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Oxford Cambridge and RSA

GCSE

Mathematics A

General Certificate of Secondary Education **J562**

OCR Report to Centres June 2014

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General Certificate of Secondary Education

Mathematics A (J562)

OCR REPORT TO CENTRES

A501/01 Mathematics Unit A (Foundation Tier)

General Comments

The entry for this session was somewhat higher than in June last year, although still some way below entries in previous June sessions.

Marks ranged from 3 to 60 out of 60, but the mean mark is the highest it has ever been on this component, suggesting that the paper was accessible to most candidates.

There seems to have been some slight improvement in the candidates' ability to do algebra, although they had problems with bearings, mean from a frequency table and using a stem and leaf diagram.

This time, candidates were better able to attempt the overlap questions with the higher level paper, with some good solutions seen.

Comments on Individual Questions

1 Most candidates got off to a good start with this question, although "miles" was occasionally given as the second answer even though it was not one of the given options.

Other errors that were often seen in the first two parts were grams and metres instead of kilograms and kilometres respectively.

2 Part (a) was well attempted by most candidates with many correct answers. Those who did not earn 2 marks usually scored the part mark for a pair of values which multiply together to make 30, usually 3 and 10 or 5 and 6.

In part (b), there were significantly fewer correct responses. Those that were correct invariably used 4 and 9, and 1 was very rare. Candidates often gave factors of 36 that were not square numbers, with 6 being a common error.

3 Part (a) was usually correct with encouragingly few spelling errors.

Both bits of part (b) usually earned full marks. However, there were some issues with correct notation for sums of money such as £540.8 in part (b)(i). A common error in this part was to confuse the pence part, giving an answer of £540.08.

4 Nearly all candidates drew the correct pattern for part (a). Some candidates were unsure where on the script to draw the pattern so the correct pattern was often seen twice on the script.

Most candidates scored at least 1 mark in part (b). Whenever the number of dots was incorrect it was nevertheless usually backed up by a correct reason.

Part (c) proved more troublesome. 230 was a common incorrect answer for the number of dots in Pattern 100, possibly as this is 10 times the number of dots in Pattern 10. Equally wrong, but less common, was 500 from 100 times the number of dots (5) in Pattern 1.

5 This was one of the best answered questions on the paper. Most candidates gained all 6 marks. Marks were occasionally lost for bad notation, e.g. 0.75p instead of £0.75 or 75p, but rarely for a wrong calculation.

A few candidates worked out the values correctly but transferred them to the table wrongly.

6 Part (a)(i) was usually correct.

Part (a)(ii) proved more difficult. Common errors included 5*a* and 6*a*.

The equations in part (b) were generally well solved. Occasionally it was necessary to award SC1 for embedded answers, although this occurred less often than in previous sessions.

Part (c) was less well done, with the word "expression" seemingly not well understood. Many candidates prefixed their expressions with "s =", presumably for Sam.

Part (d) was correct roughly half the time, and many candidates who did not score both marks at least earned the method mark for −12 seen. The answer was sometimes left as 12 + −12, although this became 24 or 144 on occasions.

7 Although there were many correct triangles seen, it was not unusual for there to be no arcs drawn, despite the instruction in the question saying "Do not rub out your construction lines".

Isosceles rather than equilateral triangles were quite common.

8 This question discriminated very well between candidates and this was a good question for better candidates. Most scored at least 1 mark, this usually being for a correct reading from the jug.

Answers were usually clear and well set out and so were easy to mark. However, many candidates misunderstood and did not use the conversion from 1 litre to 1000 ml.

Weaker candidates failed to deal with finding the fraction of a pint, i.e. 0.75 x 568.

Many candidates failed to notice that they should be starting with a litre of milk and just used the 420ml in the jug.

9 Part (a)(i) was invariably correct, as was part (a)(ii) although 30 was a common wrong answer here, presumably from using the numbers in the "Totals" column rather than the "Abbey" column.

Part (b) was not well answered. Some candidates just ticked one of the boxes and did not even make a comment. However, a good number of candidates were aware of the need for an "Other" option.

In part (c), there were few frequency polygons and vertical line diagrams. However, that did not stop some candidates spoiling their bar charts by having unequal bar widths and/or uneven gaps between bars.

10 In part (a)(i), weaker candidates could not interpret the diagram well, so ranges of 8 (for example) were common. The method mark was rarely awarded alone as candidates who got that far usually gave the right answer.

In part (a)(ii) there were fewer correct answers, but this time the method mark was often awarded for an answer of 47 or 49 or for those values indicated in the stem and leaf diagram.

Part (b) was not well done. Those who got to 1300 often divided by 5. A very common error was just to add up the frequencies and then divide that total by 5. However, candidates seem to be getting better at showing working..

11 A good number of candidates scored full marks in part (a). For those who went wrong, a common error was to divide 24 by 5, as if 24 hours were the total number of hours worked rather than just Caroline's hours. Consequently, answers of 2×4.8 = 9.6 were frequently seen.

Candidates were generally less successful in part (b). The most common error was to see 26 000 divided separately by 3 and then by 2 giving answers of £8666 and £13 000 (or £17 333).

12 A good majority of candidates scored at least 1 mark in part (a). A common error was 32.5 from measuring AB as 6.5 cm.

Part (b) was the lowest scoring question on the whole paper. Many candidates gave no answer at all, while those who did write something often gave the bearing of Borsey from Aylton rather than the other way round. Other wrong answers, both obtuse and acute, were very common.

