GCSE

Mathematics A

General Certificate of Secondary Education **J562**

OCR Report to Centres

June 2013

CONTENTS

General Certificate of Secondary Education

Mathematics A (J562)

OCR REPORT TO CENTRES

Overview

General Comments

There was a smaller entry for J562 papers this summer. Across the ability range outcomes were higher compared to last summer.

All papers were accessible to candidates with most attempting every question set. The standard of work continues to be high; candidates have been well prepared by centres and entered at an appropriate tier of assessment.

In general, the quality of presentation continues to improve with work clear and easy to read and logically set out. However, the structure of extended answers, where candidates need to think ahead and plan the presentation of their work, still needs some attention. Candidates' solutions need a clear layout with a full mathematical method shown, annotations and headings and a conclusion set in the context of the question. Though many candidates are familiar with these requirements, others need further practice.

Some candidates are making multiple attempts at answering a question with no indication as to their preferred solution. This should be avoided as it could lead to no marks being awarded even when some correct working is shown.

Drawing at Higher tier remains very good with equipment being used accurately. At Foundation tier, less care is taken and pencil, ruler and rubber are not always used.

Calculator work continues to be good though it is clear that some candidates do not have access to one. There are still those, even at Higher tier, who prefer to use 'pencil and paper' methods (often incorrectly) even when a calculator is allowed.

Though algebra is improving, trial and improvement is still prevalent. For any question, it is always advisable that candidates should use the most efficient method and take full advantage of any equipment available to them.

Centres need to be aware that from June 2014 candidates will need to complete one paper from each of the three units in a single examination series. Each unit will still be assessed on a limited, specified content, and candidates will still be able to be entered for a mix of Foundation and Higher units.

Centres requiring further information about this specification and details of support materials should get in touch with the Customer Contact Centre at OCR.

A501/01 Mathematics Unit A (Foundation Tier)

General Comments

The marks scored by candidates covered the whole mark range. There were some excellent scripts produced by candidates that had been well prepared by centres.

Many candidates were able to interpret a bar chart, while weaknesses were apparent in converting metric units to imperial units, squaring a negative number, calculating a mean from a frequency distribution and dealing with scale diagrams generally.

Geometrical instruments were not always used accurately.

Poor handwriting is a perennial issue with candidates at this level, with some scripts being hard to decipher. Many were trying to show their working so that some method marks could be gained.

Comments on Individual Questions

1   Part (a) was usually correct.

     In part (b), there was some confusion about how many zeros there should be.

     Part (c) caused more problems, although most candidates were able to score at least one mark. Problems were encountered when dealing with the 1.2 million.

     Part (d) was usually correct, although kilometres was a common wrong response.

     The low number of acceptable answers to part (e) suggests that there was little practical appreciation of metric measurements or of imperial units generally. Answers obtained by dividing rather than multiplying 111 by 3 or multiplying or dividing by 10 were common.

2   Part (a) was done well by many candidates with the majority earning at least four of the five available marks. The most common failing was in drawing the cot, where some candidates had difficulty working out the correct scaled dimensions. Many of those who lost only one mark overall did so for not using a ruler, even though the question clearly stated a scale drawing was required. Marks were also lost for unsuitable arrangements of furniture where, for example, the bed had to be climbed over to access the cot or the chest of drawers.

     In part (b)(i), incorrect answers of 72° were seen frequently. Other candidates demonstrated poor measuring skills with answers close to, but outside, the acceptable range.

     Conversely, part (b)(ii) was very often correct, although occasionally errors were made in unnecessarily changing the units, eg 6.3 cm = 60.3 mm.

3   Most candidates did produce some working indicating that the question was generally well understood. A very common error was to convert 125 minutes to 1 hour 25 minutes, but it was still then possible to score two out of the four marks. Most candidates did remember to include the 10 minutes "rest", although some answers had the starting time for cooking the joint after 1pm.

4 A number of candidates earned full marks on this question.

In part (a), answers of 7.6 demonstrated poor rounding skills while answers of 7.6811... indicated that some candidates simply did not read the question carefully enough.

Both parts (b)(i) and (b)(ii) were often correct, although the latter proved a little more troublesome. Answers of 32.3 and 62.5, obtained from $37 - 7 \div 1.5$ and $37 \times 1.5 + 7$ respectively, were common.

5 Acceptable answers in part (a) were in the minority. Some candidates described the process, eg add 3, while others used inappropriate terminology, eg linear sequence.

3 was a common wrong response in part (b), with 12 also seen often.

In part (c), many candidates did not realise that the question was about adding odd and even numbers. Consequently, reasons given bore no connection to the question asked. A common unacceptable reason was "because the numbers all end in 3, 7, 1, 5 or 9".

Parts (d) and (e) proved fruitful for most candidates, although 22 and 2 were occasionally seen in the former and ⁻8 in the latter.

6 Although there was good understanding of the question overall, with solutions well presented by many, the most commonly awarded score for this question was 2 marks out of 4. This was usually earned because candidates used 5 or 6 gaps of 1.2 metres between the 5 cars rather than only 4. There were some nice diagrams but unfortunately these often had no lengths shown.

7 Better candidates managed to score both marks in part (a). Many however were penalised for having only either the $8a$ or the ⁻1, or even $8a +$ ⁻1 not simplified.

The simple equation in part (b)(i) was usually correct.

There were problems with the two-stage problem in part (b)(ii). Unfortunately, it was common for embedded answers, such as $3 \times 7 + 5 = 26$ to be seen without any indication of how the 7 was found. Such incorrect interpretation of what is required will continue to be penalised.

