RECOGNISING ACHIEVEMENT

GCSE

Mathematics A

General Certificate of Secondary Education **J562**

OCR Report to Centres

November 2012

This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

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

OCR will not enter into any discussion or correspondence in connection with this report.

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OCR REPORT TO CENTRES

Overview

General Comments

There was a general improvement in the standard of work in all units and at both tiers of entry. Candidates were entered at an appropriate tier and were well prepared. They showed a sound knowledge of the specification content and were able to apply that knowledge. Very few could not attempt all questions on their paper.

Presentation was good, on the whole, with working clear and well set out. Work on the QWC (Quality of Written Communication) questions showed some improvement though many candidates were still not aware that a more rigorous approach to presentation was required for these. There was some concern that candidates were rushing into their answers without thoroughly reading a question and appreciating what was being asked. Often inappropriate work was seen, insufficient detail was shown and answers were not given to the required accuracy. Some questions required the units of an answer also to be given; many overlooked this. In multi-step questions, particularly at Higher Tier, candidates were often rounding intermediate answers and consequently arriving at an inaccurate final answer. Candidates should not leave more than one answer to a question and they should clearly cross out any work they do not want to be considered.

It appeared that most candidates had access to a calculator and geometrical equipment where appropriate and could use them accurately and effectively. Some still tried, often unsuccessfully, to perform calculations without a calculator even when the unit allowed its use. On Unit B, where calculators were not allowed, many struggled with a range of numerical calculations, particularly fractions.

Statistics and geometry questions continued to show candidates' best work. Algebra was still a good discriminator with better candidates consistently displaying a rigorous approach in their solutions. Weaker candidates found algebra very challenging though some improvement had been noticed this series. The standard of arithmetic continued to be variable.

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

Overall, there appears to have been an improvement in the performance of candidates across all abilities entered for this paper. Better attempts at some of the overlap questions were a noticeable feature.

Candidates appeared to attempt more questions on this paper than in previous series. None seemed to have run out of time.

While poor handwriting remains an issue for some candidates, the proportion of such candidates appears to be on the decrease, with the great majority of scripts being clear and easy to read.

Comments on Individual Questions

1 Part (a) was generally well answered but some candidates gave the arrival time rather than the departure time.

In part (b), it was apparent that many candidates assumed one hour to be equivalent to 100 minutes, leading to answers such as 87 minutes following the correct time in (a). Conversely, some candidates scored a follow through mark after incorrect answers in (a).

2 Parts (a) and (b) were usually correct.

In part (c), however, +11 and 5 were common wrong answers.

3 While most candidates scored well with at least three correct answers out of four, there were many interesting responses, with eggs of mass 70 kg and trees 20 km high.

4 This question was generally high scoring. Common errors were to forget to add the given post and packing value of £4.70, and to write £7.5 or £7.05 for £7.50.

5 The diagram in part (a) was usually correct.

In part (b), although 30 was recognised as the number of dots in Pattern 5 the explanations were often poorly expressed.

Very few correct answers to part (c) were seen.

6 This question was well answered on the whole and the working was reasonably clear and well presented. All four methods in the mark scheme were commonly seen. In most cases problems arose from an inability to change ml to litres, with candidates often using 1l = 100ml.

7 Part (a) proved troublesome for many candidates. A common error was to answer North and South East, i.e. giving the compass bearings of Woking from Guildford and Basingstoke from Newbury rather than the other way round.

Part (b) was generally correct.

Answers to part (c) were very poor with few correct bearings seen despite lines being drawn in the right place on the diagram.

8 The triangle was generally well drawn with many within the tolerance. There were roughly equal numbers of candidates who showed or did not show the construction arcs.

9 The majority of candidates gained some marks in part (a).

Weaker candidates had problems dealing with the negative numbers in part (b)(i). The embedded answer, $^{-}8 + 8 = 0$, was a common offering here.
Part (b)(ii) proved to be more challenging, with the correct answer of 1.6 often found by trial and improvement rather than by algebra. Only a few embedded answers were seen in this part.

Part (c) was rarely correct. A common error was to just interchange x and y giving $x = 4y + 6$.

10 Parts (a) and (b) were well answered.

Candidates found part (c) very difficult and failed to deal with the 8 sheets and 5 sheets involved. Common answers were 10g and 50g which both scored marks. Many gained a mark for the subtraction 90 – 80 even though little understanding of the practical aspects of the question was shown. As a consequence, full marks were rarely awarded for this part.

11 All three parts of (a) were well answered.

In part (b)(i), most candidates scored some marks mainly for the 21 and 37, while the remaining two answers were often both given as 65.

Part (b)(ii) was often correct.

Part (c) was not as successful with 60 ÷ 3 = 20 as a common wrong approach.

12 In part (a), many candidates appreciated the problems with the survey even though they could not express them well. On the other hand, there were many candidates who failed to appreciate that it was the response boxes they should be criticising, not the actual question.

Part (b) was generally well presented with working that was easy to follow, and even though it was not usually successful some method marks could be awarded. Various common errors were seen, such as using upper bounds, failing to multiply by frequencies, summing but then dividing by 6 or even just calculating 40 ÷ 6.

A501/02 Mathematics Unit A (Higher Tier)

General Comments

The marks achieved ranged from zero to full marks.

The overall quality of the entry was thought higher than in previous series. There were few candidates who would have been more appropriately entered at Foundation tier, and the genuine Higher tier candidates had usually covered the lower demand material well. Many were also able to make good attempts at the high demand material. As a result, questions 1 to 4 were often answered very well. Candidates knew what to do and did so with few errors. Particularly pleasing was the algebra in question 4, where factorising, solving the equation and rearranging the formula were performed far better than last summer.

