d) a good number of candidates attempted to locate the median as the middle

number but many quoted 41 or 43 and failed to realise the need to locate a value between these. The mode of 35 was a common wrong answer.
Only the better candidates scored full marks in part (e), usually giving correct answers without any working shown. Many picked up a single mark for values differing by 3. A few candidates quoted the old mode in their working. Candidates should be encouraged to show working in questions like these where multiple marks are available.
Part (f) was answered quite well, although there were some inaccurate subtractions.

13 In part (a) language skills were often a problem. The word 'explain' was ignored by most candidates who resorted to calculations to prove the answers were wrong. Few were able to complete correct long multiplications or a division. A number simply stated that the answers were wrong.
Part (i) was the best attempted part in (a) with a large number of candidates realising the answer had to be negative. It was not necessary to carry out a long multiplication but most of those who tried to do so failed to reach the correct numerical value of 16.65 but did indicate that their answer was negative. Some candidates tried to state what was wrong with the question rather than what was wrong with the answer e.g. it is multiplied by a negative number. Part (ii) again contained some poor long multiplication but many candidates did realise that 7.2 was too small for the square root of 67.24. A few confused the meanings of square and square root. Common incorrect responses were that 7.2 was not a factor of 67.24 and 'a decimal does not have a square root'. In part (iii) many candidates stated the answer was too large because they assumed that dividing always gives a smaller answer. A number showed that 63 ÷ 9 = 7 but then gave the answer to 6.3 ÷ 0.9 as 0.7. Others thought that dividing a decimal by a decimal resulted in a decimal answer. Better candidates rounded the two numbers in the question to show the size of the answer was incorrect.
Hierarchy of operations were recognised more in part (b)(i) than in part (ii) with the most common answer in part (ii) being 30. The most common error in part (i) was in dividing 21 by 7.
Part (c) was generally well done. The common errors were to put the bracket the wrong side of the '–', to put extra brackets around the other pair of numbers or to just put brackets around the first two numbers. Some candidates spent a long time testing out their calculations by trial and error to arrive at the 'correct' positioning of the brackets.

14 This question was not well answered with very few fully correct results. More than half of the candidates failed to score marks.
In part (a) many candidates managed to score a mark for -10 but 4 was a rarity with -2 × -2 = -4 very common. Of those that managed both substitutions, many were unable to calculate 4 – 10 with -14 the common response.
Most candidates were unable to cope with part (b). The most popular answer was 3.5 from 1 + 2.5. The calculation 5 × ½ = 5½ was often seen.

15 In general this was a poorly answered question with only the best candidates scoring full marks. Most candidates used πd and many of those who used the correct formula of πr^2 often spoiled it by calculating $(3 \times 4)^2$. Others forgot to halve to find the semicircle area, leaving an answer of 48. A few used a radius of 8. Very few candidates scored the units mark. Candidates must be urged to read the question carefully to make sure that everything has been answered. Disappointingly, most of those candidates recognising the need for square units used cm^2 instead of $feet^2$.

16 This question was poorly answered.
Only a third of candidates were able to give the correct angle of rotation in part (a). It was not uncommon to see 270° but there were many guesses.
A very few candidates were able to mention another type of transformation when attempting to answer part (b). Many made no attempt and many of those that did try to answer simply gave another angle of rotation. Some candidates mentioned reflection but could not give any details of the mirror line. Some were able to give a form of translation using right and up as directions, very few used a vector and only a very small minority used the word 'translation'.

17 In this question candidates who showed clear working earned partial credit, even if the answer was incorrect. Candidates could be encouraged to label lengths on the diagram to help them in their calculations. Most candidates who correctly labelled the diagrams went on to gain some, and often all, the marks for the question. Some candidates incorrectly labelled the width of the rectangle as 3cm. Quite a few candidates confused area and perimeter.
In part (a) quite a few candidates simply multiplied the two dimensions given, failing to recognise the need to split the shape into 2 smaller rectangles. Some candidates multiplied many numbers together resulting in a large final answer, indicating no, or very little, understanding of area.
For the perimeter in part (b) it was common to see 10 + 6 + three more lengths, although often only the answer was given. Many candidates omitted the 2cm length or added on the two 4cm sides that were joined.