Part (c) was considerably less well done. More candidates earned the M1 mark for some correct working than scored full marks, while a zero mark was by far the most frequent outcome. A common mistake here was to write $(^-3)^2 = ^-9$. Also common was an answer of ⁻24, presumably from ⁻9 + ⁻15 but with no working, so no part mark was available for the ⁻15.

8 This question proved to be difficult for many candidates, with no marks being the most common outcome. The greatest difficulty arose in working out the length of hedge corresponding to filling 6 bags and candidates seemed to lose direction at this point producing spurious working of numbers of bags and metres, often confusing the two. Fully correct solutions were very rare, with the special case mark all that many candidates could score. Candidates scoring more than 2 marks were few and far between.

9   Both parts (a)(i) and (ii) were well answered. After that, candidates struggled to score any marks at all.

In part (b), many candidates appeared to be confused by this question and gave answers for trees in their own gardens, or even wrote out a list of questions. Many candidates had little appreciation of the height of a garden tree so sensible categories were beyond their experience. Many simply asked the question "how tall" or" what type of tree". For those who attempted a correct response the most common error was to have overlaps between their categories.

Answers to part (c)(i) frequently involved bar charts rather than frequency polygons, thereby reducing the number of marks available to only 1 out of 3. Even when polygons were drawn, it was rare to see the points plotted at the midpoints of the intervals, and many candidates then joined the last point to the first point.

In part (c)(ii), there were very few proper calculations for the mean of grouped data. A very common answer was 6.25 from sum of frequencies divided by 4.

10   Most candidates scored no marks for this question. While blank answer spaces were relatively few, most answers were freehand sketch guesses with no use of geometrical instruments. Those candidates who scored any marks at all almost invariably did so for the arc centred at D. Most appeared to have no idea about the angle bisector and this was not often even attempted.

A501/02 Mathematics Unit A (Higher Tier)

General Comments

There was a smaller entry for this paper than previous June series. Though the standard of work was variable, many candidates produced neat, well thought out answers.

Some good basic algebra and number work was seen, with many candidates showing a good solution to the linear equation, for example. As expected the harder algebra at the end of the paper was done poorly, especially the problem involving an identity.

There was no evidence of any time shortage for candidates in attempting the questions, although of course weaker candidates' attempts tended to tail off towards the end of the paper as they reached the more demanding questions.

Comments on Individual Questions

1   In part (a), the required method for simplifying ratios was well known and usually carried out accurately. Most candidates converted the units correctly, although a few left units in their answer. Some stopped at 39 : 45, thinking that there was no common factor remaining.

       In part (b), sharing in a given ratio was nearly always done correctly, with good working shown and quite a few candidates showing they had checked their answers. A few made the expected error of dividing the total by 3 and by 2 to obtain their answers.

2   Those candidates who used two sets of construction arcs for the perpendicular bisector were usually accurate. Some only showed a single set of arcs above the line AB with a correct bisector having measured the midpoint of AB, and received partial credit for this; a few did not draw in the bisector after constructing the arcs. Many, however, did not realise that the perpendicular bisector of AB was required as a boundary for the condition 'nearer to B than A'.

       The arc centred at D was usually accurate and compass drawn and sometimes this was the only mark gained. Weaker candidates often drew intersecting arcs with centres B and D and shaded the region closer to B. A few, lacking compasses, attempted the arc using measured 4 cm dots.

       For candidates getting this far, indicating the region was done with varying success. Some took great care with shading or ruled hatch lines while others scribbled lines and often did not clearly indicate the full region. When construction lines crossed the region many incorrectly used these as part of the region boundary. Those who could not use constructions often drew a shaded circle or 'splodge' within ABCD.

3   Many candidates solved the equation in part (a) correctly. For those who did not, often this was due to the usual errors in expanding the brackets, but follow through marks helped their further progress. Just a few candidates attempted to solve by trials – this should be avoided.

Factorising the expression in part (b) was often correct, although some candidates only spotted one of the two common factors. Weaker candidates who did not know what to do attempted to simplify or sometimes to solve an equation, usually after interpreting $6a^2$ as $36a$.

A number of candidates realised that they could simply write down ⁻6 as the other solution in part (c). However, many started again, attempting to solve $3x^2 = 108$. These usually made the error $3x = \sqrt{108}$ as their first step.

4   Most candidates made a good attempt at the response categories in part (a) and gained at least one mark. Giving suitable boundaries to the categories to avoid overlaps was the main problem, with 0-5 m, 5-10 m etc quite common. To avoid this, inequalities were often used, but frequently poorly understood with notation such as $5 < 10$. Some candidates did not give a wide enough range of values and some omitted units. A few did not realise what was required and attempted to answer the question 'What is the height of the tallest tree in your garden?'.

In part (b), the majority of those candidates who used the correct method to find the sample size realised that the answer of 12.2 needed to be rounded to 12, but a few rounded to 13. Premature rounding after the first stage of calculation sometimes lost the accuracy mark. However, many candidates did not know what to do, with some simply dividing 50 by the number of year groups giving an answer of 10.

In part (c)(i), most candidates knew what a frequency polygon was, although some simply drew a bar graph. The main error was in not plotting at the midpoints. Some did not join their plots at all, whilst others lost the line mark because they joined their plots without ruled line segments, or else joined the endpoints.

In calculating the estimate of the mean in part (c)(ii), only a few candidates knew what to do and gained full marks. Others knew something about multiplying by frequencies but either divided the 190 by 4 instead of 25 or else used endpoints or class widths in their calculations instead of midpoints. A common wrong answer from those who had no idea what to do was simply to calculate $25 \div 4$.

