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Oxford Cambridge and RSA

GCSE

Mathematics A

General Certificate of Secondary Education **J562**

OCR Report to Centres June 2016

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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

A501/01 Mathematics Unit A (Foundation Tier)

General Comments:

The entry for this session was the highest it has been for a few sessions with approximately 1700 scripts marked.

Marks ranged from 0 to 59 out of 60, with a mean mark of 33.4 suggesting that the paper was appropriate for the candidates intended.

General presentation by candidates was usually fine.

Comments on Individual Questions:

Question No. 1
This question was well answered with the majority of candidates giving the correct values in most parts. A very common error was an answer of 72 in part (b) displaying confusion between the terms 'factor' and 'multiple'. Several candidates gave answers which were not in the list from which they were supposed to choose.

Question No. 2
Part (a) was very well answered with just the occasional misreading of scale giving an answer of 320.
In part (b) many candidates lost a mark by not giving the units for their answer. The majority of candidates knew that 1000 g = 1 kg.

Question No. 3
In part (a), although the majority of answers were 14 or more, there was poor use of scale factors in calculating. There were many answers of 14 or 14.2. A common error was to count up the number of whole squares, double it and then add 0.1 or 0.2 for the remaining part square. Those who measured were more likely to gain the method mark for a correct measurement, going on to score 2 marks.
Part (b) was reasonably well answered, with most errors being on the 4.2 m side of the table as many candidates drew this 2 squares long. Those candidates who drew the table to the full size were unable to leave the required gap around the edges and so lost both marks. Some candidates tried to put their answer in the space below the question instead of on the scale drawing.

Question No. 4
The table in part (a)(i) was usually completed accurately. The corresponding bar chart in part (a)(ii) was usually correctly drawn.
Part (b) proved to be more of a challenge with relatively few candidates scoring full marks. Most managed to score the first mark here for '8 silver cars'. However, many candidates had difficulty understanding/explaining why the statement might be wrong. It appeared that many candidates did not realise that some numerical work was required.
There were also calculation errors as many candidates seemed to get confused with the 12 cars (which were black and silver) and how many cars were left. It was common to see 12 and 14 'other' cars used in their comments.
Some candidates gave answers that were not relevant, such as 'the data was not collected correctly', 'the data was not collected over a long enough period' and 'other days might give different results'.

Question No. 5
Part (a)(i) was rarely wrong, and although part (a)(ii) caused a few more problems most candidates scored at least 1 mark. A common mistake was to give 30 as the answer.
Some candidates thought that the answer was 32 because 'pattern 5 is 16, so multiplying by 2 gives pattern 10'.
Part (b) was reasonably well answered, with the majority of candidates attempting to deal with the *b* and the *c* terms separately. Common errors included $2b - 14c$, $6b +/- 4c$ and $16bc$.

Question No. 6
Part (a) was generally well answered, although the final zero was occasionally absent with these candidates forgetting they were dealing with a sum of money.
Part (b) was generally well answered, although some candidates gave a time on the clock such as 1:15 hours rather than as an amount of time in hours and minutes.
While fully correct answers to part (c) were seen, this part produced a wide variety of errors. There was a significant number of candidates who presented clear accurate journey plans, but incomplete descriptions spoilt many other candidates' work. The responses indicated that they understood the question but many struggled to comply with the conditions. At best some simply omitted the 'walk' or 'train' but gave a completely correct plan for the other two elements. At worst some candidates simply wrote down the three conditions and left the times blank or gave a start and/or end time. Between these two extremes, answers gave 'walk' or 'train' with times but without a start or end point. Others had less than 3 miles for the walk or omitted the total distance walked. Some candidates had the family starting the journey before 2pm and/or ending after 3.40pm. Some did not start their journey at Exmouth. Others thought they could arrive at one place then leave from a totally different place.

Question No. 7
The majority of candidates gave correct answers in the whole of this question, with the exception of part (b)(ii). Parts (a)(i) and (a)(ii) were done quite well done but common errors included 9386 from not ordering the data in (a)(i) and 52 575 from not dividing by 5 in (a)(ii).
In part (b)(i) the method was usually correct but it was common to see an incorrect total following correct values, caused by (for example) misaligned numbers not totalled correctly. Other errors arose from such as adding the '*x*' and frequency values.
Part (b)(ii) was poorly answered, with a mean price of 22.5 seen regularly from dividing the sum of the four ticket prices by 4. It was a small number of candidates that knew to divide by 8760. There were many answers in the thousands, suggesting candidates did not think about whether their answers were sensible or not.

Question No. 8
Candidates' work was generally well presented in this question, with the majority gaining 4 or 3 marks for correct calculations. It was rare to see M2 awarded as these candidates generally went on to score more. The most common part mark awarded was M1 for three values multiplied.

Question No. 9
This question saw some exceptionally well presented work, with each step clearly set out and generally complete.
Most marks were lost for the final stage of dividing by 2. Some candidates lost marks because they did not show every step of their working. Several started by dividing 3 by 3.75 and so had little chance of making further progress.