In part (c) there were a lot of blank answer spaces, but some correct lines were seen, and quite a few candidates scored 1 mark for a line of the correct length in various (incorrect) directions. Candidates generally had difficulty with bearings over 180°.

A501/02 Mathematics Unit A (Higher Tier)

General Comments:

Now that this is a totally linear specification, it was noticeable that candidates were more confident with the content of this unit compared to past sessions. There remained a few weak candidates who had little knowledge of the content of the Higher tier and who therefore did not attempt much of that, but the vast majority were able to make a good attempt at most of the questions, or at least to 'have a go' at them.

This helpful attitude was exemplified in attempts at the AO3 questions, especially in question 10, where a mix of algebra and trigonometry was required. However, in question 12, lack of understanding of function notation led to many wrong initial statements being seen.

Comments on Individual Questions:

1 Candidates found the first part of this ratio question harder than the second. In the first part, most candidates had it correct but the common error was to apply the same technique as part (b) and to divide by 5 instead of by 3, treating 24 hours as the total for both people instead of Caroline's share

2 Candidates usually answered part (a) well, demonstrating good calculator and rounding skills. However, as expected, how to find a reciprocal was less well-known. In the last part, most candidates were able to insert brackets correctly, with the first calculation being correct more often than the second.

3 Most candidates measured the length accurately and found the distance, although very occasionally errors such as $6.2 \times 5 = 30.2$ were seen. Finding the bearing, with the reflex angle, was poorly done by many. Some measured anticlockwise at B giving values around 46 - 48 while others only gave the part of the angle above 180 with answers around 132 - 134. However, the position of C was constructed accurately by many candidates, with any errors usually with the bearing rather than the distance.

4 Most were able to expand the brackets reach the $5a$ part of the expression but sign errors when expanding led to a very common error of $5a + 26$ or less frequently $5a - 14$. In part (b) some only partially factorised, but gained some credit as this was usually done correctly. Extracting only $2y$ or y as the common factor were the most common errors. A few candidates had no idea how to factorise.

5 This sequence question was done well, with errors in finding the terms of the sequence fairly rare in part (a). Finding the nth term of a sequence in part (b) was also usually correct, with some carrying out checks that their expression was correct. A few made the error $n + 6$, often with + 6 marked between the terms.

6 Prime factorisation trees were very common and many were fully correct. Others chose repeated division and a few used Venn diagrams. However the HCF was not always chosen from these diagrams, though lesser factors often gained partial credit. A few, after correct diagrams, thought the choice of HCF was between a 2 or a 3 so chose 3. Others had correct working but then used the factors to find the LCM.

7 Estimating the mean was well done with good supporting working. Many were fully correct. A few used class widths or end points instead of the mid points while a small number simply added the frequencies and divided by 5. In part (b), many interpreted the boxplot correctly, although occasionally there were errors in reading off, while some found the range instead of the interquartile range.

8 In part (a), most candidates obtained the single solution of $x = 5$, but few included the -5. The other common error was to perform the two operations in reverse. In part (b), about half the candidates rearranged the formula completely correctly. Square rooting followed by division by 2 was the most common error, but by this stage of the paper some of the weaker candidates were struggling and some had little idea of where to begin.

9 Good candidates answered this well, although a few came to the wrong conclusion. Merely attempting 2-D Pythagoras was the usual error. Weak candidates often found the volume.

10 Many candidates made good attempts at this AO3 question, particularly part (a). Many obtained 658, with a few others making an arithmetic error in their working. There was good use of trigonometry with many correct angles found. Some candidates used Pythagoras' theorem to find the hypotenuse and then $\sin^{-1}$ or $\cos^{-1}$ and often did so correctly. In part (b), fewer gained full marks by showing all the conditions were met by their solution, but many and managed to set-up and solve $2R + 270 = 700$.

11 Quite a good number of histograms were drawn. Frequency graphs were also in evidence but perhaps not as many as on past occasions, and many candidates seemed to realise they needed to calculate something first. Errors were inverting the division, multiplying frequency by width or, occasionally, performing a calculation involving the mid-points or cumulative frequency. Most scales were appropriate and consistent for their values, although the 'frequency density' label was often missing. The width of the first bar extending to zero, rather than starting at 10, was another common error. In part (b), those who had been able to work out frequency densities to draw their graph, and a few others, usually correctly interpreted the histogram to work out the number of people cycling for 10 hours or more. However, in the last part, although most responses used the first bar, few candidates could correctly interpret its meaning in relation to the time taken, with many referring to the number of cyclists or comparing its 'frequency' with that of the other bars. Those that did mention time often thought the shortest time was 2 hours.

12 The topic of functions continues to be one that many candidates find difficult. So here, although quite a few good, correct solutions were seen, there were also many showing a very confused understanding of the notation. For instance in using the statement $f(2) = 10$, the roles of the 2 and the 10 were sometimes swapped.

A502/01 Mathematics Unit B (Foundation Tier)

General Comments

The paper appeared accessible to the vast majority of candidates, almost all of whom completed the paper. Many scored more than 50% of the available marks. Weaker candidates scored marks throughout the paper.

Candidates' arithmetic skills were too often inadequate. Some common errors included 11 × 11 = 122 and an inability to divide 360 by 8. However, the performance on the QWC question was quite good, even from weaker candidates. Many candidates showed working to support their responses, both in the QWC and other questions.