The correct use of a calculator appeared to be a general weakness for some. Errors were common when a negative value needed to be squared and when brackets were required to produce the correct order of operations. Premature approximation part way through calculations also often spoilt the accuracy of the final answers.

In cases where the later questions were not attempted, it appeared to be through lack of knowledge rather than lack of time.

Comments on Individual Questions

1 Most candidates knew how to complete the two-way table in part (a)(i) and did so accurately. The main error was only to consider the row totals, which led a few to assume that 65 and 65 were the totals for Purple and White instead of 77 and 53.

In part (a)(ii), the simplification of the ratio 64 : 56 was performed well, with very few errors seen.

In part (b), most candidates recognised that there were 15 shares and used that information correctly to find the number of flowers. A few then multiplied 60 by 15 instead of dividing by 15. Some candidates wrote 28 : 20 : 12 on the answer line, rather than a quantity, and so did not score the final mark. Some of the weakest candidates merely divided 60 by 3 to reach an answer of 20.

2 Most candidates realised what the errors were in part (a) and communicated them well. Some managed to give one of them but floundered on the other, or did not give enough detail, such as ‘the range is not wide enough’. A few did not focus on the categories as requested and suggested the errors related to other aspects of surveys and questionnaires such as age groups and types of music.

Many candidates knew what to do to calculate the estimate of the mean in part (b) although only half of the candidates produced fully correct solutions with clear working. Despite the regular appearance of this type of question, a number of the candidates scored zero. Additional columns were usually added alongside the table for midpoints and *fx*. Some candidates made a calculation error but managed to gain 3 method marks. This error was sometimes caused by poor alignment of their answers to each *fx*. A few reached the total of 10400 but divided by 6, whilst weak candidates merely divided the total frequency by 6 or used the interval widths in place of the midpoints in their calculation.

3 Most candidates used their calculators correctly. A few forgot to use brackets or other strategies for coping with the order of operations. Thus, in part (a), 74.86 (from 3.36 + 139.2 ÷ 2.4 × 1.25) was sometimes seen and 8.15 (from $\sqrt{6.2^3}$ – 7.288) was seen rather more frequently in part (b).

4 This question provided a good test of the algebraic techniques expected of a Higher tier candidate. A significant number scored full marks.

In part (a), the incorrect answers of $^-96$ or 576 were common. These candidates received partial credit for either recognising the correct order of operations or squaring a negative number correctly, whereas those giving another common wrong answer of $^-576$ scored no marks because of the two errors involved. It was evident that some candidates who used a calculator did not realise that they required brackets around the negative number.

Part (b) was usually correct, with a few candidates giving 7, 10, 13 or 7, 31, 127. A small number of candidates started their sequence with $n = 0$, and gained some partial credit for obtaining 3, 7, 11.

Most candidates knew how to factorise in part (c) and did so in full. Few partial factorisations were seen.

Many candidates solved the equation in part (d) correctly, and most did so with clearly presented, efficient, algebraic working. Most, for example, started by subtracting $2x$ rather than $6x$ and thus avoided working with a negative coefficient. Other candidates often scored follow through marks for correct algebra following wrong steps. Those candidates who used trials were usually unsuccessful.

In part (e), most candidates rearranged the formula successfully. A few weak candidates who did not know what to do just swapped x and y but the majority gained at least one mark. Sign errors were more common than the wrong order of operations.

5 Many candidates struggled with this construction question. Kite constructions were at least as popular as the more conventional approach for finding the perpendicular from a point. However, candidates who used either of these valid methods were in the minority. Angle bisections of ADC and invalid constructions involving arcs centred at D and their intersections with AD and BC, were very common. A few candidates constructed the perpendicular bisector of AB and then appeared to have drawn by eye a line parallel to it through D. Even following an accurately constructed perpendicular, candidates often failed to convert their scale measurement into metres correctly.

6 Most reached the correct product in part (a), usually via a factor tree. A few candidates just listed the prime factors.

Part (b) proved to be very challenging, with few candidates having a clear strategy for solving it. The most common ways of earning a method mark were to factorise 4200 successfully, or to work out 4200 ÷ 24 = 175, but candidates did not know where to go from there. An attempted use of Venn diagrams was quite common amongst the better candidates but the factors were rarely split correctly. Working by weaker candidates was often a series of abandoned trials, although credit could be gained by those who gave 600 or 168 as one of their final answers.

7 Most candidates either scored full marks or no marks in each of these two parts. Finding the height in part (a) was more successful than finding a missing angle in part (b). Many recognised that trigonometry was needed but were not always able to select the correct trigonometric ratio to use.

In part (a), a few candidates used cos64° × 85 to find the horizontal distance but then almost always failed to apply the necessary Pythagoras to reach a final answer. Some others incorrectly assumed that the angle at the crossing point of the two legs was 90° and then used Pythagoras: $42.5^2 + 42.5^2 = h^2$.

Premature rounding of 79/85 caused some candidates a loss of accuracy in the final answer to part (b). Others did not give their answer to the required 1 decimal place.

8 Many candidates achieved all five marks in part (a). A few other candidates lost the final accuracy mark through excessive premature rounding in their working. Candidates often used one of the given altitudes, rather than the difference, as their vertical height. Generally, candidates decided appropriately to work in metres with only a few converting the vertical distance into miles, however many were unable to perform that conversion correctly. Thus it was common for candidates to enter the Pythagoras stage of the solution with at least one incorrect value and sometimes inconsistent units where no conversion had been attempted.