Question No. 10
In part (a) a number of candidates coped successfully with the algebra, but the majority failed to give a correct response. It was rare to award M1 as candidates who showed this level of understanding generally went on to a correct answer. A very common wrong answer was 1500 from adding the 48 and 12 and then multiplying by 25.
In part (b) candidates coped somewhat better and many correct answers were seen. Errors seen included $20C + 16n$, $C = 36 + n$ and $36n$.
The majority of candidates did not attempt part (c). It was extremely rare to see a valid attempt to equate the two expressions. There was a wide variety of spurious working, often abandoned part way through. Candidates mainly wrote the two equations separately and attempted to solve each one for a variety of values of P and C, or added various elements from each one.

Question No. 11
This question was reasonably well answered. Common errors included leaving the answer as 1752…, 6082... from $\sqrt{\left(63.4^3\right)}$ then dividing by 0.083, and 6000 from not square rooting the denominator.

Question No. 12
In part (a) there were quite a few blank answer spaces, but many candidates drew accurate angles and lines. The most common error was having no arc. A common error with the angle was to draw 75° using the wrong side of the protractor.
Candidates in general did worse in part (b) than in part (a). However, those who actually made an attempt in (b) were often fairly accurate with correct arcs. It was relatively rare for candidates to earn 1 mark.

A501/02 Mathematics Unit A (Higher Tier)

General Comments:

The high quality of performance seen from most candidates last year has continued this June. This is exemplified by the performance on the rearranging the formula question, and the work on the AO3 questions in the paper.

Many candidates demonstrated a thorough knowledge of the content of this paper, except for the metric/imperial equivalents in question 6.

There were very few questions omitted by candidates. Usually working was fairly clearly laid out.

Comments on Individual Questions:

Question No. 1
The first two parts of this proportion question were quite well done, but there was a tendency to 'lose' figures when dealing with recurring decimals, resulting in inaccuracies.
Several different approaches were used to solve the problem in part (a). As expected, the most common wrong answers were from those who used addition/subtraction instead of multiplication/division.
In part (b), some confused cooked and uncooked rice and multiplied their answer to part (a) by 4.
The ratio in part (c) was less well done, with many giving a decimal answer instead of the requested fraction, whilst some used $\frac{12}{29}$ instead of $\frac{29}{12}$.

Question No. 2
There were good answers to this calculator and rounding question, with most candidates gaining full marks. In part (a) the large majority did the calculation correctly to obtain 1752…, although a few then rounded to 1800 instead of the nearest thousand as requested.
In part (b), most candidates used their calculators correctly although the rounding was not always to the requested two decimal places, and some were truncating instead of rounding.

Question No. 3
Most candidates answered part (a) correctly, with a few applying an incorrect order of operations, leading to an answer of 1500.
Writing the formula in part (b) was answered very well, with just a few not scoring both marks; omission of 'C =' was the usual error.
In part (c), the simple equation formed by putting the expression for 'P' equal to the expression for 'C' was not the most frequent means of solving this question. All too often candidates chose simultaneous equations for their solution and then forgot to multiply the P/C and ended up without an answer. Some found the answer by trials, some omitted this part.

Question No. 4
Measurement of the angle and line length in part (a) was generally very good; although some drew an angle of 95° instead of 105° and some used CD = 11.7 cm, along the line they had constructed for the angle, instead of AD = 11.7 cm. Many did not draw an arc for the line AD as they had moved a ruler length of 11.7 to find the position of D. A few indicated both possible positions of D and completed both quadrilaterals.
Constructing the angle bisector in part (b) was usually done well. Most drew an arc centred on B crossing AB and AC and used these points to centre their final arcs. Some used A and C as the centre of their arcs as AB and BC were of equal lengths. A few drew a line at the correct angle using their protractor without any arcs and a few failed as they used arcs of different radii.

Question No. 5
The first three terms of the sequence were rarely incorrect in part (a).
Stating the *n*th term showed an improvement over past years, with many giving the correct 20 – 3*n*, and most reaching 3*n* or better.

Question No. 6
Part (a) was quite well answered. Most candidates showed a detailed method with f*x* values in the table and division by 8760 below. A few made arithmetic errors but still managed to gain 2 marks. Less able candidates divided the sum of f*x* values or 8760 by 4.
Most of part (b) was very poorly done, with the exception of interpreting the bearing in part (ii), which most candidates had correct, with West and South-East being the most common wrong choices.
The conversion of 150 km to miles in part (b)(i) produced a wide variety of incorrect answers. Many candidates showed no working but some used 8 km = 5 miles or 5 km = 8 miles whilst others divided by 1.6 or simply multiplied or divided by a power of 10.
Candidates were even less familiar with the relationship between litres and gallons in part (b)(iii). Few showed any working and answers were widely varied. A fairly common error was stating 1 gallon = 8 litres or sometimes 1 litre = 8 gallons. A few successfully used 1 gallon = 4.5 litres but again some used reversed values.

Question No. 7
Candidates coped well in this AO3 question with the unsignposted Pythagoras' theorem in part (a), with most realising that they needed to apply it for the diagonal bar. However, there were many errors in obtaining the height of the vertical bars, with a wrong use of the ratio 3 : 2 leading to dividing 1.8 by 5 instead of 3 a common error. However, a number of candidates gained all 6 marks on this question.
In part (b), compared with previous inverse trigonometry questions, this was answered very well, with many correct responses and good notation. There were a few instances of the cosine rule and some candidates were determined to perform a sine inverse via first using Pythagoras to find the missing side – although the side was usually correct, premature rounding sometimes caused a lack of accuracy in the angle.