18 Candidates did not appear to have access to a pair of compasses and too frequently attempted to draw the circle by joining dots 6cm from A.
As would be expected this proved to be a challenging question and was not understood by many candidates. Many simply joined the points in a triangle or drew circles from A, B and C. Candidates often picked up marks for the circle of radius 6 cm around A and intersecting arcs (usually also of radius 6) around B and C – there was usually only one pair of arcs here. Hardly any of the candidates knew what a perpendicular bisector was and those who did draw it often failed to draw it long enough to find the correct position of the second point to the left of A. Others simply measured distances with their rulers and placed one or two points in correct locations although these were not always clearly identified other than by large dots. Some candidates indicated the correct 2 points but then also indicated other points in the region – often where the arcs crossed – thus spoiling their answer. A dot at the midpoint of BC was quite common. Very few candidates scored 4 out of 5 marks and only a handful scored full marks. Many made no attempt at this question.

J512/02 Paper 2 (Foundation Tier)

General Comments

Candidates were generally well prepared for this paper with most of them able to attempt a good range of questions. Generally, weaker candidates tried to answer most questions on the paper and as a consequence were able to receive some method marks on the later, harder questions, even if they did not get the correct answer. This is encouraging.

Nearly all candidates appeared to have enough time to complete the paper.

Most candidates appeared to use a calculator where appropriate. There were two questions which required measuring and drawing and the majority of candidates made good attempts at these using appropriate measuring instruments. A small minority either could not use such equipment or did not have access to it.

Comments on Individual Questions

1 This question was well answered with most candidates scoring at least 4 marks. A small number did not interpret the answer on their calculator to give an appropriate answer writing, for instance, 12.5 rather than 12.50.

2 Candidates had a good understanding of interpreting pictograms. A common error was to give an answer of 37 or $37\frac{1}{2}$ for the third part.

3 This question was poorly answered.
In part (a) some candidates attempted to find the area using an incorrect formula and others found the perimeter in some way and gave an answer which should have been recognised as not sensible.
In part (b) few candidates obtained both marks. Some candidates did not follow the instructions carefully and only put ticks in the boxes, leaving the others blank.

4 Generally, candidates were aware of their own mortality, although not all. Most had an understanding of what was required for parts (a), (b) and (c), although some were confused by part (d).

5 Overall this question was answered well.
In part (a) only a few candidates did not understand the term “place value”.
Answers for the largest number in part (b) only suffered from occasional carelessness with answers such as 876423.
In part (c) candidates had a good understanding of what a factor was, although some failed to give all the factors of 12.
Weaker candidates could not cope with the identification of square numbers in part (d) or the problem solving required in the addition calculation in part (e).
Most candidates found the equivalent fraction correctly in part (f).

6 There were many correct answers to the solution of the equations, especially for parts (a)(i) and (ii). Few candidates used an algebraic method and so method marks were rarely given after incorrect solutions. -2 was often given as an incorrect answer to part (iii).
Finding the next numbers in the sequence was well answered in part (b).

7 Explanations were generally easy to understand and most candidates did well on this question. Some were not clear as to which way round to subtract to find the range in part (a). A few gave definitions for the mode and the mean for either part.
In part (b) a few candidates failed to mention that the data needed to be ordered.

8 Most candidates drew an appropriate circle in part (a) and marked the midpoint of the line within tolerance in part (b)(i). Candidates generally understood the term parallel in part (b)(ii), but not perpendicular in part (b)(iii). In part (b)(iv) nearly all candidates measured the line accurately.

9 In part (a) many candidates drew the angles accurately although a few had problems labelling the 205° angle correctly.
In part (b) the knowledge of different types of angles varied. Some candidates did not gain the mark for the definition of obtuse as they missed out 'less than 180'.