5   In part (a), expressing 12 as a product of its prime factors was done well. The usual errors were to forget to express the answer as a product, to think that $6 = 3 \times 3$ or to leave the answer as 4×3.

In part (b)(i), many candidates realised that they needed a multiple of 8 and 12 but gave an answer of 24, ignoring the criterion 'at least 3 sweets each'. Other common wrong answers were 72 and 96, or 36.

In part (b)(ii), very few candidates expressed the correct idea of adding multiples of 24 to 48, although some got as far as multiples of 24. Some thought that repeated doubling was sufficient; this likewise gained partial credit. However, the majority scored no marks here, with some omitting this part.

6   Finding the *n*th term of the linear sequence in part (a) was fairly well done. As usual, a common error was to give $n + 4$ instead of $4n$, whilst some used $5n$.

The common error in part (b)(i) was to work out the first three terms using $3n$ and not 3^n. However, the majority of candidates used the correct 3^n and gained both marks, although 9, 27, 81 was seen occasionally, gaining just one mark.

Only those candidates who used the correct sequence gained any credit in part (b)(ii). Most of those who had the previous part correct went on to find the correct answer in this part. Trials were rarely shown. Some thought that 177 147 was greater than a million and gave this as their answer. Some divided 1 million by 3 and gave this or a rounded version of it. Some candidates omitted this part.

7   Some diagrams were seen and some candidates used a number line to try and identify the midpoints, but most just applied arithmetic processes to the given values. The most common wrong answer was (5.5, 3), obtained by halving the difference in *x* values and the difference in *y* values.

8   Some confident use of 3D Pythagoras was seen in calculating the diagonal of the cube. Some candidates found the diagonal of a face and received just one mark. Weaker attempts included Pythagoras which began with $6.7^2 \times 6.7^2 \times 6.7^2$ and those who calculated the volume.

9   In part (a), many candidates recognised the need to use trigonometry and correctly selected tan. However, $\tan 72 \times 50$ or 153.88... was very common, even after the correct $\tan 72 = \dfrac{50}{\text{AP}}$ had been seen. Occasional attempts at the sine rule (not always successful) reflected the fact that some candidates had recently studied Unit C.

Part (b) was less successful. Some candidates showed correct working to find an angle but did not know how to find the bearing after finding angle BPC. Some others did not realise that trigonometry was required to find the bearing.

10   As expected, there were candidates who did not know how to calculate the frequency densities, and divided the frequencies by the midpoints or endpoints. Some did make an attempt at drawing bars of the correct width and scored a mark. However, many candidates knew what they were doing and scored two or three marks.

11   The question on identities was found to be challenging.

In part (a), expansion of the bracket was a common, sensible, first step. However, candidates did not recognise how they could or should relate the left-hand side to the right-hand side, so progress beyond expanding the bracket was often unproductive but lengthy. A few candidates did some rearrangement to get *b* in terms of *a* and *x*, for example. Only a few produced correct numerical answers using clear algebraic methods.

Rearranging the formula in part (b) was answered well by candidates with a good grasp of algebra. Some started well and scored the first two method marks but then took the cube root before the division by 10. The vast majority made an attempt but weaker candidates often produced a series of invalid steps.

A502/01 Mathematics Unit B (Foundation Tier)

General Comments

The paper appeared to be accessible to all reasonably prepared candidates with many scoring marks even on the final question. However, a disappointing number of candidates seemed to have no access to a ruler and freehand lines and drawings were far too common.

Simple and structured money calculations were reasonably well understood although some candidates lost a mark for using incorrect money notations, such as £18.85p and £5.8. Few were able to apply reasonable logic to a functional use of money in question 6.

Candidates generally scored well on statistical questions 7 and 8, though the accuracy of drawing remains regrettably low.

Many candidates did not appear to know, or could not apply to a problem, simple conversions between centimetres and millimetres.

Many candidates were unable to structure an extended answer or to organise a solution using clear layout and annotations or even simple headings.

Candidates had sufficient time to attempt every question, and most tried to show some working.

Comments on Individual Questions

1   Parts (a) to (d) were well answered although some candidates could not get beyond 207 in part (a). They gained 1 mark.

   Some candidates were confused about place value in part (c) where answers of £7.10 or £0.71 were sometimes seen.

   Part (d) was not well answered by weaker candidates with too many "tables errors" and some attempting to use decimals.

   The middle row of part (e) was usually correct but few candidates could complete the final line and $\frac{1}{7}$ and $\frac{7}{10}$ were common wrong answers.

2   The most common mark was 2. The arc was often labelled as "circumference" and, less often, the radius as "diameter". Some candidates appeared to make a random selection from the list and sector was sometimes given, even though it was not in the list.

3   Many candidates answered part (a) well. However, even amongst the best candidates, "3 boxes" rather than "6 boxes" was a very common error. A large number did not add the three values correctly and some did not complete the total at all.

   In part (b), many gained a follow through mark for correctly subtracting their total from £20 although weaker candidates demonstrated an inability to subtract correctly.

4   In part (a), only the best candidates gave the correct answer of 32 cm. Some showed no working and gave 30.20 cm, being unable to convert the millimetres to centimetres correctly. Conversion between metric units did cause many problems. Some candidates thought that 10 cm = 1 mm. An alternative error was 50 cm as many just added 5, 5, 5, 5 and 10, 10 and 10. Others attempted to find the perimeter or the width of the rectangle or a combination of the width and the length.

In part (b), the correct answers were sometimes seen, unsupported by working.
In part (b)(i), many candidates scored 1 or 2 marks for having the correct elements in a valid reason. Few were able to organise their facts into a concise account. Many lacked precision, with statements such as "The angles add up to 360" commonly seen.