Question No. 8
Many candidates found this proof difficult. Some were able to write down a correct 3D Pythagoras equation and rearrange this successfully. Others worked in two stages, finding the diagonal of the base and using this to find *L*. This method was less successful. The main difficulty was in squaring $\sqrt{2a^2}$. Others rearranged the answer to make L^2 the subject but could go no further. $L^2 = a^2 + 5^2$ was a common error. Many less able candidates merely attempted to substitute a number into the Pythagoras formula, or omitted this question.

Question No. 9
A few candidates failed to appreciate the cumulative aspect of the question in part (a) and scored poorly. However, apart from a few arithmetic slips, most completed the table and plotted points at the correct height. Most also plotted at the right-hand end and joined their plots appropriately. There were only a few instances of bars. Most candidates who had drawn a cumulative frequency graph showed evidence of how to find the interquartile range and found this accurately, although there were a few instances of using the median.
Interpreting the histogram in part (b) was done well by most candidates, although, by this stage of the paper, some candidates had no idea how to proceed.

Question No. 10
Some candidates had good manipulative algebra fluency and in part (a) there were some excellent clear and concise solutions in rearranging the formula. Many were able to expand the bracket and then often collected terms correctly but the factorisation step proved more difficult and wrong division by t was a common error.
In part (b), some candidates gained full marks by solving the equation to find b and substituting this into the other equation to find a; others had difficulty in correctly forming equations from the given functions.

A502/01 Mathematics Unit B (Foundation Tier)

General Comments:

Many candidates scored well across the whole paper.

The performance on the two QWC questions was quite good, even from less able candidates. Many candidates showed working to support their responses in these questions although this was not quite so often seen elsewhere in the paper.

Work on scatter graphs, and "practical" graphs, was good but understanding of algebraic graphs was not.

Once again, candidates showed a poor grasp of fractions and general arithmetic was not strong with very inefficient methods being used.

Many candidates need to understand that "**Not to scale**" beside a diagram means that answers to questions cannot be obtained by measuring. This was particularly true of question 1d(i).

Comments on Individual Questions:

Question No. 1
This simple fraction work was beyond many candidates and few marks were scored on parts (a) to (c). 1 × 1 was often 2 (also on question 7a) and $\frac{1}{2}+\frac{1}{8}=\frac{2}{10}$ was the modal response in part (b). $\frac{1}{2}\div\frac{1}{8}=\frac{1}{4}$ was the most common answer in part (c).
In part (d)(i) many candidates measured the diagram and answers from 33° to 35° were common. A few candidates wrote 180 ÷ 6 but were unable to complete the division.
The modal (and incorrect) response to part (d)(ii) was $\frac{1}{6}$ showing the importance of reading the question.

Question No. 2
This question was quite well answered by many candidates. More candidates understood lines of symmetry than rotational symmetry although some did not attempt to draw lines on the diagram after a correct response to part (a)(i).
In part (a)(iii) many candidates scored a mark for finding either 90° or 60° but were unsure how to proceed. Few recognised "angles at a point".
Parallelogram was the common wrong answer in part (b) although each response was favoured by a reasonable number of candidates.

Question No. 3
This question was also well answered by many. One error in part (a) was to work out 3 but to forget to add it to 30. Another was to take it from 30 and give 27. Less able candidates treated 10% as 10 and gave an answer of 40 eggs.
The first QWC question was received well by most candidates and 2 was the mode mark for part (b). Many dropped a mark for either not annotating their work (finding 10% then 20% and saying that a decimal was not possible) or for writing the values of the percentages and writing a conclusion but not showing working. Few candidates could work out 20% directly.

Question No. 4
Most candidates gained marks on this question. However, this was often by following through a wrong answer but using the correct method in the next response.
A number gave completely unsuitable responses such as angle *a* is 125°.

Question No. 5
Most candidates gained at least 1 mark on each part of this question. The error was often to look up the wrong value from the table but many also lost marks because of an inability to multiply, for instance £5.13 by 8. Most used listing to answer the multiplication.
In part (b), many candidates incorrectly used £6.19 rather than £6.31 in their calculation. Again, subtraction was poorly done.

Question No. 6
Part (a) was quite well done and many candidates used a ruler and pencil. A common error was to reflect in a vertical line even though line *L* was given.
Many correct enlargements were seen in part (b). A few candidates used the wrong scale factor and a few isosceles triangles were seen. Most responses were drawn reasonably accurately but a minority lost marks through careless drawing.

Question No. 7
Part (a) was usually well answered, although a disappointing number of candidates gave 1^2 as 2. Wrong answers included $4 \times 1 = 5$, 3^2, 2^4 and $4 \times 2 = 6$. Many gained a mark for $2^2 = 4$.
The second QWC question was also quite well received and much working was seen. Most candidates gained 1 or 2 marks. Common errors were to give 4 cubed as $4 \times 4 \times 4 \times 4$ (that a few worked out to be 256) and to divide their 4^3 by 4 and not 4^2. Very few used index laws to gain an answer. A small number worked out the correct value of $4^3 \div 4^2$ but drew no conclusion.