10 Weaker candidates did poorly on this question. Some could only find the missing angles in the triangle or quadrilateral. In both parts there were candidates who thought that angles on a straight line meant that all the angles on the horizontal line should be subtracted from 180, so, for instance, in part (b) candidates found 180 – 76 – 80 for their final answer. More able candidates often scored full marks on both parts.

11 In part (a) most candidates recognised the television programme favoured by one quarter of the students.
Part (b) was poorly done; many candidates found a fraction from 60 out of 100 rather than 360.
Many candidates found the correct angle for soaps in part (c), although a few measured it from the diagram rather than calculating it.

12 Nearly all candidates gave their answers as an appropriate fraction in all parts, although there were still the occasional ratio answers which gained no accuracy marks. The main error was to use an incorrect value for the denominator.

13 Most candidates gave correct answers to parts (a) and (b), the common error being to give an incorrect sign.
Very few candidates could correctly write the number to the correct number of decimal places in part (c). Some truncated and consequently gained 1 of the 3 marks, but others had no idea of the purpose of this technique and changed the value of the number by moving the figures in relation to the decimal point.
More able candidates knew the meaning of prime and cube numbers, but others struggled in part (d).

14 This question was done moderately well.
In part (a) 11 was a common incorrect answer from 3 × 3.1 + 1.7.
In part (b) -0.4 was a common incorrect answer with candidates showing little understanding of the order of operations.

15 Few candidates scored the mark in part (a). The majority of candidates did not understand "expression" and those who attempted this often had mixed units in their answer.
In part (b) there were very few attempts at writing down an equation. Most candidates used a numerical approach and generally achieved the correct answer.

16 There was generally little understanding of bearings.
In part (a) 80° was a common incorrect answer.
There were only a few correct lines for the 320° bearing in part (b)(i). Some candidates marked X in an appropriate position on their line in part (ii) although it was not always clear that they fully understood the significance of their answer. Very few candidates appreciated that angle PXS should be 90° in part (iii).

17 In part (a) weaker candidates had little idea as to how to draw a linear graph, but better candidates generally did well on this question. Some plotted the points, but then failed to draw a straight line through them.
Those candidates who drew a correct straight line nearly always found the correct x value in part (b).

18 This question was poorly done. Only the better candidates had the algebraic skills necessary to complete the question.
Consequently in part (a) method marks were rarely given following an incorrect answer.
In part (b) many candidates showed that 5 satisfied the inequality, but were unable to give the correct answer. Some gave an answer of 4.4 without the inequality sign and received just one mark.

19 Most candidates attempted this question. The technique for dividing a number in a given ratio was understood by some candidates, but many had little idea as to how to approach this question. Many answers did not add up to 12, suggesting that candidates did not fully understand what was required.

20 Most candidates attempted this question with varying degrees of success. Answers generally suggested that many candidates did not have a clear idea of what to do, but some scored part marks from showing working that combined the dimensions in some way.

21 Fully correct answers were rare in this question. Many candidates used a factor tree and usually found some of the prime factors using this method. Those who found the correct prime factors often did not know how to give their answer as a product, as the question required.

J512/03 Paper 3 (Higher Tier)

General Comments

Candidates performed well on this paper and were able to show their understanding of a wide range of topics. Presentation of work continues to show an improvement with the vast majority of candidates giving well structured, legible solutions. There were fewer cases of candidates being entered for the wrong tier of assessment.

A disappointing standard of arithmetic was displayed by many candidates. This recurring theme is of real concern as it becomes evident that candidates have become more reliant on their calculator for even the most trivial calculation; there may be some benefit in pencil and paper methods. Questions asking for an explanation need an answer phrased in the context of the question.

It is encouraging to note that candidates were able to apply their mathematical knowledge in a clear and sensible way when tackling more involved problem solving questions. Questions on data and shape still appear to be better answered, although many candidates are getting to grips with the more rigorous requirements of algebra. Appropriate equipment was used carefully and successfully where required.