In part (b)(ii), some candidates attempted a formula using π (either area or circumference). Some gained a mark for 30 cm but the reasoning for many answers was difficult to determine.

Some good answers were seen to part (c) but a common error was £3.20. A surprising number of candidates were unable to find ½ of £1.60 with 70p and 90p often seen.

5   Candidates made reasonable attempts at part (a) and some, but too few, ruled drawings were presented. Many candidates failed to draw triangles of the correct size and some failed to notice that the triangles had to join edge to edge. These candidates lost a mark. The line of symmetry was sometimes omitted or poorly indicated.

In part (b), fewer correct answers were seen. A common error was to join the triangles at a point or to think that this was still about line symmetry.

6   This question was not well answered with poorly organised and annotated solutions. Candidates seemed to be confused by the figures and frequently added monthly and annual figures, income and outgoings. Few showed any element of a structured strategy. Many calculated either the pilot's monthly wage or the income from a flight to gain 1 or 2 marks. However, few worked out both of these and very few made a sensible assumption. Some worked out the cost of five paying passengers, leaving no room for the pilot, although a few stated that the pilot would have to pay. Many candidates produced a page of calculations, frequently demonstrating poor numerical skills.

7   In part (a), many candidates correctly plotted the three points.

Many candidates were able to name the correlation as "positive" in part (b)(i). "Negative" and "zero" correlation were also given as answers as well as attempts to describe the relationship between the arithmetic marks and the spelling marks in words.

In part (b)(ii), many candidates picked E as an anomaly but some lost marks for suggesting that there was more than one anomaly. Some candidates did not attempt either part of (b).

Parts (c) and (d) were well answered.

8   Many candidates correctly plotted the final two points in part (a) but then lost a mark for attempting to join them with a curve.

Part (b) was generally well done but a few weaker candidates were unable to subtract 18 from 46 correctly.

In part (c), many candidates gained a mark for a general description of the way the plant grew but only a small number gained a second mark for giving a correct growth figure. Many candidates used imprecise language that left the reader unclear as to whether a week was included in the period or not. Some who gave growth figures were unable to give the correct answers to their subtractions. Candidates who said the plant grew steadily or that it grew taller for eight weeks scored no marks.

9   Some candidates were able to give the correct answer to part (a). $x = 7$ was a common wrong answer but errors such as $x > 7$ or 6, 5, 4, ... on the answer line were also made.

In part (b), a pleasing number of candidates demonstrated this more difficult skill correctly. Common errors included a line starting at 10 and pointing at 4, an arrow starting at 4 and pointing to the left, a line with arrowheads at each end or an inequality sign over 4.

10   Few candidates could give the correct answer to either parts (a)(i) or (a)(ii). Very few could state the gradient, although a very few recognised it to be negative.
Many left part (a) blank or appeared to guess.

Some candidates scored 1 mark for a correct value in the table in part (b)(i) but most had problems finding the missing values. Few wrote calculations.

A surprising number of candidates did not attempt part (b)(ii), not even plotting their values from the table (for which a mark could have been scored).

Answers to part (c) appeared to be guesses and rarely had any relationship to a line that was drawn in the previous part. Candidates who were well organised scored 6 marks in parts (b) and (c) but this was rare.

11   For the question overall, 2 or 3 marks were common. However, a pleasing number of candidates scored 4 marks. Some candidates scored 1 mark for 180 in the first answer space. For the first reason, triangles and 180 were often seen but the vital "angles" was often omitted. Similarly, for the second reason, many candidates offered "A straight line equals 180°" and not "Angles on a straight line equal 180°" that would have scored a mark. The word 'interior' was often replaced by 'inside', 'inner' or 'internal'. Errors included, "Angles in a triangle add up to 360°" and "Angles on a straight line are equal".

A502/02 Mathematics Unit B (Higher Tier)

General Comments

The paper was generally accessible with many candidates scoring well. 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 who would have benefited from entering the Foundation tier paper rather than the Higher tier paper.

Generally, candidates showed the working used 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 (question 5) elicited the full range of quality. Many candidates could have improved their solutions by using headings to explain their methods. Most candidates used rulers where necessary.

Comments on Individual Questions

1   In part (a), candidates appreciated the need to convert imperial units although weaker candidates confused pounds and ounces.

    In part (b)(i), candidates used a correct method to multiply by $\frac{5}{4}$. Those who used decimals were generally correct but had a harder calculation to do; this led to more errors.

    In part (b)(ii) the majority of candidates appreciated the need for an integer answer.

2   All parts of this question were generally answered correctly. The few errors that did occur included using words other than 'positive' to describe the correlation in part (b)(i) and suggesting there was more than one outlier in part (b)(ii).

3   The majority of candidates showed a good understanding of simple inequalities and were able to score fully in this question. The approach of using '=' signs sometimes lead to candidates failing to return to a final answer with '<' and thus losing a mark. Others made basic errors in evaluating $\frac{35}{5}$; these candidates generally scored in part (b) with a correct follow through.

4   Very few candidates were unable to score in this proof question. The majority of candidates were aware their reasons needed to include statements such as 'angles in a triangle add up to 180°'.

5   This question assessed the candidates' quality of written communication (QWC) and the improving quality of candidates' answers was noted. It was pleasing that most candidates understood the necessity to compare equivalent amounts of each cereal although many candidates did not pick up on the fact that the data lent itself to exact evaluation for either 10g, 100g or 300g masses and attempted 'estimates' without justifying their work. Many simply multiplied the *Corny Flakes* values by 3 or 3.3 rather than the relatively easy calculation of multiplying by $\frac{10}{3}$. The best solutions had a clear comparison and stated the number of grams used for comparison along with full supporting calculations. The conclusions were usually clear and concise.