A disappointing number of candidates did not know the correct name for either a hexagon or a trapezium. Errors in spelling were condoned but were also, regrettably, common. Many candidates lost marks for not reading questions carefully enough.

Weaker candidates need to understand the meaning of "**Not to scale**" beside a diagram, as many attempted to answer questions by measuring.

Comments on Individual Questions

1 The question was well done with few errors on part (a). The common wrong answer was 2.5. Most answered (b) well but few appeared to see the connection between (i) and (ii)

2 This question was also well answered. Most candidates scored a mark for finding card 28 but, in part (b), many failed to score the second mark for explaining that Laura needed 47 and Mark held this card. Many just said that none of her cards could add to 53 to make 100. Some scored 1 mark for giving one example. Others scored full marks for showing that none of her cards ended in 7 and so could not add to 3 to end in 0 and make 100. A few scored no marks for giving potentially correct answers that were written inaccurately. A small number misunderstood the question and thought that the highest card played would win.

3 Parts (a)(i) and (ii) were well answered. A very few candidates reversed the coordinates. Part (iii) was poorly answered. A common misread was to think that AC was a **side** of the square and not a diagonal. In this case a follow through answer scored 1 mark although quite a few gave the answer (8, 5) which came from a rectangle with one side AC.

Part (b) was also not well answered. A few circles were drawn on the diagram. All the responses were offered at some time by candidates.

4 Part (a) was poorly answered. A common error was “parallelogram”, presumably because of the parallel lines. “Square” was given by some weaker candidates.

Parts (b) and (c) were adequately answered, although acute, obtuse, 90^{o} and 270^{o} were all seen for (b) and some candidates clearly measured (c).

Part (d) saw, hextagon, hetagone and other variants but hepagon scored no marks, being too close to heptagon.

Part (e) saw a surprising number of candidates lose 1 mark. Many wrote 360 ÷ 8, but then gave answers that were wrong after attempting the division. Others gave the answer as 135^{o}, showing 45^{o} as the interior angle. This showed a failure to appreciate the magnitude of angles (even given that the diagram was not drawn to scale).

5 This question was often well answered. In part a(i) a surprising number attempted to work out *g* and gave such answers as 180^{o}, 52^{o} and 123^{o} (from measuring). Part (ii) was often well answered but 180^{o} was a common error. Part a(iii) was less well answered, although many did score 2 marks. A common error was 65^{o} but some attempted 180 – 65 – 65 and failed to get 50.

Part (b) was reasonably answered but a common error was 125^{o}. Some wrote 125 against all the angles in the parallelogram. Both responses indicated the same misunderstanding of the magnitude of angles. Again, some wrote 180 – 125 but could not get 50.

In both parts the weaker candidates appear to have measured the angles on the diagram.

6 This question was well answered. In part (a), a common error was to write nineteen squared or just, square root. In part (b) the common errors included 122, and 22 for 11^2 and 32 for $\sqrt{64}$.

Even weaker candidates scored some marks for part (c), often for finding 4 as the denominator. Few used indices to reach an answer. Most evaluated the individual powers, where errors were made. Predictably $2^4 = 8$ and so $\frac{16}{4}$ was a common wrong step to score 1 mark. Some candidates reached $\frac{32}{4}$ but could not correctly divide 32 by 4.

7 This QWC question was answered well. Many scored 3 of the 5 marks for attempting two conversions with the correct method and “yes”. Working was usually seen. Candidates who changed imperial units to metric were the most successful. 8 feet = 240 cm was often seen and 6 feet = 180 cm was also common, though some went wrong when changing 4 inches to cm. Some thought that 240 cm = 2.04 m and some added 10 cm to 180 cm to get 280 cm. Few showed clear and explicit comparisons between the lengths of the room and the carpet and so failed to score the final 2 marks, many contenting themselves with, “...and so it will fit”.

Quite a number of candidates, having converted the lengths, tried to use area to compare the two.

8 Many correct answers were seen to parts (a) and (b) although the usual arithmetic errors occurred. 24 and 32 were common errors for the final two entries in the table.

Most candidates plotted their points accurately on the grid but those who had wrong answers were often not able to plot all the points. Follow through marks often meant that 1 mark was scored. A significant number of candidates joined the point (100, 12) to the origin. A pleasing number of candidates had a ruler. Some misinterpreted a line graph as a stick graph.

Most candidates correctly gave the answer 250 to part (d).

Part (e) was poorly answered with many candidates not evaluating the formula correctly. Most added 8 and 4 and multiplied by 200. Most did not read the information accurately and, even when reaching 2400, rewrote this as £24. They failed to appreciate the definition of the variables. Very few correct answers were seen for pat (ii); however, the very best candidates did obtain a correct formula.

9 This question was common to Higher and Foundation Tiers, and many candidates scored 1 or 2 marks. This was often for giving the correct answer without working or for converting 40% to a fraction or decimal. However, conversion of all three fractions to a common form was beyond many candidates.

Candidates who attempted to convert fractions to decimals were rarely successful as their division skills were inadequate. Common errors were to write, for example, $\frac{5}{12}$ as 2.2 or 2.4 or 60.

10 This, second common question also saw many candidates score marks. Parts (a), (b) and (c) were attempted with some success by all. Stronger candidates were usually successful on all parts.