Question No. 8
This first common question was well answered and most candidates plotted the four points correctly.
In part (b) many knew that the correlation was positive. Less able candidates attempted to describe “more teams, more rolls” and gained no marks.
Many candidates scored a mark for the line of best fit in part (c), although a number were out of tolerance. The common errors were to try to make the line pass through the origin or through the maximum point.
In part (d) almost all candidates read a correct value from the graph and some candidates also divided by 6 and then multiplied by 4, although often listing methods were seen. Less able candidates read from the graph and gave the value as their answer.

Question No. 9
The second, part common, question was also well responded to by candidates.
In part (a) many plotted the points correctly to gain a mark and most, but not all, joined them with a ruled line. Some, again, tried to connect the line to the origin. Very few freehand drawings were seen.
Part (b) was less well answered with the answers sometimes reversed but, more often, completely wrong.
The final part was not common but candidates often gained a follow through mark for correctly multiplying their hourly rate by 10. A common error was to read the value for 5 hours and double it.

Question No. 10
This question was not well understood by candidates.
In part (a) wrong answers included $x = 2$, $y = x$, $y = 2x$ and lists of coordinates.
In part (b)(i) very few candidates gave the answer as 1. Lists of coordinates and $^{-}1$ were the common errors as well as restating the equation of the line.
Very few gave the correct answer to part (b)(ii) although 1 and 29 were common errors.
Very few candidates attempted to list coordinates to draw the line in part (c). Lines were seen passing through $(0, ^{-}1)$ but with the wrong gradient. Other lines with the correct gradient were seen but in the wrong place. One strategy appeared to be to attempt to join $(^{-}2, 4)$ to $(4, ^{-}2)$

A502/02 Mathematics Unit B (Higher Tier)

General Comments:

The paper was generally accessible with most candidates scoring between 30 and 45 marks. There was no evidence that candidates were short of time. Many candidates were able to obtain over 50 marks showing real competence with the various techniques. Most of the candidates seemed to have been well prepared for the exam and were able to make attempts at the majority of the questions on the paper. There were a few candidates who scored fewer than 15 marks and who would have benefited from entering the Foundation Tier paper rather than the Higher Tier paper.

Generally candidates were showing the working used in order to obtain their answers and so were able to obtain part marks for questions even when their answer was incorrect. The QWC question (Q3(c)) was not well answered and only a minority of candidates realised it was assessing the conversion of a recurring decimal to a fraction.

Many candidates appeared confused by the first question that assessed properties of quadrilaterals. Most candidates used rulers where necessary.

Comments on Individual Questions:

Question No. 1
In part (a) nearly all candidates got some marks for their knowledge of quadrilaterals but many gave general facts like angles total 360° rather than ones specific to the kite. Very few could name squares as being mathematically similar and a significant minority named shapes that were not quadrilaterals.
In part (b) most candidates seemed to understand the term congruent, although some struggled to draw the shape accurately.

Question No. 2
Parts (a) and (b) were both answered well with few mistakes.
Some candidates struggled with drawing a good line of best fit for part (c).
In part (d) candidates were able to read the appropriate value from their line of best fit and the greater majority were able to apply their calculations to the situation, realising they needed an integer answer for the number of packets.

Question No. 3
Candidates showed more fluency with fractions than in recent years.
Part (a) was well answered. A few incorrectly cancelled $\frac{6}{24}$ and a few gave the fraction of times the car did start (i.e. $\frac{3}{4}$) otherwise there were very few wrong answers.
Part (b) was very well answered with just a few candidates making an arithmetical slip or adding numerators and denominators.
In part (c) some candidates recognised the need and method to remove the recurring decimals and others used a trial and error approach. Of those eliminating the recurrence some multiplied by 10 others by 100 but they often found difficulties in converting the subsequent figures to the required days in a week. For others the recurrence was used as ..838383…which prevented a practical solution being found. Of those using trial and improvement the more able ones recognised that a multiple of 3 was needed to remove the recurring 3 and the less able ones simply multiplied by 7. Some candidates incorrectly seemed to think that QWC meant writing their answer as an essay.

Question No. 4
Most candidates were able to draw a sketch and many indicated the correct intercept in part (a)(i). However there were many who did not know the difference between negative and positive gradient.
In part (a)(ii) common wrong answers were 1 and 4.
Virtually all candidates were able to plot the points and join them with a ruled line in part (b)(i). Many however did not continue the line back to the vertical axis making it harder to answer part (b)(ii) which required the value of the intercept. Despite this most candidates were able to extract the necessary information to find the call-out fee and hourly rate.

Question No. 5
In part (a) many candidates thought 1 had no reciprocal and most of those went on to say its reciprocal was 1. Of those that realised the answer was 0 very few were able to give an accurate answer regarding division by 0. Common wrong answers were that 1 / 0 = 0 or to refer to zero being divided rather than dividing by zero.
In part (b) many candidates did not know $\sqrt{196}$ and there was a generally poor understanding of a negative square root often with reciprocals given.