6   The table and graph in parts (a)(i) and (a)(ii) were usually correct. However, when it came to understanding how the graph should be used to solve the simultaneous equations in part (a)(iii) there was not only less understanding, but also many mistakes in reading the scales correctly.

Part (b)(i) saw many candidates understanding the need to eliminate an unknown, and many were able to show a reasonable understanding of a suitable method. Some of the best solutions substituted for *y* from the second equation into the first. Only the best candidates understood that *exact* solutions necessitated the use of fractions and hence the implication of part (b)(ii) was lost on nearly all.

7   In part (a), many candidates were able to give the decimal equivalent of $\frac{4}{9}$ in a suitable, if sometimes unconventional, manner. The most common errors were to divide 'the wrong way round' giving an answer of 2.25 or to give 0.49 (with or without recurring dots).

In part (b), there was little evidence of any working or understanding of terminating decimals having 2 and/or 5 as their prime factors.

In part (c), there were a number of correct answers or unsimplified answers of $\frac{27}{99}$ or $\frac{9}{33}$ but the common wrong answer was $\frac{27}{100}$. Some candidates gave a clear explanation of their method; others simply quoted $\frac{27}{99}$. A few realised they had to multiply the given number by a power of 10 but used 10 or 1000 or both rather than 100.

8   Only better candidates managed to score on this question.

In part (a), there was generally an understanding that gradient involved doing something with the *y* and the *x* values but many candidates simply divided 'raw' values (eg $\frac{3}{8}$ or $\frac{70}{3}$ etc). Some got the correct answer but from the incorrect division (ie $\frac{5}{75}$ = 15) and therefore did not score.

In part (b), only the strongest candidates gained all 3 marks. Most often 1 mark was awarded for realising that the equation must involve 15*t* and there were a number of candidates who found the correct relationship but used the wrong variables. The best solutions used a clear substitution to find the constant term.

9   Few candidates failed to score highly on this question, and the vast majority worked with scale factors rather than differences. Some candidates lost a mark as they could not evaluate $\frac{16.2}{3}$ in part (b). Those that evaluated $\frac{18}{6}$ wrongly (often as 2) usually showed their working clearly and hence earned 3 out of 5.

10 Candidates encountered a number of difficulties in this relatively straightforward question on surds and indices.

In part (a), many candidates spoiled a correct answer by concluding that $7\sqrt{7} = 7$ or 1. A few answers of $7\sqrt{7}^3$ were seen.

In part (b), few candidates realised that finding $\sqrt{8} \times \sqrt{8} = 8$ was the key to finding the answer. Some reached 8^2 or $\sqrt{64^2}$ but were then unable to give a single number as the answer. Common wrong answers were $4\sqrt{8}$, $\sqrt{32}$, 512 or finding 64 × 64.

11 Some knew that the angle was 63° but only the most able candidates were able to give a convincing version of 'alternate segment theorem'. A number incorrectly gave 'alternate angles' as the reason. Some of the weaker candidates tried to use 'interior opposite' presumably taking an incorrect prompt from question 4.

12 The marks on this question were rather polarised with most candidates scoring either 0 or 5. Of those who could do parts (a) and (b), the common error in part (c) was to give an answer in terms of 'units' such as 13**a** – 12**b**. Whilst some candidates used some unconventional notation such as $\mathbf{a}\dfrac{13}{3}$ or $4\mathbf{a}\dfrac{1}{3}$, there were many examples of the more conventional notation $\dfrac{13}{3}\mathbf{a} - 6\mathbf{b}$.

A503/01 Mathematics Unit C (Foundation Tier)

General Comments

The majority of candidates were well prepared for the exam and again it was encouraging to see a large number of good scripts at this level. All candidates were able to access at least some of the questions and achieve some degree of success on the exam. Work was generally well presented and logically set out in many cases. There were several longer questions that gave candidates the opportunity to demonstrate their problem solving and communication skills and on the QWC question many made a very good effort and showed clear logical working and were able to communicate their solution well within the context of the problem.

The questions on simple number calculation, coordinates, time, simple area, use of a calculator, vocabulary of probability, simplifying expressions were the better answered questions. The questions involving interpreting graphs, fractions, money problems in context, experimental probability, calculating time from distance and speed proved to be the most challenging.

A calculator was allowed for this unit and there is still evidence of candidates attempting non-calculator methods for calculations such as 12% of £699 in question 14; this adds to the difficulty of the question for candidates.

Comments on Individual Questions

1   A straightforward start for candidates and this was very well answered.

2   In part (a), the vast majority of candidates had few difficulties in writing the coordinates of point A correctly. The error of reversing the values was rarely seen.

     In part (b), almost all were able to plot the point B (1, ‾4) correctly.

3   In part (a), candidates were asked to select the most appropriate metric unit.

     Part (a)(i) proved to be a problem. There were as many incorrect answers of miles as there were correct answers of kilometres. Many candidates appeared unfamiliar with metric units of length for longer distances.

     In part (a)(ii), answers of ounces, pounds and stones were all seen regularly when the metric measure should be kilograms.

     Part (a)(iii) was much better answered and the majority of candidates correctly chose litres.

     Part (a)(iv) was the best answered of the four parts with metres chosen by almost all candidates.

     In part (b)(i), many candidates were successful in correctly reading the scale as 175. Common errors included 190 and 180.

     Many candidates were also successful in part (b)(ii). Common errors included 102.2 and 102.04.

     In part (c)(i), almost all of the candidates were able to give the correct time that the train left in either 12 hour or 24 hour form.