There were very few correct responses to part (b) and these usually pointed to the varying gradient and suggested splitting into smaller sections or more triangles to improve accuracy. Many thought the same units should have been used for the horizontal distance and altitude. Some provided an alternative method, such as using a pedometer, rather than answering the question to improve Colin's method.

9 Better candidates usually showed their frequency densities alongside the table and constructed a correct histogram. However, some of these did not gain full marks because of a missing or incorrect label on the vertical axis, or for drawing the first bar with width $0 < w < 15$ rather than $10 < w < 15$. The scale chosen for the vertical axis by all abilities was almost always sensible for their values, and the heights of their bars were usually plotted accurately. Some candidates merely drew bars using the given frequencies.

10 Many candidates appeared to struggle with the concept of an identity in part (a). A correct first step, such as expanding the bracket on the left hand side, was sometimes seen but the working then became confused as they attempted to solve equations or rearrange formulae. The relatively easy step to find $r = 9$ was seen much more frequently than $p = 12$.

Although there was some very clear, efficient, solutions in part (b), many candidates were unable to collect their c terms on one side and the remaining terms on the other side. Even if that step was completed correctly, candidates often continued with some very poor algebra. Only the best candidates understood the need to factorise $5c – cn$. Some final answers were spoilt by failure to simplify $9d – 6d$.

11 The majority of candidates answered part (a) correctly. A common error was to set up and solve the equation $5.2 = 5x – 7$.

Only better candidates had success with part (b). A few showed they had some understanding but did not put brackets around $(2 + 3t)$ when substituting into $f(x)$. Other candidates often expanded $f(2 + 3t)$ as an algebraic expansion of a bracket rather than a function.

A502/01 Mathematics Unit B (Foundation Tier)

General Comments

Candidates appeared to have sufficient time to access all of the paper and a wide range of responses was seen.

Many candidates were able to perform simple arithmetic operations, extract data from tables, draw graphs representing real situations and solve geometric problems.

General weaknesses were observed in drawing accurately, solving inequalities and any calculation involving fractions.

A number of candidates did not appear to have access to a ruler. Many could not use angles at the centre of a circle to inscribe a square with any precision. Indeed few seem to realise that the diagonals could assist with the drawing of a square.

Candidates did not perform well on the QWC question. Many did not have any idea how to divide 430 by 6 to achieve an exact answer, nor were they aware of the need to show the differences to finalise the argument.

Candidates appear to need much more practise in answering questions that require:
- The solution to be structured
- Answers to be supported by evidence
- Simple deductions to be drawn.

Comments on Individual Questions

1 Many candidates answered parts (a) and (b) well, although 5 – 3.50 = 2.50 was too commonly seen.

Some good answers were seen to part (c) but many candidates did not even record the amounts that items would be reduced by.

Not many candidates attempted to answer part (d). Few good solutions were seen although the best candidates gave clear combinations of amounts equalling £96.50 which they converted to reduced amounts. Many attempted a percentage method with varying degrees of success, with dividing by 3 to find 30% a common error.

2 In part (a), most candidates recorded 1800 to receive 2 marks. However, a significant number did not read the scale correctly or could not subtract accurately.

In part (b), many candidates answered 120 minutes but 30 minutes was the usual error with 520 a less common wrong answer.

3 Most candidates drew the diameter correctly in part (a).

Some candidates answered “90 degrees” for part (b) but 180, 360 and 45 were also common.

Very few candidates gained full marks for part (c). A few gained 2 marks for an accurate square within tolerance but without using two diameters at right angles. Many clear rectangles were seen. Often shapes did not join at corners. Many candidates were unable to inscribe a square inside a circle.

Some candidates drew approximate squares surrounding the circle; these candidates were allowed “tangent” as a follow through answer to part (d). Pleasingly, there were some candidates who knew “chord” was the correct answer.

4 Many good responses were seen to part (a). Candidates were often clear in their statements although somewhat rambling and imprecise in some cases. A common error was to say that the kitten had “lost weight”. Some noticed the weight increased and then said the kitten became unhealthy due to putting on weight.

Plotting was generally accurate in part (b)(i) although some candidates did not plot the final point well. A number did not join the points.

In part (b)(ii), many could give a correct figure for improvement but some simply read the target value from the graph without taking the current weight into account. A common error was 50 or 100.

5 Most candidates correctly ordered the decimals in part (a). Some reversed the order.

Many found the missing numerator correctly in part (b), though some wrote the multiplier, 3, in the box rather than 6.

In part (c), many candidates showed no working. Some of those that did revealed poor understanding of equivalent fractions and common denominators. Some used a diagrammatic approach effectively. A few had the values in the reversed order although, with no working, this may have been a fortuitous mark.

6 This question was well answered with many candidates gaining all 5 marks.

In part (a), a common error was to show working rather than justify the answer.

In part (b), some candidates were not able to subtract 150 from 180 accurately. Most candidates realised that the sum of the angles in a triangle was 180, though a few used 360. Part (b) was better answered than part (a) as it only required calculations.

7 Many candidates gained full marks for this question.

In part (a), common wrong answers were 10 and 0.10.

In part (b)(i), the numbers were occasionally reversed.

In part (b)(ii), a few candidates only plotted 2 points. Points were either correct or wildly wrong. Few candidates showed working.