Question No. 6
This question was only fully answered correctly by a minority of candidates. There was more success in the first part with many able to see that $15x = 180$ and so proceed, but a common mistake seen was to try and use $14x = 180$ or $14x = 360$, or simply try to estimate how many sides the shape had and then use that. Even for those who were able to correctly calculate $x = 12$, many were only able to show that the interior angle was 168°. Many quoted that the sum of interior angles = $(n - 2) \times 180$ but didn't know to use n = 360/exterior angle.

Question No. 7
Nearly all candidates were able to draw the line $y = 3$ correctly in part (a) but part (b) was less well answered. A significant number of candidates did not read the question carefully and shade the region NOT required. This led to diagrams that were messy and hard to understand. The most common error was to shade above $y = 3$ leaving the enclosed triangle as the answer rather than the open area at the top.

Question No. 8
In part (a) a significant number of candidates failed to appreciate the need to equate the two opposite sides of the rectangle to show why the given equation was true.
Many did not use the example from part (a) to then form a second equation in part (b) to allow the solution of a pair of simultaneous equations. This limited the marks available to these candidates. Despite being told to form a second equation many attempted to use expressions. Those that formed two equations went on to show a good understanding of the elimination method, although many made simple arithmetic slips which spoilt their final answers.

Question No. 9
In part (a)(i) more able candidates correctly identified each term and added them, others were able to identify one term, usually the 3^0. Less able candidates thought the negative power gave -4 and some added the 3 and 4 to get 7 and then raised that to the sum of the powers (i.e. -1).
In part (a)(ii) only the more able candidates were able to give the correct answer. A common wrong method was $\frac{3}{4}$ of 16. Those starting from 16^3 were unable to get any further.
In part (b) more able candidates dealt with both terms and successfully collected them. The $5\sqrt{2}$ was found more often than the $4\sqrt{2}$. Less able candidates combined the 32 and 50 before attempting to square root. This often resulted in an incorrect answer of $41\sqrt{2}$ from $\sqrt{82}$ but those giving the correct answer of $9\sqrt{2}$ from this method did not score.

Question No. 10

In part (a) many candidates found BED as 81° although some did it by first assuming that AC and ED were parallel. The most able candidates, however, could concisely and confidently use and explain the alternate segment theorem. Many candidates either did not notice the demand for the reflex angle, despite it being in bold type, or more worryingly did not understand what a reflex angle is.

Only the most able candidates could understand the demand for a proof in part (b). They stated in full the reasons they were using and then showed clear, concise algebra to finish up with $x = 30°$.

Less able candidates often scored a mark or two for quoting a relevant reason but others started off by assuming $x = 30°$ thus making it hard for them to earn any marks.

A503/01 Mathematics Unit C (Foundation Tier)

General Comments:

The majority of candidates were well prepared for the exam and most made a good attempt at the work at this level. Candidates scored across almost the full mark range and there were a number of candidates scoring very high marks on the exam as well as a number struggling to access the work. Work was generally well presented and logically set out and candidates showed appropriate working in most cases. Some still need to be careful where a structured answer is required to set out their work in a logical manner rather than as random jottings.

Most candidates attempted all of the questions. There was sufficient time for all candidates to complete the paper.

Topics that candidates did well at included simple probability, coordinates, simplifying algebraic manipulation, solving simple equations, currency conversion, interpreting a distance-time graph and harder probability. Topics that candidates found more difficult included problem solving with directed numbers, general unit conversion, perimeter, expanding brackets, ratio and the QWC question on area.

The use of a calculator generally was good, although a few for example still tried to use a non-calculator method in some parts, for example, when finding 18% of 32 or when calculating with fractions.

Comments on Individual Questions:

Question No.1
This proved to an accessible starting question for most, and the majority gave the three correct probability terms. Errors were made by some in the first two terms with ‘certain’ and ‘likely’ the more common mistakes.

Question No.2
In part (a), almost all candidates were able to answer this question on using checking strategies correctly. Some less able candidates gave answers such as $5 \times 7 = 35$ which did not relate to the original values in the question.
Part (b) involved use of a calculator and was well answered generally. The common errors were in following the correct order of operations in parts (b)(i) and (iii) and in using the fraction facility of the calculator in part (ii). A few did not round their answer to one decimal place in part (iii).

Question No.3
This question on basic coordinates was very well answered. Almost all candidates gave the correct coordinates for part (a).
In part (b), some struggled to correctly place the point for the ferry according to the instructions given, but were able to give the correct coordinates for their plotted point. The term ‘bearing’ was not understood by some candidates.

Question No.4
Most candidates completed the isometric drawing of the cube correctly in part (a)(i). Errors included showing the hidden edges of the cube as solid lines and not using the 'dots' on the isometric paper for the edges of the cube. Some drew horizontal lines for example.
In part (a)(ii), many described the errors clearly and the best answers gave the correct volume and units. Some were vague and simply said that the calculation was wrong or the units were wrong which was insufficient.
In part (b), the number of faces was answered very well but a large number of candidates gave the number of vertices as 12 and the number of edges as 8.

