GCSE

Mathematics A

General Certificate of Secondary Education **J562**

OCR Report to Centres June 2015

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General Certificate of Secondary Education

Mathematics A (J562)

OCR REPORT TO CENTRES

A501/01 Mathematics Unit A (Foundation Tier)

General Comments:

The candidate entry for this session was slightly lower than for June 2014.

Marks ranged from 0 to 59 out of 60, whilst the mean mark for this session has only been exceeded in three of the previous thirteen presentations of this paper, suggesting that the paper was appropriate for the candidates intended.

There were a number of completely blank scripts where candidates wrote absolutely nothing.

Comments on Individual Questions:

Question No.

1. Most candidates got off to a good start with part (a). However, parts (b) and (c) proved more tricky. Some candidates gave answers outside the given range of 30 to 39.
Whilst a small majority correctly gave 36 as their answer in part (b), many gave answers that were not square numbers, with 30 being the most common error.
In part (c), most candidates appeared to be unsure of what a prime number actually is. 33 and 39 were common errors, whilst other candidates again gave values outside the given range.

2. Most candidates scored at least 3 out of the 4 available marks. There were many candidates, however, who thought the length of a desk was measured in cm^3. Conversely, most candidates correctly had the amount of water in a bucket measured in litres.

3. Whilst nearly all candidates found the correct coordinates of a given point on a grid in part (a), fewer were able to plot a point given its coordinates in part (b). A common error here was to plot (–4, –3) rather than (–3, –4).
Part (c) proved to be the most challenging. The required midpoint of AC was found by just over half the candidates. That the required *x*-coordinate was not an integer seemed to confuse some, and (2, –1) was often seen. Very few candidates marked the midpoint on the diagram and the range of responses suggests that they may not understand what is meant by the term midpoint.

4. Good answers were seen from most candidates to all three parts of this question. In part (c), candidates sometimes made addition errors but were able to score part marks, often 2 out of 3, by showing their working.

5. Part (a)(i) was usually well answered. However, in part (a)(ii) quite a few candidates got the calculation wrong, with 15 (coming from 8 + 9 – 2) and 3.5 (from 8 + 9 ÷ -2) being common wrong answers. Similarly, 36 was a common error in part (a)(iii).
Part (b) proved to be considerably more difficult. Most candidates scored 0 whilst nearly all the rest scored 2. It was very rare to award a part mark. …x 0.5 = 4 was the most common correct response, while common errors were made by multiplying 0 (giving an answer that was not positive) or 1 (giving an answer that was not less than 8).

6. Candidates often mixed up mean, median and mode in all parts. A common wrong answer for the mode in part (a) was 22, this being the maximum of the given data.

In part (b), most candidates managed to score some marks, although the correct answer for the median was not common. Candidates usually scored at least the method mark for ordering the numbers or for recognising the median was dependent on the two middle numbers, 17 and 22.
Part (c) was generally not well done, with only the very best candidates scoring full marks. Many candidates did not realise that they had to actually calculate the mean and the range for Class 11M despite this being stated explicitly in the question. It was not unusual to see the range mentioned in part (c)(i) and the mean in part (c)(ii).

7. Only about a half of all candidates gave the correct compass point in part (a), with SE being a common error.
Significantly more were able to measure on the diagram and hence calculate the required distance in part (b)(i).
Conversely, part (b)(ii) was one of the worst answered questions on the paper. Few candidates were able to cope with the need to calculate a reflex angle.
There were more incorrect than correct answers for part (c). The most common incorrect choices were 40 and 8.

8. Working was generally well presented and easy to follow in this question. Part (a) earned full marks for many candidates.
In part (b) however, full marks were rarely earned as most candidates did not fully answer the question. Many scored the first 3 marks and obtained an answer over £30 showing that Pavel could get the special offer. However, they then did not apply that special offer and so did not take off the £10 from their total cost.