11 The final question was also common to both tiers. In part (a) many lost a mark for describing the correlation in the first case as strong. Many also lost a mark in the second case for, after stating there was no correlation, then illogically, describing its strength. Weaker candidates clearly had no idea of correlation and wrote descriptions of the data being spread out or connected.

In part (b) many used the scale correctly to complete the scatter graph and most candidates wrote a response to the final two parts. A common error in part (ii) was, effectively, to say “Because there isn’t one” without explaining why. These candidates often used many words to do this. Some gave a succinct and correct response that the data formed a curve or there was no (linear) correlation.

In part (ii) many candidates gave partially correct responses but, because there was only 1 mark, these were insufficient to score. A common error was to say that, as people aged their reaction times became slower, without describing the improvement from very young age to around 20 years of age. Some candidates misread the data and thought that a **higher** time meant **better** reactions.

A502/02 Mathematics Unit B (Higher Tier)

General Comments:

The paper was generally accessible with most candidates scoring between 15 and 45 marks. Many were able to obtain over 50 showing real competence with the various techniques. Most of the candidates seemed to have been well prepared for the exam and were able to make attempts at the majority of the questions on the paper. There were a few candidates scoring fewer than 15 marks who would have benefited from entering the Foundation Tier rather than the Higher Tier paper.

Generally candidates were showing the working used in order to obtain their answers and so were able to obtain part marks for questions even when their answer was incorrect. The question relating to the quality of written communication (Q8) showed the full range of quality and many candidates could have improved their solutions by showing working clearly and labelling the values they found. Most candidates used rulers where necessary.

Comments on Individual Questions:

1 There were many clear, precise answers with the majority being from those who converted to fractions. The most common denominators chosen were 120, 480 and 96, although there were many who successfully worked in decimals or percentages. The few who tried reasoning through the use of diagrams did not produce enough accurate supporting work to give a full and comprehensive solution. It is worth noting that the question did ask for candidates to show their method clearly.

2 All parts of his question were answered fully correctly by the vast majority of candidates.

3 In part (a) many could recognize the given shape as a trapezium but the common wrong answers were rhombus and parallelogram.

In part (b) the angle was generally given correctly and it was pleasing to see the number of candidates that could use the correct terminology of ‘alternate angles’. Some weaker candidates used contradictory multiple terms such as ‘corresponding Z-angle’. A handful of candidates incorrectly thought that ‘parallel lines’ was sufficient reason.

4 Parts (a) and (b) of this question were answered very well with nearly all candidates giving answers with the correct digits and most the correct value. Part (c) was slightly more challenging but most candidates gained at least 1 mark.

5 In part (a) the majority of candidates stated ‘negative’ and ‘no correlation’ for the 2 diagrams. It was less common to see an acceptable strength for the first diagram and a number of answers gave a strength to the second diagram. There were very few answers that gave ‘random’ or ‘scattered’ or ‘close together’ rather than use standard terminology.

Part (b)(i) was answered very well with few wrong plots. In part (ii) candidates found it difficult to express their thoughts in words. It was a common error to simply state that the points were at random or scattered without noticing that there was no correlation or that a curve would have been a better choice than a straight line. Candidates need to be clear in their language – using ‘it’ was not sufficient as examiners did not know if candidates were referring to time or speed.

Candidates generally scored better in part (iii) with most being aware that the reaction time decreased and then increased but they were confused as to appropriate words to use. A number thought that the reaction time was better for very young and older people as it was highest for these age groups. It would be better if candidates avoided such value judgements.

6 Most candidates successfully solved the inequality in both parts of this question. Errors in part (a) were mostly in transposing the −11 or in dividing 36 by 3. A small number ended with the solution to an equation.

Part (b) was more challenging, but apart from a few who were not sure how to present their answer and left it in various inequality forms, this part was also quite well done.

7 Diagrams were usually neatly drawn with ruled lines. Most candidates were able to rotate shape S correctly in part (a). Common errors were using the wrong centre or rotating through 90° anticlockwise.

Part (b) was less well answered with many confusing the scale factor of −2 with a scale factor of ½. Those drawing rays to help often then got confused about which point was which, although these often got 1 mark for a shape with two correct vertices.

8 This question assessed the candidates' quality of written communication (QWC) and examiners commented on the high quality of many candidates' answers. It was pleasing to see that most candidates understood the necessity to show all steps of their working in order to achieve full marks.

There were many very clear, precise solutions, showing all the relevant working and then giving the 2 answers with appropriate units. For those who correctly found the scale factor, the most common error was in trying to divide 22.5 by 2.5, with an answer of 8.10 being seen fairly often. The written communication required for this question was lacking for those few who simply quoted a number to multiply or divide by without showing that it came from the scale factors 10/4 or 4/10. A few responses were seen where +6 or -6 was used or other linear rules such as × 2 + 2 and there were, occasionally, attempts to use Pythagoras's Theorem.

9 Most candidates were able to demonstrate their understanding of $y=mx+c$ and give the correct answers for the first 3 parts of question. Common errors for the gradient were $4x$ or −5 and (0,5) or (−5,0) for the y-intercept. In part (c) some candidates were able to pick up 1 mark for just the correct gradient or the correct y intercept, while many felt the need to emphasise both parts and answered $y=4x+0$.