Question No.5
Part (a)(i) was very well answered, but in (a)(ii), quite a number of candidates gave the answer as 0.33p instead of 33p and overlooked the units given in the problem.
Part (b) proved very challenging although many were able to give a negative and positive integer that had a sum of 4 or a difference of 18 to gain partial credit.
For those that obtained the correct answer, trial and improvement was a successful strategy used.

Question No.6
Conversion between units remains a topic that discriminates achievement.
For many candidates, part (a) was very straightforward. Others had little idea of the conversion facts between kilometres and metres and grams and kilograms. A number used 100 or 10 as the conversion factor in both cases.
Part (b) involved some reasoning with a capacity problem. Most obtained 13 as the number of cups that could be filled but then were unable to interpret the remainder into ml. Common errors included 13.3, 13 cups and 30 ml, 12 cups and 200 ml. A few were unable to convert 2 litres to ml correctly.

Question No.7
This question on simple probability and reasoning was very well answered.
Almost all candidates were able to interpret the probability line in part (a).
Part (b) required some interpretation and reasoning and was very well attempted by many. Most were able to give the number of orange sweets as zero to earn partial credit. A common error was to give the number of red and blue sweets as equal but with impossible values such as 25 for each when there were only 20 blue and 16 red sweets at the start before 20 of them were eaten.

Question No.8
This question was very well answered, almost all candidates were able to simplify the expressions in part (a) using the correct algebraic conventions. Of those that made errors it was mainly down to a lack of care, for example, 9*b* in part (i), 8 in part (ii).
The equations were answered well in part (b). There were a few candidates who made the predictable error of an answer of 4 in part (b)(i) and a few were unable to cope with the directed numbers in part (b)(iii) when doing $^{-}23 - 5$, but they often gained a method mark for showing this step in their working.

Question No.9
In part (a), almost all candidates gave the correct area but many struggled with the perimeter. Most overlooked the instruction 'measure' given in the question and gave an answer of 10 obtained by counting squares and including the diagonal line as 4 cm.
Part (b) was generally answered well. For less able candidates there appeared to be some guesswork with random numbers chosen from those given but the majority gave a scale factor of 2 for the length and the perimeter and then a different factor for the area although this was not always given as 4.
Part (c) was very well answered with almost all candidates recognising the angles remained the same after enlargement.

Question No.10
Many candidates were successful in giving the correct time interval and used a clear non-calculator method for obtaining the answer. Some obtained 4 hours but were unable to give the correct number of minutes. A number gave an incorrect answer with no working at all with evidence that they had used a calculator incorrectly for this time problem.

Question No.11
This question did discriminate between candidates. Many were able to obtain the value 25 in their working from 200 ÷ 8 and gained partial credit for this. A common error was then to give 12.5 as the answer. Those that read the question carefully and recognised that the cuboid had a square base often used a checking strategy before the final answer and 5 × 5 × 8 = 200 was seen in working before giving the correct answer of 5.

Question No.12
This question on substitution and expanding brackets had a mixed response.
Many candidates were successful, but a common error for less able candidates in part (a) was to give the answer 144 from $(3 \times 4)^2$ or 1156 from 34^2.
In part (b), the majority were able to correctly expand the brackets but then a number went on to try to further simplify $12x - 4$ and answers such as 8 or $8x$ were given.

Question No.13
This question proved to be accessible to most and many candidates were able to score well on the question. A few used the correct method but did not work to the required accuracy of two decimal places for money. For less able candidates a common error was to multiply by 1.34 when converting back from euros to pounds. A few misinterpreted the information and used incorrect conversion factors, 1.34 for converting to euros and 1.19 when converting to pounds.

Question No.14
In part (a), there were many correct solutions but some were unable to deal correctly with both the £1.12 per litre and 4.5 litres = 1 gallon. Those who were most successful initially found the cost of one gallon of fuel as £5.04 or the number of litres as 56.25.
In part (b)(i), some candidates were distracted by the stationary section of the graph and thought that this section was when she was travelling in the city. Those who did have the correct times often gave a correct reason with some describing the uneven line on the graph and others stating the interpretation of the graph as stopping and starting of the car.
In part (b)(ii), the incorrect answer of 30 was seen as often as the correct answer of 31.
Part (b)(iii) was answered correctly by almost all candidates.
There were a minority answering part (c) correctly. Incorrect lines varied from those with a positive gradient to those that did not meet the time axis. Of those who did know that a line with a negative gradient was required, many misread the scale on the time axis and their line met it before 10 30 or at 10 33 or beyond 10 36.
In part (d)(i), there were many correct solutions where candidates usually used the conversion factor 1 mile = 1.6 kilometres, but some candidates used the values to find the conversion factor.
In (d)(ii), a minority of candidates gave a fully correct solution. Of those who knew what was required, most stopped at 10.6 or 10.7 and did not correct it to the nearest litre. Some used 80 miles instead of 128 km.

Question No.15
Part (a) was well done by many candidates. Some omitted the zero from the pence and were penalised. Others used 5 return tickets in their calculation and a few used just 5 one-way tickets instead of 10.
In part (b), most candidates started with 2.7(0) : 2.16 and often made some progress in cancelling the values. Few reduced the ratio to its simplest form. A small number left units in their final answer.