Time did not seem to be a problem as most candidates attempted all questions.

Comments on Individual Questions

1 In part (a)(i) a large proportion of the candidates commented on the need for a negative answer. Those attempting multiplication invariably went wrong and often overlooked the negative sign of one of the terms being multiplied. Those candidates using estimation, $7^2 = 49$ or $8^2 = 64$, were more successful in their explanations to part (ii). Others who attempted to square 7.2 often ended up with 49.4 having failed to understand how to square decimal numbers. The use of estimation in part (iii) was again the most successful approach; $7 \div 1 = 7$ and $6.3 \div 1 = 6.3$ were the common answers. Of those attempting a calculation, few obtained 7 as their answer. A large number of candidates thought that any division must lead to a lower value and some just stated that the answer must be a decimal.
Part (b)(i) was universally correct. There was varying success, however, with part (ii). As expected, many candidates ignored the order of operations required and gave an answer of 30.
Though the responses to part (c) were better, there was much evidence of candidates inserting more than one pair of brackets. Some did try to cross out those not required.

2 Many candidates had encountered 3-D coordinates and could easily answer this question. Less aware candidates wrote capital letters in the spaces. The most common error was to write the *z*-coordinate second, seemingly confusing the *z*-axis with the vertical *y*-axis in 2-D coordinates.

3 This question was well answered with most candidates showing some clear steps in algebra. A small number failed to multiply both terms inside the bracket in their first step. The biggest mistake was often in solving $2x = -4$. Answers of 8, -8 and 2 were all commonly seen, as well as the correct answer.

4 This was a well answered question. The majority of candidates read the question carefully and presented their method clearly. A small number just gave the number of girls rather than the total number.

5 In part (a) the evaluation of expressions involving either negative numbers or fractions was not well done by many candidates. $(-2)^2 = -4$ and $(½)^2 = 1$ or 2.5 were frequently seen.
There were many correct answers in part (b). A common error was to start the substitution with $n = 0$.

6 Most candidates realised that the addition of the probabilities was required in part (a). This was invariably done successfully. A few incorrectly decided to multiply.
$\frac{0.35}{1}$ sometimes appeared as an answer despite comments in previous reports that this format is not acceptable.
Though some candidates realised that multiplication was required in part (b), many opted to add the probabilities. Surprisingly, a number chose to change the decimals to fractions and often proceeded successfully.

7 The correct formula was widely chosen and the area of a full circle was usually found correctly. A large number of candidates forgot to halve this value for the area of the semi-circle. Of those who remembered to put units into their answer, many wrote cm^2.

8 There were many correct answers to part (a). An answer of 270 did appear a number of times implying that candidates did not know the difference between clockwise and anticlockwise directions. It was also evident that some were measuring the angle, not always accurately enough.
The majority of candidates could describe the translation in part (b) but neglected to name it. Those using the vector format sometimes confused the position or the sign of the two values. Some incorrectly thought that a rotation of 270° in a clockwise direction was a different type of transformation.
There were a good number of correct answers to part (c). Some candidates did miss the negative sign in the y equation and there was the expected confusion between $x =$ and $y =$ equations. Some candidates incorrectly thought that a line parallel to the y-axis had a $y =$ equation.

9 Part (a)(i) and (ii) were answered well with clear supporting working. There were a few numerical slips but all candidates appeared to understand what was required.
The introduction of algebra in part (b) allowed for differentiation between the candidates. Parts (i) and (ii) were usually answered correctly. Unfortunately, in parts (iii) and (v), candidates did not read the question and many did not give their answer in terms of x and y; $p = x – r$ and $px \div yx$ were by far the most common responses. The failure of candidates to get $p = 2x – y$ made a suitable response in part (iv) unlikely.