Many candidates were also successful in part (c)(ii) giving either 80 minutes or 1 hour 20 minutes as their answer. A few gave answers such as 1:20 which was not acceptable given the units in the answer space.

4   Answers here were mixed. Most candidates chose to convert to grams and then arrange in order. The main misplacement was either 2.3 kg or 340 g.

5   In part (a), most candidates were able to make the correct decisions for the probability words. A few chose 'likely' for the first sentence rather than 'evens' and some chose 'likely' rather than 'unlikely' for the third sentence.

     Part (b) involved using the vocabulary of probability to solve a problem. Many candidates were able to use the clues successfully to give the correct amounts of money for the eight envelopes. Those who made an error usually overlooked the fact that only one note or one coin was in each envelope.

6   In part (a), many candidates lost marks despite having the correct order of d, a, b for the sections of the graph. This was because for their reasons they described the journey rather than the features of the graph eg for d, a common reason was 'it is fastest' rather than 'the graph is steepest'.

     There was a mixed response to part (b). Many candidates referred to the post office, not realising that this was where Salima stopped before she went into town. Some were able to gain the mark by implying that she was now stationary and no longer on a journey, most commonly making a reference to her being in town or what she could be doing while in town, eg eating, shopping.

7   Both areas were found successfully by the majority of candidates in part (a).

     Part (b) proved more challenging and although many candidates chose the second option for the perimeter of shape A being 12 cm, far fewer chose the fifth option for the perimeter of shape B being more than 10 cm. Most said that it was equal to 10 cm.

     Although part (c) proved to be discriminatory, there were a large number of correct answers. A few candidates drew a non-right-angled triangle of area 8 cm^2 but the main error was in drawing a right-angled triangle of area 4 cm^2.

8   Part (a) was often correctly done, although some candidates did not round or rounded incorrectly.

     In part (b), many candidates did not follow the instruction to give the answer to the nearest integer and gave 5.4... as the answer. Others evaluated $169 \div 2.4$ before taking the square root to give the answer 8.

9   Part (a) was poorly answered despite the structure provided in the question. Candidates need to learn the correct procedures for adding fractions with different denominators.

     Responses in part (b) were much better as many of candidates did reach $\frac{2}{20}$ and then went on to $\frac{1}{10}$ as the final answer. A few gave a decimal answer and some tried to convert to a common denominator and appeared confused between the procedures for adding and multiplying fractions.

Part (c) had mixed responses. Occasionally it was possible to award 1 mark for a correct lower bound. Candidates were often inconsistent in their answers as they were rounding to the wrong degree of accuracy. It was not uncommon to have both values above or below 6500.

10   Part (a) involved selecting the correct letter from a probability line to fit three statements. This was well answered with few problems for candidates.

Candidates found part (b) more challenging and some were unable to define what the question was asking from the text. Instead of giving the flavours of the 6 packets of crisps added, they gave the flavours of all 14 packets in the box. Partial credit was given to those that recognised that 7 of the 14 packets should be plain.

11   Many candidates scored well in all parts of (a). The more common errors were $4p$ in part (i), $2p$ in part (iii) and $7a + 4b$ in part (v). Some poor notation led to p^2 and $p2$ being confused. It is essential that candidates write indices clearly.

There were many correct solutions to part (b) with 5 being the common incorrect value.

The vast majority of candidates scored at least one mark in part (c) with many scoring both marks. There was some confusion between formula and expression.

12   Many candidates had 118 as the width required for each complete strip. A few went on to the efficient method of dividing 970 by this value to obtain 8.2..., and then interpreted the answer as 8 strips. Many candidates did successive subtraction of 118 from 970 and should have reached 26 cm remaining. Others used an incorrect value to convert 9.7 m into cm or the reverse (usually using 10 or 1000). A significant number of candidates used the wrong strategy of trying to find a combination of shirts, shorts and socks that would fit exactly on the line rather than the number of complete strips.

13   In part (a), there appeared to be equal numbers of correct and incorrect diagrams. The most common error was to draw a correct cuboid but to show the hidden edges as solid lines or to draw a cuboid with dimensions 4 by 4 by 3. Occasionally candidates had the 'correct' cuboid but with one vertex 1 cm out of position.

In part (b), only the more able candidates knew how to calculate the volume. Some candidates attempted to find the surface area whilst many others omitted this part.

14   The more able candidates had the correct solution in this question. A few of these forgot to subtract the cash price and gave the answer as £827.88. The vast majority of candidates were awarded only 1 mark for evaluating 24 × 31. Many candidates attempted, and failed, to use numeracy strategies without a calculator when finding 12% of £699. The efficient method of multiplying 699 by 0.12 was very rarely seen.

15   Part (a) was very well answered. A few candidates suggested that the given answer was incorrect as they used a wrong score.

Part (b), testing the quality of written communication, was well answered. Working was usually straightforward to follow. There were many correct solutions but occasionally candidates forgot that the degree of difficulty was a value correct to one decimal place and gave the final answer as 4.21 or omitted to show full and complete working leading to the solution 4.3. A significant number of candidates eliminated two scores by following what happened in part (a) where the first and last in the list were not used. This led to Patrick's overall score being 58.9 and Leon's sum of three values being 16.5. Many of these candidates earned credit by going on to make the correct conclusion that the degree of difficulty required was 3.6.

16   This question was not well answered. Some candidates described how to make a dice biased rather than how to test whether a dice is biased, whilst others thought that throwing a dice 6 times would give a fair set of results. Only a few referred to a number of throws in excess of 50 to get a reliable set of results. Many candidates thought that it was necessary to record all the values thrown rather than just the number of times that a 4 was thrown. A very small minority of candidates described how to find the probability by using the number of times a 4 was thrown divided by the total number of throws.