Question No.16
In part (a)(i), most candidates started with the correct fraction and many of these managed to reduce it to its simplest form. Some incorrectly totalled the number of teeth, leading to an incorrect fraction.
There were many correct answers in part (a)(ii). Candidates knew the method required and most rounded their answer correctly. Some employed a non-calculator 'break down' method, though this was often unsuccessful.
Part (a)(iii) was also well answered. A number of candidates changed the fraction into a decimal or a percentage before performing their calculation.
In part (b)(i), the majority of candidates knew the probabilities had to add to 1 and could find the missing value.
In (b)(ii), there were many correct answers. A small number of candidates had an answer of 0.17, failing to include 0 in their total for less than 2.
There were many correct answers in part (b)(iii). Most candidates successfully used their calculator to solve the problem. A few used a non-calculator method which often led to errors.

Question No.17
The quality of presentation was varied. Many candidates failed to explain what they were finding and did not fully document parts of their working. Some arrived at the correct answer and many realised they needed to include units with their answer. A common error was to subtract the area of a full circle rather than a semicircle though some used the formula for circumference. The least able candidates just gave the area of the rectangle and did not know how to proceed.

Question No.18
In part (a), many candidates realised that the large number of trials made this a reliable estimate. Others wrote about it being a fair spinner which made the estimate reliable. Some discussed how the data could be used to find the probability.
In part (b), there were many correct answers given as a fraction, a decimal or a percentage. Some candidates failed to total the frequencies correctly. A number divided the wrong way around. Others ignored the table and went for $\frac{1}{4}$ or equivalent as their answer.
In part (c), most candidates thought that the spinner was fair since the frequencies were close. Others thought that it was biased since they were not all exactly 125, $\frac{1}{4}$ of the total number of spins. A number thought that it was fair because the probability of getting a 4 was approximately 0.25 but made no reference to the other numbers.

A503/02 Mathematics Unit C (Higher Tier)

General Comments:

Candidates had been well prepared for this paper. They had a sound understanding of the specification content and clearly demonstrated that they were capable of applying that knowledge. There were a pleasing number of high scoring scripts. Few were entered at the wrong tier.

In general, candidates approached each question by thoroughly reading what was required and demonstrating how they achieved their answer. However, the presentation of work, particularly in answer to multi-step questions, is still a cause for concern. The answer to a QWC question must include full working, with written explanations of what the candidate is doing and why. In longer questions, many candidates are rounding intermediate values and consequently arriving at an inaccurate final answer; this should be avoided. Overwriting of numbers and lines in diagrams was avoided and the checking of answers was evident.

Diagrams were drawn accurately and carefully. Calculators were used efficiently and accurately, though there were instances where candidates used 'pencil and paper' methods when a calculator method was more appropriate.

Candidates show an improving command of algebra, even the higher level algebraic processes. Probability is well understood and approached with confidence. Number work is good. Though work on shape, space and measures continues to improve, problems do arise where knowledge has to be applied to more complex situations.

Candidates had sufficient time to complete the paper. Few failed to attempt every question.

Comments on Individual Questions:

Question No.1
Part (a) was well done by many candidates. Some omitted the zero from the pence and were penalised. Others used 5 return tickets in their calculation and a few calculated 5 or 14 one-way fares instead of 10.
In part (b), most candidates started with 2.7[0] : 2.16 and often made some progress in cancelling the values. Few reduced the ratio to its simplest form. A small number left units in their final answer.

Question No.2
In part (a)(i), most candidates started with the correct fraction and many of these managed to reduce it to its simplest form. Some incorrectly totalled the number of teeth, leading to an incorrect fraction.
There were many correct answers in part (a)(ii). Candidates knew the method required and, although some left their answer as 4.86, most rounded their answer correctly. Some employed a non-calculator 'break down' method, though this was often unsuccessful.
Part (a)(iii) was also well answered. A number of candidates changed the fraction into a decimal or a percentage, before performing their calculation.
In part (b)(i),the vast majority of candidates knew the probabilities had to add to 1 and could find the missing value.
There were many correct answers to part (b)(ii). A small number had an answer of 0.17, failing to include 0 in their total for 'less than 2'.

Again, there were many correct answers to part (b)(iii). The common error was to add the fractions instead of multiplying them.
Most candidates successfully used their calculator to solve the problem in part (b)(iv). A few used a non-calculator method which often led to errors.
The tree diagram was invariably correct in part (c)(i).
Most candidates recognised that there were two possible outcomes to consider in part (c)(ii) although some only found one of them. In general, candidates knew to multiply probabilities and add the results. There were many correct answers.

Question No.3
Those candidates who calculated the area of the rectangle minus the area of the cut-out triangle in part (a) were nearly always successful. Breaking the diagram down into smaller parts rarely led to a correct answer with candidates miscalculating some of the lengths of these shapes. A common mistake was to assume that the 'diagonal' line in the shape went through the top left hand corner of the rectangle.
In part (b), a pleasing number of candidates knew how to change cm^2 into mm^2. However, many multiplied by 10 instead of 100.

Question No.4
Part (a) was not well done. $\frac{8y^2}{y}$ was a common wrong answer where candidates cancelled the terms incorrectly. It was clear that cancelling was not well understood.
On the other hand, parts (b) and (c) were tackled well with many fully correct answers.