Part (d) was less well answered with only the more able capable of explaining the error. Correct answers usually referred to the gradient not being the negative reciprocal or another common answer was to state the correct line should be $y= -\frac{1}{4}x - 5$. A few strong candidates demonstrated that the product of the gradients was not equal to −1. Weaker candidates referred just to reciprocals or 'not equal to' or 'not opposite'.

10 This was a comparatively straightforward simultaneous equation question, as only one of the equations had to be multiplied, and consequently it was well done. Few were not able to score at least M1 but the A1 was sometimes lost, usually due to incorrectly adding to eliminate one variable. Other errors included giving $x = 1$ following $5x = -5$. A few weaker candidates attempted trial and improvement.

11 In part (a), many candidates were able to give the decimal equivalent of $\frac{5}{9}$. Often the value had simply been learned but more common was to divide 5 by 9. The most common errors were to divide 'the wrong way round' giving an answer of 1.8 or to give 0.59 (with or without recurring dots).

In part (b) stronger candidates realised they were being asked to convert the recurring decimal to a fraction and many could complete that fully either by multiplying the given decimal by 100 or by subtracting the whole number first. Some got to $\frac{201}{99}$ correctly but did not simplify it, earning 3 out of 4 marks. Weaker candidates tended to make numerous random attempts to find two numbers that divided to give the correct answer, rarely with any success. Some realised they had to multiply the given number by a power of 10 but used 10 or 1000 rather than 100. Some got 1 mark for multiplying by 100 correctly, but then often forgot to subtract the 2 and went on to give the wrong answer of $\frac{203}{99}$.

12 The majority of answers in part (a) were correct as candidates recognised that they were looking at the point of intersection of the 2 relevant lines. A number of candidates successfully solved the simultaneous equations to give correct fractions. Others, who attempted this method, were unable to proceed very far.

Part (b) was less successful as candidates did not realise that the second given equation was the third line drawn on the diagram – extra lines were sometimes seen drawn on the diagram. A number of candidates found coordinates of the correct point of intersection but then doubled their answers to 'compensate' for having divided $2x + 2y = 12$ to give $x + y = 6$ at the start. Others doubled their answers to (a) as doubling the x coordinate was the only difference between the 2 parts to the question. A few confused parts (a) and (b) by giving their answers for the wrong parts.

13 The word 'exact' in the question was significant only to the strongest candidates who had little difficulty in achieving 3 correct answers. However many candidates gave answers to multiple decimal places.

In part (a)(i), many candidates spoiled a correct answer by trying to 'evaluate' $125\sqrt{2}$. Common errors involved attempts at $\sqrt{125}$ and common wrong answers were $\sqrt{250}$, 250 or 62.5. Many managed to get a follow through mark in part (a)(ii) for their answer to (a)(i) × $\sqrt{2}$.

In part (b) many candidates gained 1 mark for $\frac{1000}{\sqrt{2}}$, although many did $1000\times\sqrt{2}$ by mistake. The better candidates knew that numerator and denominator needed multiplying by $\sqrt{2}$ and generally went on to give the correct answer.

A503/01 Mathematics Unit C (Foundation Tier)

General Comments:

The majority of candidates were well prepared for the exam and it was encouraging again to see a large number of candidates making a good attempt at the work at this level, although the spread of ability was quite wide. Work was generally well presented and logically set out in many cases. Candidates generally try to show a method where parts of questions are worth more than one mark. There were several longer questions that gave candidates the opportunity to demonstrate their problem solving and communication skills, and these proved to be the harder areas for the candidates in this session.

Most candidates attempted all of the questions and there were a number scoring high marks on the exam, but difficulties on some parts of questions and with some questions limited the number of very high scores this time. The weaker areas included the topics of unit conversion, volumes of cubes and cuboids in a problem solving context, subtracting fractions and showing reasoning, interpreting a problem graphically, describing errors in an algebraic method, relative frequency and expected value and length and perimeter in a multi-step problem. The stronger areas included time and money, simple probability and the probability scale, solving simple equations, rounding to integers or decimal places and coordinates.

A calculator is allowed for this unit and the use of calculators was more evident in this session with only a very few attempting non- calculator methods for calculations or failing to interpret the answer on the calculator correctly.

Comments on Individual Questions:

1 Parts (a), (b) and (c) provided a straightforward start for candidates and these were very well answered. A few gave answers of 6 for part (c) rather than 5.

Part (d) proved more difficult for some with a common error of 1 sometimes given. In all these parts candidates kept their selection to the number cards provided.

In part (e), answers were more varied, there were several correct options for candidates to choose and many were successful. A number invented their own cards however in this part and gave a calculation than worked, but not with the cards provided.

2 Most answered part (a) very well but for some, who often did well on the harder parts of this paper, time calculation can be a weak area. A few did not give an answer in the 24 hour clock and in this case it was essential that they gave pm with their answer.

Part (b) was very well answered with clear working. A few worked out prices other than for two adults and 3 children and a few weaker candidates could not interpret the calculator display in terms on money.

3 Part (a) was very well answered and the majority of candidates were able to select the correct letters from the probability scale that represented the given event.

Part (b) involved some simple problem solving; a good number were successful in giving one of the correct solutions. Most others were able to identify that there were 5 tuna sandwiches left from the condition that choosing a tuna sandwich was even, many were unable to give more cheese sandwiches left than chicken. A few gave an answer such as 4 cheese, where there were more cheese sandwiches left than there were at the start of the day.