8 This QWC question was very poorly answered. Many candidates had no idea of how to proceed. Few wrote both estimates in the same form. 71.4 as the decimal equivalent of $71\frac{1}{4}$ was quite common. Many attempted 430 ÷ 6 but then had no idea how to continue and approximated answers. A few managed $71.\dot{6}$ and even fewer $71\frac{2}{3}$ but those who worked on the weight of individual cakes rarely found the difference between their exact value and the two given ones. Others worked with the total weights and for these very few differences between 430 and 71.25 × 6 or 71.7 × 6 were seen. Fractions are clearly poorly understood by most candidates.

9 This was the first common question and was well answered by many candidates.

Points were plotted accurately in part (a) and many good lines of best fit were seen in part (b).

In part (c)(i), many candidates estimated distances for Carl and Marco that were within tolerance.

In part (c)(ii), many candidates correctly selected Marco but were unable to describe stronger correlation or the clustering of points closer to the line of best fit at younger ages. Many wrote, “They are all about the same” or some version of this. Some attempted reasons beyond correlation and described such things as having better physical development.

10 This was the second common question and was also quite well answered with a number of candidates using a ruler. Marks were awarded for accurately interpreting the conditions stated. Many candidates lost a mark for continuing lines beyond the time when a change in the school population took place. A common error was to think that all lines drawn had to be like the one given and a number of graphs consisted only of diagonal lines. These candidates gained marks for identifying correct turning points which were deemed to be at the ends of their lines.

11 In part (a), many candidates correctly identified 6 as the lowest integer solution. Common wrong answers were 5 and 1. Some candidates clearly did not understand that 5.3 was not a whole number.

In part (b), candidates struggled to solve the inequality. Some rewrote it as an equation but then could not move terms correctly or failed to replace the inequality. Common errors were (x =) 4 or 5. Some attempted to rewrite the inequality with these values in place but often made errors in doing so.

12 In part (a), quite a lot of good answers were seen although 12 was a common wrong answer.

Many candidates did not attempt part (b) although some spent a long time working out 5^7 and 5^4, often incorrectly, and then were unable to deal with the resulting division. A few did go to 5^3 but then contented themselves with saying that 5^3 was greater than 6^2 without further evidence.

A502/02 Mathematics Unit B (Higher Tier)

General Comments

The paper proved quite accessible with few candidates scoring fewer than 20 marks and many scoring over 50. There was no evidence of candidates being short of time.

Candidates were, in general, using a ruler in graph and transformation questions. Most working was clearly shown allowing part marks to be awarded even when the answer was incorrect.

The Quality of Written Communication was assessed in question 13 and many candidates presented their arguments clearly, showing the relevant calculations and giving reasons for each step. The weakest candidates did not attempt this question.

Some questions addressed functional elements of mathematics and candidates had to interpret the real life relevance of the calculations or diagrams they produced. This was done most successfully in questions 1 and 2 with many candidates realising the scatter graph had a stronger correlation for the lower ages. Question 4(b)(ii) proved more difficult and only the best candidates realised that their answer to part (b)(i) indicated that Alex was definitely in the 'Overweight' category.

Questions that were particularly well answered include question 1 (scatter graph), question 2 (linear real life graph) and question 8 (similarity).

Comments on Individual Questions

1 In part (a), most candidates were able to correctly plot the 2 points.

In part (b), most candidates produced an appropriate ruled line of best fit. A common error was to force the line of best fit to join the "origin" of the graph.

In part (c)(i), virtually all candidates correctly used a line of best fit to read off values.

In part (c)(ii), only a minority of candidates could describe the strength of the correlation with many describing the number of points or not relating their points to the line of best fit.

2 It was pleasing to see many fully correct graphs with candidates showing an understanding of the context of the question. The most common reason for not scoring full marks was the occasional miss-plot, or the incorrect plotting of 180/2 at lunchtime. A minority of candidates had children leaving the school before the start of lunch and the end of the school day. Some candidates failed to recognise the need for joined points, but still scored 1 or 2 marks for some correct plots. Only a small minority failed to score.

3 In part (a), many candidates who used a full method for long multiplication struggled to deal with the decimal values. The most common error came from only multiplying 6 × 3 and 5 × 6 leading to answers of 18.3 or 21. Many candidates forgot to give their answer to 2 significant figures.

Part (b) was answered well with most candidates gaining the mark for 10^9 or 1 000 000 000. Some gave both answers and others gave an answer which had an incorrect number of zeros.

4 The vast majority scored full marks in part (a), though there were many who did not read the question correctly and gave the final answer as 'Normal'. A common error was to calculate 100/2 = 50. A small number ignored the instruction to use approximation and struggled with the unnecessarily difficult division they encountered.

Whilst there were a lot of correct answers in part (b), many candidates failed to justify their result being an underestimate, and some thought that it was an overestimate.

Part (c) saw most candidates not realising that their answer of 25 being an underestimate meant that Alex was not on the border of Normal/Overweight.

5 There were a lot of good responses in part (a). Fraction work seems to be improving. Nearly all candidates attempted to find a common denominator. The most common error came from an incorrect conversion to top-heavy fractions before finding the common denominator.

In part (b), many candidates did not understand the term 'reciprocal'. However, there were some concise methods for part (b)(i) although many could not go beyond 1/2.5.

In part (b)(ii), a common error was for candidates to believe that 1 does not have a reciprocal.

6 This proved to be a challenging question with many candidates struggling to apply their skills in context.

Part (a) was often answered correctly but lack of labelling made it difficult to know whether candidates were 'shading in' or 'shading out' the required region.

In part (b), the majority did not score as they did not realise they had to draw the line $5x + 5y = 10$ before representing the inequality.