17   In part (a)(i), there were some correct answers but fewer than expected. When candidates attempted the calculation, by multiplying by 5 and then by 2, there were varied errors but at least these candidates earned a method mark. Many others scored 0 because no working was shown leading to their incorrect answer.

Part (a)(ii) proved very challenging and many wrong versions of what to do with 6¼ and 20 was seen, the most common was to multiply them. Some candidates tried, often incorrectly, to use their answer from part (a)(i). A few did correctly divide 6¼ by 20 to give a time in hours but then were unable to convert this time to minutes and seconds.

Many candidates were more successful with part (b), involving finding a fraction of 65. The answer of 26 (boys) was fairly common and the weaker candidates often left this blank.

Part (c)(i) was generally well answered but it was also omitted by a number of candidates. A few gave an answer of 0.48 after making an arithmetic error in adding 0.4, 0.33 and 0.15.

In part (c)(ii), many candidates recognised the need to add 0.4 and 0.15 and were able to do this correctly. A number felt the need to also give a worded answer such as 'likely' in addition. Some were torn between using the probabilities in the table and giving an answer of $\frac{2}{4}$ from identifying two of the four options in the table.

Part (c)(iii) was well answered by the more able candidates. Weaker candidates often chose to divide 2500 by 0.15 rather than multiply.

18   Part (a) was a straightforward question on finding the circumference of a circle. Some candidates confused the area and circumference formulae whilst others left this part blank.

Most candidates scored the mark in part (b) for 3 × their answer to part (a).

19   There were many correct solutions in part (a) but these were usually obtained using trial and error. It was rare to see any algebra but when this was seen candidates scored at least a method mark.

Candidates were more successful with part (b). However, it was more common to give 2 marks for expanding the brackets than 3 marks as they often made mistakes when combining the directed terms.

A503/02 Mathematics Unit C (Higher Tier)

General Comments

The vast majority of candidates were correctly entered at this tier; only a small number obtained very low marks. Centres had prepared their candidates well and all showed a sound understanding of the unit content and were able to demonstrate their knowledge successfully. Invariably, candidates attempted every question on the paper.

Presentation continues to improve and candidates seem to be trying to make their work clear, concise and legible. However, of concern is how candidates do not show enough working or give enough information when answering a question. It should never be assumed that the steps are 'obvious' and need no explanation or justification. This is particularly important in questions which say 'Show that…' or 'Explain why...' or 'Show your method clearly' or in any QWC question. Here every required step, no matter how straightforward, must be shown and explained. Some candidates made multiple attempts at answering a question without indicating which was their preferred solution; this should be avoided.

Drawing was done well, with accuracy and using the appropriate equipment.

Surprisingly at this level, some candidates used a 'break-down' method of solution rather than a more formal approach. This occurred in particular with percentage questions but also with questions on fractions and rates. Similarly, though not as prevalent, was the trial and improvement method of solving any equations. Every Higher tier candidate, irrespective of whether or not they hope to continue to A-level Mathematics, should be familiar and comfortable with the conventional structure required to the solution of all questions.

Comments on Individual Questions

1   Most candidates made a good start to the paper with a significant number scoring full marks in all three sections of part (a). Some did confuse decimal places and significant figures in parts (a)(i) and (a)(ii), so answers of 4.2 and 1.42 were seen. Very occasionally an answer of 2.78 was given in part (a)(i) where the order of operations was incorrectly entered into the calculator. Even in straightforward questions like this it is important to write down 'working' so that part marks may be awarded. Very few candidates made any error in part (a)(iii).

Answers to part (b) were usually correct and it was good to see many answers of 6549 for the upper bound.

2   In part (a), the majority of candidates put the arrows and labels in the correct positions. Occasionally, the arrow for A was misplaced at $\frac{2}{6}$ on the probability line. A small number showed the answers as a range by drawing horizontal lines with arrows.

Although it was clear that most candidates knew what was required in part (b), many struggled with their written explanation often not giving enough information. Most realised that a large number of trials was necessary. Many then made a statement about recording the results but not all made a specific reference to the number of times that a 4 was obtained. The final mark was for an explanation of how the results could be used to find an estimate of the probability. Few candidates gave enough detail here and just made a statement such as 'the probability can then be calculated'.

3   Surprisingly, there was a mixed response to part (a). Though a considerable number of candidates calculated the area of the six sides correctly, just as many calculated the areas of the two ends but then assumed that the other four faces were all the same (70 × 60 cm). An answer of 23 400 was as common as the correct one. A small number found the volume and a few added the lengths of the edges.

Though many candidates found the volume correctly in part (b), a number did not show how their answer in cm^3 could be converted into litres, thinking it was sufficient just to state the answer.

Part (c) was answered quite well with many candidates doing the correct division and obtaining 385 seconds in their working. Of these, a substantial number failed to convert this into minutes and seconds. A popular answer was 6 minutes 42 seconds or 6 minutes 41 seconds, coming from 6.416.. minutes. Less able candidates multiplied the values or divided incorrectly. Some tried to 'build up chunks' of 0.6 trying to get to 231. These approaches usually failed.

4   Part (a)(i) was invariably correct though some candidates worked out the total distance for 7 days while others only considered the total distance for one direction.

In part (a)(ii), correct answers of 18.75 minutes were often incorrectly converted to minutes and seconds, 19 minutes 15 seconds being a common wrong answer. Weaker candidates multiplied the two relevant values or divided them incorrectly.

Parts (b) and (c) were exceptionally well done with very few errors.