4 Part (a) and (b) were very well done with very few errors. The only common error was in giving an answer of £4.4 for part (b) where interpretation from the calculator display to give £4.40 was required.

5 Candidates found this question harder. In part (a) some were clearly guessing the correct choice for 15 feet in metres, with 3m and 7.5m common incorrect answers. It was very rare to see a conversion stated and less than one quarter of students were correct with their choice.

Part (b) was answered very well in the first part, with an answer of 96. The second part was answered less well, with a common error to give an answer of 640 miles by treating the conversion as 400 miles to kilometres rather than the other way round.

6 This was very well answered in parts (a) and (b) with few incorrect answers.

A number struggled with the bearing in part (c) and gave answers such as 60°, 125° and a selection of other incorrect angles. A few gave a compass direction such as NE which is not acceptable for a bearing.

Part (d) involved simple interpretation of two conditions and was answered reasonably well. The most common error was to plot and give the coordinates of a point that satisfied one of the conditions only.

7 Part (a) was answered very well.

In part (b), most interpreted the question as saying the shape had 5 layers and gave an answer of 100. The word ‘more’ was in bold to emphasise the importance of this but less than 30% of candidates were successful here.

Part (c) was answered very well, and almost all were able to count the cubes, including the invisible ones correctly.

Part (d) was a challenge, but many used a count the gaps strategy to solve part (i) and gave a correct answer of 9. Correct answers to part (ii) were much fewer and only a few recognised that the size of the smallest cube was 4 by 4 by 4, and were able to work out the difference. Counting on strategies were less successful in the second part.

8 Part (a) was answered very well and most were able to give 35 as the answer.

Part (b) was answered less well with the errors of 3.9 or 4 being most common.

In part (c), many candidates did not appear to know what was meant by significant figures and many rounded their answers to two decimal places instead. Common errors included 125, 124.000, 120.000, 124.92 .

9 This question tested various algebraic skills including simplifying expressions and solving equations. Part (a) was not answered as well as expected. The correct answer 63*y* was given by many candidates in the first part but there were a range of errors, including 63 × *y* and16*y*. The second part was answered poorly with the majority giving an answer of 5*t* for the division. A few did recognise the common factor of *t* in the numerator and denominator of the expression to give an answer of 5. In the third part, many gained partial credit for either correctly collecting the terms in *a* or *b*, but a minority earned both marks, with the most common error being not to deal correctly with the negative term in *a* correctly.
Part (b) was answered quite well. Many were successful in the first part of (b); the common error was to give the answer 5 from 30 ÷ 6 rather than 30 × 6.

The second part was answered well; many candidates did not show the steps for this and simply gave a solution which is fine if it is correct. Candidates should note that solutions to equations should be stated clearly and not left embedded in the original equation.

Part (c) had a mixed response. Straightforward for many, but for others the temptation of incorrectly simplifying the expression further after a correct expansion of the brackets was too great and answers such as 32 or 32*x* were often seen.

10 Parts (a)(i) and (ii) involved simple conversion of metric units. A range of answers were seen and many candidates were simply not well versed in these conversions. Answers such as 560, 56, 0.56 and 0.0056 were regularly seen in the first part, and 320 was the most common error in the second part.

Part (b) was quite well done. Many candidates gained partial marks for showing 120 or 1500 or 600 in their working. It was rare to see candidates working in litres but those who did usually had the correct solution and converted to millilitres at the end.

11 Part (a), involving practical applications of money, was quite well done, but it was surprising that candidates made errors with part (i), which was the more straightforward part, rather than part (ii). Working with a mixture of pence and pounds leading to the answer £54.11 was the very common error. In part (ii), the reverse process was less of a problem than expected as many who made errors in part (i) had the correct solution here and worked correctly with the mixed units.

Part (b) appeared straightforward and many were successful, however a number of candidates appeared to think that £1875 was not a reasonable answer since after having the correct working of 22500 ÷ 12 they gave the answer as £18.75. In part (ii), £9000 was a common wrong answer as candidates used 4% = 0.4. Others found the 900 but then added it to 22500 and a few found 23400 directly by multiplying by 1.04 and misunderstood the question as a percentage increase problem.

12 Part (a) was very well answered with most giving correct answers to both parts (i) and (ii). A few gave answers such as 0.99 to part (i) and 390 to part (ii)

Part (b) was also well attempted. The most common error was to approximate the decimal version of the fraction $\frac{1}{12}$ to 0.8 or 0.83 which resulted in a rounding error in the calculation. A few did not know how to find $\frac{1}{12}$ of 912.

13 Part (a) was generally well answered. Many did not use calculators to tackle the fraction questions however and there were some arithmetic errors such as 3 × 1 = 4 in the numerator of the first answer.

Part (b) was answered poorly despite the structure provided in the question. Many could work out the correct answer but without the correct method of converting the two fractions to a common denominator of 15 first.

14 This question, involving area and perimeter within a context, was quite well answered and the correct solution was often seen. Some candidates confused area and perimeter. Others considered only two sides of the room for the edging. There were many solutions with either £522 or £90, the correct cost for the flooring or edging, as candidates used either the area or the perimeter for each of the parts.

15 The graph question was answered well in general with many candidates having a graph with four sections correct and ruled. Many used a point to point method, plotting points for every one minute interval on the graph and this usually proved successful. Follow through marks were allowed where sections had been completed successfully after a previous error. Marks were also available for some correct points plotted at the start and the end of the four sections where lines had not been joined. Weaker candidates often plotted points at 20, 15 and 25 vertically and some drew bar charts.