10 Most candidates recognised the use of Pythagoras' theorem was needed. However, in part (a), poor use of arithmetic let many candidates down, particularly the evaluation of 11^2. Others performed the calculations correctly but failed to establish how they could be used to confirm the result.
Candidates were not as confident with part (b), even when they had the evidence required written in part (a).

11 Nearly all candidates drew a circle, radius 6cm, centre A. Even though a large number knew to draw intersecting arcs from B and C, many failed to draw the bisector. In some cases, the bisector was not extended across the circle to obtain the second point. A small number of candidates used trial and error to locate the two points.

12 It was clear that some candidates did not know what was meant by a 'mixed number'. These candidates left their answer as $\frac{64}{21}$. Others, with less idea of what to do, just multiplied the whole numbers and the fractions separately. There were also candidates who confused the methods of multiplying with addition and dividing. For these there was much incorrect work involving common denominators leading to complex numerical calculations.

13 Pleasingly, part (a) was well done. A few candidates did find just one common factor. A small number, seeing x^2, tried to find two pairs of brackets.
Candidates who started part (b) by dividing by $2\pi r$ before subtracting r were usually more successful than those who multiplied out the brackets first. The majority incorrectly tried to move r or h from within the bracket before either expanding or dividing.

14 Better candidates had no trouble in scoring full marks here.
In part (a) there were some problems with reading off values from the axes and the odd numerical slip. In general, the topic was well understood and answers were correct.
Though the correct answers were commonly seen in part (b), some candidates still thought the upper bound of 12 was 12.4 or 12.49. Less aware candidates gave values like 15 and 10.

15 Parts (a) and (c) caused little problem to most candidates.
In part (b), although the widths were invariably correct, the heights were usually wrong. By far the most popular heights of the bars were 0.4, 0.6, 0.8, 1.2.
The standard of the comments in part (d) showed some improvement on previous years. There are still, however, many candidates who compare a single group instead of looking at the distribution as a whole.

16 The majority of candidates gave the correct answer in part (a).
Though there were many correct answers to part (b), a number of candidates were defeated by the required arithmetic. Wrong answers were often associated with an attempt to use percentages. Others thought that 40, 40 was a good enough split.

17 Work on indices was poor. It was clear that many candidates did not realise that the rules of indices applied here.
Few candidates made any headway with part (a). Better candidates realised that they must subtract the powers but were unable to do that correctly. 2^{2x+7} and $2^{2x} - 3$ were common wrong answers here.
Without an answer to part (a), part (b) proved even more difficult. Some candidates scored a mark for writing $32 = 2^5$, but unfortunately this was more commonly given as 2^4. Some managed to find a correct answer using trial and error.

18 There was a disappointing lack of understanding of powers in part (a). $64^{1/2}$ was often given as 32 and 2^{-4} became -8, -16 or 0.0002. Even those candidates who evaluated the powers correctly often left their answer as $\frac{8}{16}$.
Candidates knew how to expand the brackets in part (b) but often were unable to evaluate each product correctly. For example, $4 \times 2\sqrt{7}$ was $8\sqrt{28}$. By far the most common problem was the evaluation of $3\sqrt{7} \times 2\sqrt{7}$ where $6\sqrt{7}$ was a common wrong answer.

19 This question was the worst answered on the paper. Candidates displayed little knowledge of this topic.
In part (a), (8, 20) was the most popular wrong answer with (2, 5) and (4, 20) also evident.
The uncertainty continued in part (b) with incorrect answers of (1, 7) and (1, 10) common. Of the two parts, this was, however, the better answered.

20 It was pleasing to see most candidates 'having a go' at a solution, but only the better candidates gained marks for this question. There were some clear, concise, correct answers produced. The most common start was to add the two equations; this involved adding the two *x* expressions and ignoring the *y* terms completely. Others started by multiplying out the brackets but could go no further. Those who correctly started by trying to subtract or equate the two equations often got tangled up in sign errors. Trial and error was sometimes employed but rarely with any success.