In part (c), only the best candidates realised that "a coffee costs more than a muffin' could be represented by another inequality. Candidates who correctly interpreted information from the question (eg prices being multiples of 50p) were given credit but many lost marks for poor money notation such as £0.5.

7 In part (a), the majority of candidates understood reflection but some failed to identify the line $x = 1$.

In part (b), most candidates knew that the transformation was an enlargement. However, many were not aware of negative enlargements and included rotation as part of their description. The lowest scoring candidates often included reflection and translation.

8 This was well answered by most candidates though a small number were unable to calculate 3×1.5. The most common error was to calculate $3 + 2 = 5$.

9 This question was generally well answered. The common mistakes were to write the expression $6x – 5$ rather than form an equation with y, or to reverse the values getting $y = {}^{-}5x + 6$. Some forgot to include x in the answer.

10 There was a large number of well presented, fully correct answers. There were also many poorly presented answers with working scattered all over the answer space. Of those who did not reach the correct answers, most correctly equated coefficients but then did not know whether to add or subtract the equations. Those who did often struggled with the directed numbers and it was very common to see $10 - {}^{-}9 = 1$. A very small number correctly found one of the values but failed to get the other. The few candidates who tried substitution generally made it to the end.

11 In part (a), most candidates answered correctly. 18 was the most common wrong answer.

In part (b), many knew that they needed to find the cube root of 8 but there was some confusion over the negative power; some see a negative index as indicating a negative number.

12 In part (a), those who knew what was required wrote only the answer. There were quite a lot of arithmetical errors (eg $4 + {}^{-}2 = 6$ or ${}^{-}2$), and a small number wrote a 2×2 matrix, usually containing the four values given. Some included a fraction line between the values.

Again in part (b), large numbers simply wrote their answer so it was rare to be able to award a method mark. $\frac{1}{2}\mathbf{c} + \frac{1}{2}\mathbf{a}$ was a common wrong answer. There were also quite a lot of candidates who gave the opposite vector and the inclusion of vectors **m** and **n** was seen a few times.

13 The best answers followed one of two routes, a combination of alternate segment and an isosceles triangle or the angle at the centre and angles in a quadrilateral. This was a question testing the Quality of Written Communication so it was expected that candidates would correctly define angles, sides and triangles and use correct notation. Many candidates used such notation with clarity. There was some confusion between the alternate segment theorem and alternate angles as weaker candidates assumed that CA was parallel to BT. The weakest solutions typically involved a list of calculations with minimal explanation, or a list of facts which were in no particular order. These sometimes led to the correct value for *h* but more often to an incorrect answer with no obvious correct calculations. Some otherwise strong answers had all the correct steps but with a key reason casually stated as an afterthought rather than part of a coherent argument. A common error was to think that ACBT was a cyclic quadrilateral concluding that *h* was 105°.

A503/01 Mathematics Unit C (Foundation Tier)

General Comments

This was the second series for the A503/01 Unit C for the Mathematics J562 GCSE qualification. The vast majority of candidates were very well prepared for the exam and it was encouraging to see so many very good scripts at this level. Many candidates were scoring higher marks and all candidates were able to access at least some of the questions and achieve a degree of success on the exam.

Work was generally well presented and logically set out in most cases. The longer questions gave candidates the chance to demonstrate their reasoning skills and many were able to construct good solutions with clear working.

The questions on simple number calculation, coordinates, calculations involving money, simple probability, reading scales, substitution, using mileage charts and solving related problems, two-way tables and brackets and factors were generally well answered. The questions involving choosing correct imperial units for conversions, dividing fractions, ratios in the context of recipes, area of a parallelogram, 3D coordinates, harder probability in context and relative frequency, and drawing quadratic graphs, proved to be the most challenging.

A calculator was allowed for this unit but there was some evidence that a few candidates were using non-calculator methods in a number of the questions.

Comments on Individual Questions

1 Part (a) proved to a straightforward start for candidates. Almost all were successful in completing the multiplication table. There were occasional slips with the middle column with the value 8 in the top row which then affected the other values in the middle column.

In part (b), the majority of candidates correctly answered each sub-part. A few made errors in finding ¼ of 48 in part (b)(ii) or in choosing 7 or 3 for part (b)(iii).

2 Most candidates plotted the coordinate $(3, {}^{-}1)$ correctly in part (a). Only a few plotted it at $({}^{-}1, 3)$ or (3, 1).

Part (b) was well answered with most candidates understanding how to use the points A and B to construct a rectangle of area $8\,cm^2$. A few made a rectangle with an area of 4 cm^2 or $6\,cm^2$. Almost all candidates wrote the correct coordinates for their plotted points for C and D.

3 The vast majority of candidates correctly chose arrow B correctly in part (a). A few gave a numeric answer such as $\frac{1}{6}$.

Almost all candidates chose the correct arrows for both part (b) and part (c).

Fewer candidates were successful in part (d) with a number mistakenly choosing arrow F instead of arrow E.

4 Answers to all parts of question 4 varied and although a number of candidates were comfortable with the conversions, particularly as the question involved choosing from a range of options, others struggled.

A common error was to choose 4.5 miles in part (a).

There were a range of errors seen in part (b) as well as a number of correct answers. The most common error was to choose 1.75.

Part (c) was the best answered of the parts and many candidates chose litres, with a few choosing pints, as the unit. A common error was to choose 5 and not 4.5.