16 There were mixed responses to part (a) of this question. Candidates appeared not to know what was required as many solved the equation rather than looking for the errors in the given working. Expressing the errors also created problems for many. The very best candidates gave all three errors whilst others managed to see at least one. The common one that was seen was – 2 instead of + 2 in the third line. The division by 6 was not given that often, indicating that candidates thought that $x = ½$ was a correct final step. Those that were successful usually said that the answer should be 2 not ½ for that step. Candidates needed to be clear about the error and answers such as 'he did the brackets wrong' were too vague to score.

In part (b), it was rare to see the correct evaluation here. The vast majority did not follow the instruction to substitute $x = ½$ to arrive at a value of 1, but solved the equation instead.

17 In part (a)(i), a minority gave correct decimal relative frequencies. Many gave answers such as 0.82, 0.58 etc, considering the total to be 100 and not 200 and 8.2, 5.8, 3.6 etc were also common answers. The term relative frequency was not understood by many. Part (ii) was poorly answered with the majority giving answers such as 'because they add up to 1' or 'it is easy to convert to percentages'. Only a few described the large sample size as the significant factor.

In part (b), some knew that the addition of the final two answers in their table was needed here while others who did not have the correct values started again to reach the correct value, having done the incorrect division in part (a)(i).

In the final part a minority had the correct answer; of these many used the original data to calculate the expected value rather than the value from their table. A few were able to gain partial credit for using a value from their table and multiplying it by 3200.

18 In part (a), the full explanation including 40 cm and 150 cm was less common than the more vague answers such as 'he needs to add the semi-circle on to the height'. Many just said that the height of the semicircle was 40 cm without showing fully how the height was 190 cm.

In part (b), working was often easy to follow although there was often a lack of worded explanation or commentary which was required to access full marks. A significant number of candidates considered area to be the important measure in this practical question and so gained no marks. Many candidates were able to calculate the total for the horizontal lengths or the vertical lengths, or the radii, or all the straight lengths. The curved semi-circle length was correctly found by only the better candidates; some used area here despite using length for the rest – most used a combination of straight lengths for this section. It was possible to award 7 or 6 marks in some cases where candidates demonstrated complete mastery of the skills required with a clear explanation of their strategy.

A503/02 Mathematics Unit C (Higher Tier)

General Comments:

The majority of candidates were appropriately entered at the Higher Tier, were well prepared for the examination and produced work of a very pleasing standard. Candidates found the paper accessible and were able to attempt all questions and demonstrate their knowledge of the syllabus content.

Work was, in general, well presented and candidates communicated clearly their approach to each question. However, there is still improvement necessary in the structuring of answers to QWC (Quality of Written Communication) questions. More detail is required in stating what is being calculated and showing how this is being done. Many fail to show the formulae being employed. All candidates had sufficient time to complete the paper.

Few topic areas caused problems though premature rounding of intermediate values in a question often caused marks to be lost. Some improvement was evident in the answers to Algebra questions. Candidates have a firm grasp of the conventions and procedures required. Calculators were used accurately and efficiently.

Comments on Individual Questions:

1 The vast majority of candidates knew an appropriate method and could find the required shelf length in part (a).

Part (b) was also well done. However, problems arose in the rounding of the answer to the calculation. Many ignored the context of the question and rounded 33.96 to 34. A few used a trial and improvement method or a ‘build up’ method, often obtaining the correct answer.

2 Part (a) was usually answered correctly though a number of candidates only gave two solutions, overlooking the possibility of reversing each pair of values.

Even after having part (a) wrong, many went on in part (b) to find the probability correctly. Some drew a sample space diagram to show all possible pairs while others used a combination of probabilities to reach the answer. An incorrect denominator was the most common error in part (b), with 12 being the most common error.

3 This question was well answered by most. The information was correctly interpreted and diagrams were accurate and neat. A few candidates drew a bar chart and others plotted a series of points, not always connected. A small number did not start and/or finish their graph on the horizontal axis.

4 It was common to see the three errors correctly identified and clearly explained in part (a). Some, who failed to find all three errors, resorted to ‘the answer is wrong, it should be 1½’.

Many failed to understand the requirements of the question in part (b) and, instead of substituting into the left hand side of the equation, just solved it. Some of those who did substitute ½ into the equation failed to deal with the arithmetic required.

5 There were very few errors in any part of this question. In part (c), most used percentages to compare the scores although a small number used fractions with various common denominators.

6 Though there were many completely correct answers to part (a)(i), a number of candidates clearly did not understand the term ‘relative frequency’. Errors included dividing the frequencies by 2 (to make the total 100), dividing the frequencies by 100, dividing the total by each of the frequencies and rounding the frequencies to the nearest 10.

Part (a)(ii) was poorly answered. Candidates are unaware that fundamental to the use of relative frequency for probability is that it must be based on a sufficiently large sample. Most gave either that ‘the total of the relative frequencies is 1’ or that ‘as decimals they were easy to use’.

Even after wrong answers to part (a), the vast majority of candidates went on and completed parts (b) and (c) correctly. A small number either chose the wrong two values in part (b) or multiplied the probabilities instead of adding them. It was pleasing to see those with errors in part (a)(i) going back to the original table to calculate their answer to parts (b) and (c).