Question No.5
In part (a), many candidates realised that the large number of trials made this a reliable estimate. Others focussed on it being a fair spinner which made the estimate reliable. Some discussed how the data could be used to find the probability.
Many correctly gave the answer to part (b) as a fraction, a decimal or a percentage. Some candidates failed to total the frequencies correctly. A number divided the wrong way around. Others ignored the table and went for $\frac{1}{4}$, or the equivalent, as their answer.
Most candidates thought that the spinner was fair in part (c) since the frequencies were close. Others thought that it was biased since they were not all exactly 125, $\frac{1}{4}$ of the total number of spins. A number thought that it was fair because the probability of getting a 4 was approximately 0.25 but made no reference to the other numbers. A small number of candidates started their answer with 'yes' or 'no' with little indication of whether this meant 'fair' or 'biased'.

Question No.6*
The quality of presentation was very varied. Though many arrived at the correct answer, it was common not to see any explanation of what they were finding either in writing or by formula. The majority realised they needed to include units with their answer. A common error was to subtract the area of a full circle rather than a semicircle and some used the formula for the circumference or used the wrong radius of the circle. The least able candidates just gave the area of the rectangle and did not know how to proceed.

Question No.7
Most candidates performed the correct factorisation in part (a) with a small number just taking one common factor.
It was common to see only the positive square root of 49 being considered in part (b).
The use of the quadratic formula in part (c) was not well done. Many candidates made sign errors when substituting b = ⁻2 and c = ⁻7 into the formula. Of those that did substitute and evaluate correctly, some lost marks due to incorrect rounding of their answers.

Question No.8
The most common method employed in part (a) was to use a scale factor. This was done very well. Some made it more difficult for themselves and used the cosine rule, though this was often done successfully.
It was widely known that angles are unchanged in an enlargement. Very few did not score the mark in part (b).
In part (c) most candidates used ½*ab*sin*C* to find the area of the triangle but, once again, a number employed right-angle trigonometry with varying degrees of success. Some did not realise that they needed to give their answer to two or more decimal places to show how this could become 26.7 when rounded to one decimal place. A common error was to use the 9.2 from part (a) in the formula, instead of 9.1.
Only a few candidates used the area scale factor to answer part (d). Some incorrectly used a linear scale factor. The majority again used ½*ab*sin*C* with varying degrees of success. A common error was to calculate $\frac{1}{2} \times 15.5 \times 23 \times \sin 71$ where 23 was used instead of 22.75.
Others worked out another angle in the triangle and used this in the formula with a different arrangement of sides. These approaches were generally less successful.

Question No.9
The table was correctly completed in most cases in part (a). A common error was to give $y = ⁻12$ when $x = ⁻2$ and $y = ⁻6$ when $x = ⁻1$.
Graphs were drawn carefully and accurately by the majority of candidates in part (b).
Candidates knew how to use the graph to solve the equation and many did this correctly. A few gave only one of the solutions, usually the positive one.

Question No.10
Part (a) was answered well with many candidates using the more direct method rather than a step-by-step approach. Some answers were spoiled by not being given to an appropriate degree of accuracy.
Answers to part (b) were split into two camps, roughly equally: those who knew the method required and used it accurately and those who incorrectly just subtracted 4% from the given value.

Question No.11
Candidates answered part (a) well, with many gaining full marks. When an error did occur, it was where the middle two values were placed in the wrong order.
Most knew which way round to divide the given values but a few divided incorrectly and a small number multiplied. A significant number failed to convert the distance to metres so that the units of the values used were consistent.

Question No.12
There were some excellent sine rule solutions to this question although some candidates struggled with the transformation of the formula after a correct substitution. Less able candidates assumed the triangle to be right-angled and used Pythagoras' theorem and/or trigonometry.

Question No.13
Most candidates drew the correct elevation in part (a). A small number had a curved join and/or bottom edge.
Nearly all realised that a circle was needed for the plan in part (b). However, these were not always compass drawn or of the correct radius.
There were a large number of fully correct answers in part (c); candidates were not put off by the demand to leave their answers in terms of pi. It was the volume of the cylinder that caused the most problems. Here, some calculated the surface area of the whole or part of the cylinder. A number did work in decimals but then struggled to turn this back to a multiple of pi.

Question No.14
In part (a) a good number of candidates factorised correctly and cancelled the common factor appropriately. There was the odd sign error in some work. Many just cancelled the x^2 terms and thought they had done enough whereas others went further, trying to cancel the x terms and the number terms separately.
There were few correct answers to part (b). Multiplying out the brackets and comparing coefficients seemed to be the common approach though some tried to complete the square on the left. Less able candidates used a trial and improvement approach with no success.

Question No.15
Candidates found all parts of this question challenging.
Those with some knowledge of the topic drew a translation in part (a) but often it was to the left or vertically down.
There were more correct answers in part (b)(i). Most candidates realised that the answer would be a combination of sin$x$ and 4 and proceeded to write them in various orders.
Part (b)(ii) was not answered well. Among others, $y = \sin(2x)$, $y = 2\sin(x)$ and $y = \frac{1}{2}\sin(x)$ were frequently seen wrong answers.

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