5 Most candidates were successful in giving 15 bottles as the answer, with fewer giving the correct change from £20. Some gave 80 or 0.80 as the change but omitted the units which was essential in this question. A number gave the change as a value with figures 625, which was the decimal part of calculation 20 ÷ 1.28. Others attempted non-calculator methods and had a rolling list of 1.28's being added. This usually led to an incorrect answer.

6 Part (a)(i) was very well answered with the majority giving the correct answer 180. A few misread the scale and gave an answer of 80.

Part (a)(ii) was very well answered with the majority giving the correct answer 72. A few gave 70.2.

Less well answered was part (a)(iii). A common wrong answer was 38.9 from misinterpreting the divisions on the scale.

Many candidates were successful in correctly ordering all 4 lengths in part (b). A common error was to confuse the positions of 59 mm or 0.582 m.

7 Part (a)(i) was very well answered. The majority of candidates chose 1 from the spinner, though a number chose 6, perhaps misinterpreting the term 'evens' as even number.

Many candidates gave the response 'unlikely' in part (a)(ii). Others used more vague statements; responses such as 'possible' and 'likely' were not acceptable. Some gave a more sophisticated response of $\frac{1}{6}$ which was accepted.

The vast majority chose a number that was not 1, 3 or 6 and answered part (a)(iii) correctly.

In part (b), many candidates correctly applied each of the three statements about the spinner to the required 8 values. Almost all candidates were able to score some marks by either giving the mode of the values as 8 or giving a total of 4 different values or by giving more odd values than even ones.

8 This question proved to be more discriminating. A number of candidates appeared to be using non-calculator methods throughout the question.

The majority of candidates were able to calculate the correct pay for the weekdays in part (a), but there were a surprising number of arithmetic errors given that this is a calculator paper.

Part (b) was less well answered than part (a) as a number of candidates could not calculate the hourly pay for Saturday as 25% more than £5.80, the weekday pay. Some were able to calculate that the pay for the 18 weekday hours was £104.40, but some were then unable to calculate the hours worked on Saturday because they did not have the correct hourly pay. These used the weekday hourly rate instead, arriving at an answer of 5.

9 The majority of candidates gave the correct answer 21*a* to part (a)(i). A few gave 10*a* as the answer, while others gave an answer such as 21×*a* which was not fully simplified.

Part (a)(ii) was very well answered with the majority giving the correct answer 10*x*.

Part (a)(iii) was also well answered. However, a number of candidates were unable to process the directed terms correctly, and gave answers such as 8*a* + 13*b*. Most were able to obtain at least one of the terms of the two-term answer correctly.

Many were successful in matching the pairs of expressions in part (b). The majority of candidates worked underneath the expressions given and gave the correct numeric evaluation for each before matching the terms. Errors seen included errors in processing the directed numbers eg in $3 \times (^{-}3) - 1$, and with the squared value where some doubled instead of squaring.

10 Part (a) was well answered with the majority of candidates evaluating both the numerator and denominator of the fraction correctly. A number evaluated the numerator as 4 however.

Part (b) was less well answered. More candidates were successful in giving the final fraction of $\frac{1}{5}$ but the majority did not correctly complete the first box with the value 1. The value 11 was the most common error.

11 Most candidates scored well in part (a) and were able to give the correct probability from 1 – (0.5 + 0.3).

Most candidates scored well again in part (b) by working out the expected value of 225 from 450 × 0.5.

12 This question proved to discriminate between candidates.

A number of candidates were successful in obtaining 165 g in part (a). Some approached this using a 'scaling factor' of 1½ and this was the most successful method used. Others divided 110 g by 12 before multiplying by 18. This sometimes led to a rounding error when candidates rounded the grams of flour needed for one pancake to 9.16 or 9.17, for example, before multiplying by 18. Some misunderstood the question and gave an answer of 55 g.

Part (b) was less well answered. Many candidates used the technique of 'building up' to 450 and 125 rather than the more precise method of division of 450 by 200 and 125 by 50. A common error was to use a scaling factor of 2.5 in both cases which led to an incorrect answer of 30. A number started the 'building up method' from 200 ml of milk and 50 g of butter but lost their way with the remainder when they had reached 2 lots.

13 This question tested the Quality of Written Communication and virtually all candidates were able to score some marks on the question considering rectangles that used 36 tiles. As this was a QWC question, it was essential that the relevant information was written down clearly and logically to score the higher marks. The best solutions had clear drawings of the rectangles with the perimeters clearly written alongside or in a results table. Where units were given, they were correct. The 6 by 6 square was considered as a special type of rectangle. Weaker candidates were more random in their approach and often did not record the information required such as the perimeter which was essential to communicate the findings. Some did not consider the 6 by 6 square but scored the majority of marks in an otherwise good, well written approach. A few candidates appeared to try to make the perimeter equal to 36 for their rectangles.

14 Part (a)(i) was well answered with the majority of candidates able to demonstrate their understanding of how to read the mileage table and obtain the distance of 203 miles correctly.

Part (a)(ii) was also answered very well and candidates were able to structure their answers. The majority calculated the number of litres required first by dividing 203 by 7 to obtain 29 litres. A few went wrong at this point and multiplied 29 by £42.05 instead of dividing £42.05 by 29 and were not concerned that their answer was then a very large amount for one litre of petrol.

Many candidates were successful in calculating the average speed in part (b) and obtained the total distance travelled as 105 miles before dividing by the time of 2 hours. A significant number chose to convert the time to minutes however and divided 105 by 120 without conversion back to miles per hour.