J512/04 Paper 4 (Higher Tier)

General Comments

Overall the standard was high and there were significant numbers of very good papers demonstrating that candidates had clearly been well prepared. There were many high scores from candidates who displayed an excellent knowledge of the topics; these candidates showed full and accurate working throughout and demonstrated skills, knowledge and the ability to interpret. It was pleasing to see the majority of candidates were able to attempt all questions in the paper. There was some evidence that a minority of candidates were not familiar with the content of the Higher Tier specification and appeared to have been inappropriately entered for this 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 with clear working shown so that marks could be awarded even when the final answer was incorrect. However, some candidates created problems for themselves in their reluctance to set out working tidily and rather too many were careless when writing + and × signs.

Questions requiring an explanation of the mathematics were less well answered.

Comments on Individual Questions

1 The majority of candidates scored full marks in parts (a) and (b). Some candidates rounded 10.189 to 10.29 in part (b).

2 In part (a) almost all candidates scored full marks, although answers were not always well presented.
In part (b) a significant number of candidates did not give an equation or gave an equation with mixed units. However, the majority of candidates did arrive at the correct answer.

3 There were a lot of correct answers to part (a). The most common wrong answer was 80° ±2° with some candidates measuring the angle from the west direction and giving 10°.
There was a mixed response to part (b). In part (i) a good proportion of accurate lines were drawn although some candidates measured 40° from the west direction producing a line on a bearing of 310° or 230°. These candidates often scored the mark in part (ii) for the line PX making an angle of approx 90° with SX. Most candidates used a ruler and a protractor and there were some nice constructions of perpendiculars to XS. A few candidates drew PS as Richard's route, and these usually put an X at S, or omitted it. In part (iii) quite a lot of candidates knew that the angle PXS should have been 90° while others measured an angle from their diagram, in either the correct or incorrect place.

4 The majority of candidates could successfully use the formula for area of a trapezium in part (a)(i). In part (ii) most candidates who scored marks found the angle correctly, but only half were able to give a correct reason.
Part (b) was usually correct with very few candidates showing any working. Typical incorrect answers here were 47 or 45.

5 In part (a) many candidates realised that 4 × 15 minutes = 1 hour and so were able to write down 0.75 × 4 and give the correct answer. The other method commonly used was to divide the distance by the time for the average speed that is 0.75 ÷ 0.25. However, a large number of candidates did not deal with the units correctly with the relatively common answer of 0.05 from 0.75 ÷ 15.
Part (b) was answered well with very few incorrect answers.
In part (c) most candidates made an attempt to calculate the time for the run. Some used an incorrect formula such as distance × time but most used distance ÷ time. As in part (a), many candidates had difficulty with the time and it was quite common to see answers such as 41.6 coming from 5/12 × 100. Those candidates who did obtain 25 minutes for the run did not always add the times for the swimming and cycling. Another error seen quite frequently was candidates misreading the time for the cycling from the graph, giving 45 minutes rather than 43 minutes.

6 A very high proportion of candidates scored full marks for this question.

7 A significant number of candidates failed to use the most basic processes of algebra and used trial and error as the method of choice to solve equations.
The majority of candidates scored highly in parts (a) and (b).
In part (c) there were lots of correct answers, but some candidates turned the inequality into an equation. Some gave the solution to the inequality as a list of numbers.

8 A very high proportion of candidates scored full marks for this question.

9 The majority of candidates scored full marks for part (a)(i). A few gave their final answer as a sum rather than a product, or wrote the factors as a list separated by commas. However, most candidates could not clearly use their answer to explain why 36 is a square number in part (ii).
Part (b) was answered successfully by most candidates, but a significant number spent a lot of time on trial and error rather than using prime factors to find the solution quickly. It was common to see an attempt at trials and it was noted that occasionally the correct trial was obtained but the candidate did not identify it as being the one required to give the answer.