5   Though the correct answer was often obtained in part (a), some candidates only partially simplified the fraction. Interpretation of the expression was not always correct; for example $40x^3$ was mistakenly taken to mean $(40x)^3$.

There were many correct answers to part (b). However, even when the brackets were correctly removed, some candidates did go on to make errors in the collection of like terms.

6   Very few candidates used the most efficient method to answer this question. That would have been to evaluate the expression for $x = 2$ and $x = 3$ and compare the outcomes with 20. Instead the majority of candidates chose to treat the question as though it asked for a solution of the equation. This involved making numerous trials, though the final solution was rarely stated explicitly.

7   Nearly all candidates were able to draw a suitable net using a square and four isosceles triangles. Better candidates produced accurate diagrams, neatly constructed using the appropriate geometrical instruments. A number did not use compasses to draw the triangles, either because they did not have them available or thought they were not essential. Some of these did manage to draw the triangles within the allowed tolerance. Others thought that the vertical height of the triangles should be 4 cm rather than the length of the equal sides.

8   Only the best candidates scored full marks here; these terms were not well understood. Of the three, the second was most often correctly identified as an equation.

9   Part (a) was answered well with most candidates gaining full marks. Some only partially factorised the expression. A common wrong answer was $2x(x - 3y)$. Some candidates saw an x^2 term and tried to factorise into two pairs of brackets.

The expansion of brackets in part (b) was accessible to the majority of candidates, and a significant number scored full marks. There were those who made a slip and ended with x^2 + 9x + 9 and a small number of others who omitted one or both of the x terms. After finding the correct four terms, some weaker candidates failed to group these terms correctly.

10   Most candidates did take heed of the instruction to 'Show all your working clearly'. Those who did not were penalised. There were many well presented, concise solutions. It was disappointing that some failed to give their answer in a correct money form, omitting the final zero. Spotting and coping with reverse percentages continues to be a problem for many. The most common error was to increase the given sale price by 20% and then reduce the result by 15%. It was surprising to see, on a calculator paper, candidates using non-calculator 'break-down' methods rather than a more formal approach. Very often this led to numerical errors.

11   Although there were many fully explained answers to part (a), large numbers of candidates just stated that the triangles contained the same angles without seeing the need to calculate angles C and Y to support this.

There were many correct answers to part (b). Those candidates using a 'ratio of sides' method seemed to fare better, though some of these did slip up by making 8 ÷ 6 = 1.3 and, consequently, lost accuracy in their final answer. Others followed a 'sine rule' method but often encountered problems when rearranging their formula.

12   There was a mixed response to this question. Many candidates could identify the first graph as a quadratic, the second as a cubic and the third as a trigonometric but were unable to match the correct equation. Pleasingly, some candidates, when uncertain of which was the correct equation, substituted values to determine the shape of the curve it corresponded to.

13   Work done by better candidates was impressive with many elegant, correct solutions. Others made multiple attempts, including trial and improvement, to answer the question. These were usually scattered around the working space with no attempt to indicate their preferred solution. It was common to see the three square terms placed incorrectly in the Pythagoras formula and sometimes one of these terms was left as b^2 or c^2. Candidates found difficulty in expanding $(x + 2)^2$; often this became x^2 + 4. Some failed to put brackets around the $x + 2$.

14   Many candidates had difficulty with this question; it was clear that some had not come across function notation at all.

Part (a) was answered well by most candidates. A few left their answer unprocessed as 12 + 2 and others misunderstood the question and found $4(3x + 2) = 12x + 8$.

Both parts of (b) were not answered well. Large numbers of candidates gave answers involving f and/or *a* and *b*. Only the best candidates knew what to do and could evaluate their algebra correctly.

15   Candidates showed a good understanding of the sine rule, and there were many correct answers to this question. A few could substitute values into the formula but then were unable to rearrange it correctly. There was a small number who rounded values prematurely so that their final answer was inaccurate. Some candidates treated the triangle as being right-angled.

16   The standard of response to this question was very good. It was pleasing to see so many candidates coping well with working in multiples of pi, clearly showing each step of their working. Unfortunately, some missed the directive and worked in decimals. The most common problem was to forget to halve the volume of the sphere. Very few used incorrect formulae.

17   Candidates found this question very challenging. Presentation let many down and it was often very difficult to follow a logical progression through their work. Many were unable to make a correct first step. Even when the two expressions in *x* were equated, most had little idea of how to proceed or collected terms incorrectly. Some managed to progress to a quadratic equation but found the factorisation of the quadratic formula too demanding to tackle successfully. A small number of candidates tried an alternative method leading to a quadratic equation in terms of *y*. The algebra required for this was even more demanding and hence, rarely successful. As a last resort, some tried trial and improvement, occasionally arriving at one or both of the correct values of *x*.

18   There were numerous confident attempts at this unstructured QWC question. In many cases work was clear and well presented. The common approach was to use a tree diagram where the probabilities for the individual first and second choices were often correct. However, a frequent wrong answer for Alice's second blue selection was $\frac{5}{10}$ rather than $\frac{5}{9}$. Candidates usually knew to multiply the individual probabilities though this was not always shown. It is imperative in a QWC question that a full method, with both mathematical and written explanation, is shown for every step. Rounding errors did occur and 0.3 was often written as the decimal equivalent of $\frac{1}{3}$. Many lost the final mark for not giving supporting evidence for their conclusion. It was possible to answer this question just by comparing the probabilities at each choice. Even though some made a valiant attempt at this, candidates found it harder to score marks as a clear written explanation was required. This approach also often did not gain the final mark as candidates failed to adequately compare probabilities to justify their conclusion.