15 The two-way table was completed particularly well by almost all candidates of all abilities.

16 This was probably the weakest area for candidates on the paper. Only a few understood that to obtain the area of a parallelogram, the base and perpendicular height should be measured and multiplied. There was a range of incorrect answers, most commonly from the product of the base and the slant height. Some gave the perimeter and others were unable to obtain correct measurements for the lengths. The units mark was earned by a minority. Most candidates overlooked the request for the units and gave no units at all. Other errors included cm or cm^3.

17 The majority of candidates understood that six rectangles were needed to form the net of the cuboid in part (a). A number were able to draw the rectangles in the correct positions and of the correct dimensions. A few gave the net of an open box which was otherwise correct. The majority of candidates scored one or two marks for a partially complete net with the common error to make a dimensional error with one of a pair of the rectangles. For example, it was common to see four 4 by 2 rectangles or 4 by 3 rectangles alongside the 2 by 3 pair of rectangles.

For some candidates in part (b), 3D coordinates appeared to be an area that was new to them. Those that made an attempt were often successful with at least one of the coordinates. For B, a common error was to give (4, 2, 3) instead of (4, 3, 2). A number of candidates used the value 8 instead of 4 in their coordinates, and some gave answers where all 3 values were twice the correct values.

18 Part (a) involved expanding brackets and simplifying the answer, and was well answered. Candidates demonstrated improvement on previous series. Many obtained the correct answer of $10x - 3$. A few left unresolved signs eg $10x + {}^{-}3$. Most were able to expand both brackets correctly.

Part (b) was also quite well answered and most candidates were able to recognise the form of the answer required. A number only partially factorised by removing a common factor of 5 or x from the two terms. Others chose $5x$ as the highest common factor but made errors in dividing the second term by $5x$.

19 Virtually all candidates scored some marks on this question. The better candidates noted the mark allocation and attempted to make 3 clear comments about the results to the coin experiment. Most compared the expected value of 300 with the actual value of 315 or did so by comparing the expected probability of 0.5 with the relative frequency from the experiment. Fewer candidates commented on the number of trials being sufficient to ensure the validity of the experiment.

20 Candidates answered part (a) quite well and most gave the correct value of $^-1$ in the table.

Most were successful in plotting the points in part (b) but there were occasional errors in particular with the points at ($^-2$, $^-1$) and (1, $^-1$) which were plotted in the positive *y* quadrants. The curve was less well done; candidates should ensure that the curve is smooth and passes through each of the plotted points. A few ruled the sections which was penalised. Some did not appreciate the shape of the graph and joined the two minimum plotted values with a horizontal line.

In part (c), those candidates that understood that they needed to use the intercepts of the curve with the *x*-axis were invariably successful at reading the values from the *x*-axis correctly. Many did not understand how to use the graph to solve the equation however and there were a number of candidates that omitted this part.

A503/02 Mathematics Unit C (Higher Tier)

General Comments

Candidates were, in general, well prepared for this exam and performed to a pleasing standard. Very few were entered at the wrong tier. There were many high scoring scripts from candidates who displayed a good working knowledge of the topics covered.

It was clear that some candidates did not read the question carefully enough and failed to provide exactly what it required. Looking for key words in a question may overcome this problem. Also, at this level, students should be re-reading the question, considering its context and requirements, checking their work and reviewing their answers more thoroughly to identify where errors may have been made. The accuracy to which answers were given was also an issue.

Presentation of work was, on the whole, good with clear working shown so that credit could be awarded even when the final answer was incorrect. Some attention needs to be paid to the structure and setting out of answers to QWC questions. More detail of the calculation being used should be provided along with a commentary of what is being found and why. Candidates would do well to have this in mind for every question they answer.

Work on algebra showed some improvement though there were still those candidates who solved equations by trial and improvement. More time should be spent on the formal algebraic methods. In all other topic areas, many showed a high level of competence and understanding. In general, calculators were used efficiently and effectively.

Candidates had sufficient time to complete the paper. Most attempted every question.

Comments on Individual Questions

1 The majority of candidates scored full marks on this question. Very few made any arithmetic slips.

2 There were a lot of correct answers to this question though far too many candidates multiplied 5 by 3 without considering that the shape was not a rectangle. Surprisingly, many candidates failed to do as instructed in the question and did not measure lengths from the diagram; some simply guessed the lengths. Few of those that divided the parallelogram into a rectangle and two triangles managed to reach a correct answer. Most got confused in a mass of measurements. Invariably, candidates gave the correct units for their area.

3 Many did not read the question carefully, in spite of the word ‘more’ being bold. Consequently, there were a significant number of candidates who increased by 35% instead of 135%. Even though a calculator was available, there were those who followed the non-calculator route (50%, 10%, 5%) to answer the question. A few mistakenly multiplied by 1.135.

4 It was common to see the correct answer to part (a).

A few candidates made things difficult for themselves in part (b) by doing the calculation in stages, often truncating their answer at each stage. 1/9 becoming 0.1 was a common error. Some incorrectly converted 81 minutes to 1.21 hours. Answers were, in general, given to an appropriate degree of accuracy.

5 Nearly all candidates obtained the correct answers for parts (a) and (b).

In part (c), many candidates added rather than multiplied the probabilities. Some misread the question and calculated the probability of a total of 2 with two throws of the dice.

Most candidates knew to multiply 250 by 0.11 in part (d). However, some did not see the need to round up or down their answer of 27.5.

In parts (b), (c) and (d), there were a small number of candidates who disregarded the given information and calculated values for an unbiased dice.

6 Clear, accurate drawings of the net were given by the majority of candidates in part (a). However, some failed to check their diagram and included rectangles of incorrect dimensions or rectangles where sides did not correspond correctly in a reconstruction of the cuboid.