10 There was a mixed response to part (a). Many candidates gave a fully correct answer showing all steps in the method. However, some candidates divided by an incorrect value such as 5 and others chose values within the class, usually the upper bounds, to use as the midpoints. Other common errors included 31 ÷ 5 or an attempt using cumulative frequencies. A number of candidates failed to show sufficient method to earn part marks.
In part (b) diagrams were well drawn and nearly always correct. Those candidates who did not score full marks nearly all scored part marks for a histogram or translated polygon.
In part (c) most candidates got part (i) correct with less getting part (ii) correct. A common error was to use the middle class interval ($20 \leq m < 30$) as the median. New classes were sometimes invented ($5 \leq m < 15$), and answers were occasionally numbers rather than classes.
Candidates found part (d) challenging. A general statement referenced to a measure of

location was required.
In part (e)(i) the majority of candidates appreciated that a number less than 20 was required giving either a single value or a range, but could not explain why. Candidates found part (ii) straightforward with most giving the correct response.

11 The question was done well. In parts (a) and (b) most candidates calculated the points and plotted them correctly. There were many very nice curves, although some candidates chose to draw polygons and some candidates made no attempt to join their points.
Several candidates who attempted part (c) misread the scale or ignored the negative sign.

12 About half of the candidates found this standard simultaneous equations question straightforward. Those who chose the elimination method sometimes added the original equations together without equating the coefficients of either x or y. However, most candidates were able to select an appropriate multiplier and although a few did not multiply the right hand numbers by their chosen multiplier the majority completed the first step correctly. Candidates sometimes made a sign error when carrying out the subtraction. Of the candidates that eliminated y, most reached $-10x = 5$ where common errors were $x = \pm 2$ or $x = ½$. Almost all candidates who gave a correct answer for either x or y were generally able to substitute back to obtain the correct answer for the other variable. The less common method of rearranging for x or for y and then substituting was usually successful. Candidates who used a trial and improvement method were almost always unsuccessful.

13 Better candidates scored highly on this question. A significant number of candidates did correctly find the interest before tax was deducted, £65, but were then unable to convert this to a percentage interest rate. The common error was $1.2 \times 52 = 62.4$.

14 Part (a)(i) was correctly answered by over half of all candidates. Common errors included adding or dividing powers of x and eliminating y. Candidates were less successful in part (ii) with over half scoring either two marks, or one mark for getting two terms correct in a single product.
Better candidates did well in part (b), but too many appeared not to know any method to solve a quadratic equation.
In part (c) some candidates correctly found the constant, but failed to give their answer as an equation. The common error was to write x proportional to y.

15 About half of the candidates knew how to use trigonometry and scored full marks throughout this question. Some candidates used long methods, such as those involving Pythagoras or applying the sine rule several times to reach an answer, and lost accuracy through premature approximation part way through their method. In such cases it is crucial that candidates show working in order to earn method marks. About a third of candidates appeared to have no knowledge of trigonometry.

16 About half of the candidates scored some marks for this question although many did not appreciate that for arc length you need to use the circumference formula and not the area formula. Those candidates who successfully calculated the arc length did not always give the distance to a suitable degree of accuracy.

17 Many candidates made some attempt at this question and scored at least one mark, usually for a method using trigonometry which led to a correct solution. However, relatively few candidates realised the significance of the statement that lengths were measured to the nearest 10cm. Those candidates who did, generally then gave either or both upper and lower bounds correctly. However, not all candidates chose to use the correct upper bound with the correct lower bound, but instead used all possible combinations of upper and lower bounds. To earn the final mark, candidates needed to be clear which calculation they were using on which to base their reasoning .

18 Many candidates found this question straightforward showing a good understanding of probability without replacement. Only occasionally was the question omitted completely.
In part (a) the tree diagram was often completed correctly and it is pleasing to report that only a few candidates treated the question as 'with replacement'. A few candidates only gave the numerators of the required fractions.
In part (b) most candidates were able to identify the two relevant paths through the tree and many of these candidates gave the correct final answer. However, some candidates wrote down the correct products but did not add them and there were some arithmetical errors in the addition of the fractions despite this being a calculator paper.

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