7 Although most knew why the maximum height was 190 cm, many of them failed to explain it fully. A common answer was simply to say that the radius of the semi-circle was 40 cm.

Many found part (b) challenging and very few scored full marks. As a QWC question it is expected that candidates write down words of explanation as well as formulae and show full working to justify their answer. This was often lacking. Even when the calculations were done correctly, candidates often failed to round their answer to the required accuracy. Common errors were to find the area of the door or the perimeter of the door. A lack of care sometimes led to the omission of one or more of the lengths.

8 Part (a) was answered quite well with candidates dealing appropriately with both the number and the x terms. Some only partially simplified the expression.

Although there were many correct answers in part (b), it was surprising how often candidates correctly multiplied out the brackets but then incorrectly collected the like terms. The most common errors were made when multiplying out the first bracket, many simply multiplied through by 5 instead of $5y$.

There were very few wrong answers to part (c).

Most reached $x = 4$ in part (d) with only the better candidates giving both solutions.

9 A large number of candidates quoted the correct formula, substituted correctly and evaluated this to the correct answer. Some, after giving the correct formula, worked out 3.6^2 instead of 3.6^3.

In part (b), nearly all knew there was a relationship between density, mass and volume. While many correctly evaluated mass divide volume, there were those who worked out volume divide mass and others who multiplied mass and volume. The correct units were often given even when the calculation was incorrect. A number gave no units with their answer while others appeared to guess.

10 This question was generally answered well, with most candidates giving the most efficient method of 15 000 ÷ 1.2. As expected, the common wrong answers were 12 000 (from 15 000 × 0.8) and, less often, 18 000 (from 15 000 × 1.2).

11 This proved to be a challenging question for many candidates. Although the formula to be used was given in the question, many candidates found using it with standard form numbers difficult. It was not uncommon to see a solution in which no attempt was made to square the numbers. Those who did use squares did not always calculate them correctly

and in some cases the squares were added, or even divided, rather than subtracted. Even when squares were subtracted, candidates did not always attempt to take the square root of their answer. Many of those using a correct method were able to reach an unrounded answer of 195 765 and some of these successfully carried out the final two steps by putting this into standard form and rounding it to an appropriate degree of accuracy.

12 The tree diagram was invariably completed correctly in part (a).

Although there were a lot of correct answers to part (b), some only found the blue/green combination and overlooked that the green/blue combination also satisfied the question. The rules for combining probabilities are well known. However, there were those who added instead of multiplying and vice-versa.

Part (c) was answered much better than part (b). It was more obvious to candidates that three products were required.

13 Part (a) was answered very well with most identifying the scale factor and using it correctly. However, some approximated the scale factor to 1.3 and hence produced an inaccurate answer.

Candidates found part (b) challenging; it was rare to see the volume scale factor used. Instead, most incorrectly used the linear scale factor in their calculation. Perhaps candidates failed to realise that mass and volume are proportional?

14 Many recognised that either the quadratic equation formula or completing the square was needed for the solution of this equation. These, in general, performed the process well and usually obtained the required solutions. Some errors occurred in the application of the quadratic equation formula. These included not having both + and - , only dividing the discriminant by 2*a* and incorrect arithmetic in its evaluation. A small number forgot to round their answers to two decimal places.

15 Most candidates realised that the answer came from subtracting the lower bound of the smallest distance from the upper bound of the largest distance. Some incorrectly gave the upper bound of the largest distance as 406 749. A number misunderstood the implication of the given accuracy and used incorrect upper and/or lower bounds or simply subtracted the two given values.

16 Accurate use of their calculator in part (a) meant that candidates usually had the values in the table correct. Some incorrectly gave the value of y as zero when x was zero.

Plotting of points and drawing of curves was done accurately and neatly. There was some difficulty in plotting the final two points, probably due to misreading the vertical scale.

Although most gave an answer in the required range in part (c), it was not uncommon to see candidates finding a value of y for $x = 0.4$ instead of the reverse.

17 Candidates produced a large number of well set out, succinct solutions to these simultaneous equations. They equated the two expressions in x, collected the terms into a quadratic equation and solved, usually by factorising. More adventurous candidates tried to rearrange the linear equation for y and then substituted into the quadratic equation. This approach was rarely successful. Some started by subtracting the two equations but this method was more prone to error. Weaker candidates tried to use linear simultaneous equations techniques, trying to eliminate the $6x$ by multiplying the second equation by 3. Almost inevitably these forgot to multiply the y also by 3. A number of candidates resorted to trial and improvement methods to find a solution, sometimes successfully.

18 It was clear, in part (a), that many candidates did not understand the instruction to 'Show that…'. Often they used 106° in the cosine rule formula to show that the opposite side was 22 cm. Some did understand, quoted the cosine rule formula with cos x as the subject, substituted the lengths and arrived at a value for the angle, given to at least one decimal place. Those using the cosine rule formula from the formula sheet usually substituted lengths correctly but then failed to rearrange their equation appropriately.

It was pleasing to see candidates working well on part (b), the last question of the paper. There were many fully correct answers, well explained and clearly set out. All knew to subtract the area of the sector from the area of the triangle and a large number knew the required formula for each. Some, however, ignored the 106° and assumed the angle was 90°. This incorrectly allowed the use of $\frac{1}{4} \times \pi \times r^2$ for the area of the sector and $\frac{1}{2}$×base×height for the area of the triangle.

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