Part (b) was unsuccessful for many candidates. A significant number gave the coordinates of B as (4, 2, 3) and some gave answers where all 3 values were twice the correct values eg (8, 0, 0) and (8, 6, 4).

7 There were some good answers to both parts of this question.

In part (a), very few candidates failed to multiply both terms inside the brackets and the majority collected their terms correctly. After a correct answer, a small number did go on to solve $10x - 3 = 0$. These did not score full marks.

Most found both factors correctly in part (b), though a few only found one of them. Rarely did candidates have no idea how to proceed.

8 It is important in questions like this that candidates provide sufficient numerical evidence to support their decision. The majority used the given data appropriately though some answers made assumptions of prior knowledge about probability. Many candidates did not mention that 600 trials were sufficient for the relative frequency to be a reliable estimate of probability.

9 Though there were many correct answers to this question, the presentation and explanation of the method used was disappointing. This meant that full marks were not regularly awarded. Candidates must be made aware of the importance of giving structured, clear and fully explained answers to QWC questions. A pleasing number gave their answer in the context of the question. Weaker candidates knew they had to divide the volume of the carton by the volume of the glass but failed to write either, or both, in an appropriate form.

10 There were many correct answers to part (a). A few made one slip either in a sign or the order of the operations needed in the rearrangement.

Many candidates used trial and improvement in part (b) rather than one of the more formal algebraic methods. This often led to errors.

11 Candidates coped well with part (a) though some failed to take account of the scales on the axes. Others thought that the equation of the line was required. Those who did give units mostly did so correctly, however this was often omitted.

In part (b), it was clear from the responses that many candidates just guessed. Some failed to read that the question referred to the gradient and answered 'increasing distance'.

Most candidates answered part (c) correctly.

12 There were many correct answers to this question. It was nice to see candidates getting to grips with reverse percentages. However, there were still too many finding 2% of 1887 and subtracting. A small number employed a trial and improvement method, sometimes successfully. This should be discouraged in favour of a more rigorous approach.

13 Most candidates realised that the two lengths had to be multiplied together. The omission of brackets in writing this down sometimes led to an incorrect expression. Of these, many had difficulty with, or omitted, the division by 2. Weaker candidates were confused by the algebra and the request for an answer in the form $ax^2 + bx$. Some of these assigned numbers to the lengths and used those to work out the area.

14 In part (a), there were many answers not given as a mixed number; top heavy fraction and decimal answers were common. A very common wrong answer was 1 11/12. Many candidates used pencil and paper methods, ignoring their calculator, but with little success.

Parts (b) and (c) were invariably correct showing a sound knowledge of calculator key sequences.

Part (d) posed problems when candidates tried to work this out without the use of a calculator. Some gave their answer in a rounded or truncated form of the correct one or not correctly in standard form.

15 In part (a), most candidates were able to multiply out two pairs of brackets and simplify their answers. FOIL and the grid method were the popular approaches used.

In part (b), it was clear that some candidates knew about difference of two squares and could apply the process confidently and accurately whereas many others had little knowledge of what to do.

There were many correct answers in part (c). A significant number of candidates gave their final answer as the product of the two factors. A few tried a solution using the quadratic formula though many of those failed with the arithmetic required.

16 Candidates answered this question well. There was little confusion about completing the tree diagram in part (a) and also when to multiply or add probabilities in part (b). A small number of candidates only considered one of the possible combinations for one day being sunny and a few others calculated the probability of at least one of the two days being sunny.

17 Work on this question was disappointing. Though many candidates could read off the values where the graph crossed the *x*-axis in part (a), few successfully attempted part (b).

There were attempts in part (a) to solve the equation by calculation, ignoring the instruction in the question.

There were a good number of correct answers to part (b,) however some were spoilt when the answers were given as coordinate points rather than *x* values. Many drew the line $y = 2$ and found where this crossed the given graph.

18 There was a mixed response to this question.

It was common to see Pythagoras' Theorem being used in part (a) though not always successfully. Where candidates did the calculation in stages, accuracy was sometimes lost through the rounding of an intermediate answer. Some failed to show their full decimal answer and how this would round to the required value. A number of candidates tried to work backwards, using the given answer to help find TB or MB.

In part (b), many candidates correctly calculated the size of angle TBM for example. Often this involved very long-winded methods. Some, however, mistakenly thought that the required angle was angle TBA.

19 Better candidates scored full marks for this question.

A common answer to part (a) was 680, using $t = 1$ instead of $t = 0$.

Part (b) was answered more successfully by candidates. A large number left their answer as 348.16 and did not consider the context of the question.

20 Some good work was seen here. Many candidates confidently factorised the two expressions and then cancelled common factors. Even when the answer was wrong, many had tried to factorise the two trinomials. Weaker candidates employed spurious cancelling of letters and numbers.

21 There were a significant number of well thought out, well presented, correct answers. Many others knew what was required but failed to find the two areas correctly, often quoting an incorrect formula. Some candidates used unnecessarily long methods to find the area of the triangle, often unsuccessfully. They had overlooked the fact that the formula needed was on Page 2 of the question paper. A few took the angle to be 90° even though it was clearly labelled as 106° on the diagram.

22 Pleasingly, very few candidates used straight lines and cubic curves as the image after these transformations.

Part (a) was often correct though some did translate the curve horizontally to the right.

Candidates had less idea with part (b). Those who did realise that a stretch was needed sometimes stretched the curve horizontally rather than vertically.

Part (c) was often correct.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

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