9. Most candidates scored the mark in part (a), although occasionally an answer of $9a^2$ was seen.
Whilst a majority of candidates scored the mark for part (b), many spoiled their correct result by further work with final answers such as $5dt$. $d^2 + t^3$ being often seen.
Most candidates solved the first equation in part (c)(i) and it was pleasing to see that there were fewer embedded answers, i.e. 11 – 7 = 4.
The equation in part (c)(ii) though was only solved successfully by the best candidates. Whilst many scored the first mark for correctly removing the brackets, not so many went on to correctly gather either the x terms or the numbers. The minus sides on both sides of the equation seemed to prove difficult to deal with. Many candidates 'lost' the equation and wrote spurious expressions such as $3x - 1 = 2x$ and $10x - 5 = 5x$.

10. Candidate answers to part (a) usually scored either 3 or 0. Candidates who understood the method generally got the right values for both rents. A common error was to calculate both of 700÷3 and 700÷2. Some simply guessed giving two apparently random numbers that added to 700.
Part (b) proved difficult for many candidates. Whilst those who divided 84 by 2 often went on to score full marks, a significant number worked on the assumption that 84 was one share instead of 2 and so calculated 84×5.

11. Whilst most candidates were able to score 1 or 2 marks for correct arcs centred at points T and/or B, few were able to successfully construct the perpendicular bisector of T and B. Even those who did manage to construct the bisector could not then often identify the correct region. Full marks were very rarely awarded for this question.

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 functions question at the end of the paper; more candidates are now familiar with this topic.

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

Comments on Individual Questions:

Question No.

1. Nearly all candidates answered the first part of this ratio question correctly. Finding the total bill given one share in part (b) was found a little more demanding, with a few finding the other share rather than the total, and a few dividing by 3 instead of 2 to find one share.

2. There were good answers to this calculator and rounding question, with the correct order of operations being used by most candidates. As expected, there were more errors seen in rounding to three decimal places than there were giving an answer to the nearest hundred.

3. In part (a)(i), the answer −25 instead of 25 for $(-5)^2$ was common, but the other substitutions required in part (a) were done more successfully. Nearly all candidates made a reasonable attempt at solving the equations in part (b). In solving the linear equation, most expanded the brackets correctly, but some made errors when collecting terms, although most had one side correct. A good number reached the correct solution of x = 3/4, but some after successfully obtaining $4x = 3$ gave a final answer of 4/3 or equivalent. In the last part, quite a few candidates correctly gave both roots 8 and −8, but just giving 8 was more common.

4. There were some excellent answers here with plenty of full marks. Most candidates drew arcs of circles centred T and B with the correct radii, although some anticipated what part of the circle they were going to need instead of drawing the full arcs within the garden, which then led to them choosing the wrong region. The locus causing the most problems was the perpendicular bisector where some candidates did not interpret the condition correctly, whilst some candidates seemed reluctant to use a compass to construct it. Some constructed the correct boundaries but chose the wrong region meeting the conditions.

5. The first three terms of the sequence were rarely incorrect in part (a). The approach to the AO3 sequence question in part (b) was fairly evenly divided between those evaluating for $n = 14$ and $n = 15$ (and occasionally something in between), and those attempting to solve an equation. The first method was usually either fully correct or scored zero because $(5n)^2$ had been evaluated instead of $5n^2$, whilst the second method sometimes failed because of the incorrect order of operations being applied or the answer being left as $10\sqrt{2}$ with no recognition that the result needed to be an integer. A few candidates used both methods without indicating their final attempt – sometimes one was correct and the other wrong.

6. In part (a) the modal class was usually given correctly, with the common wrong answers being 8 (the frequency) and 11 – 15 (the middle class in the list). Estimating the mean was well done, with good supporting working. Many answers were fully correct. Only a few candidates used class widths or end points instead of the mid points, whilst some simply divided 30 by 7. A common error was to use the midpoint of the class 1 - 5 as 2.5, often with correct values for subsequent classes.

   In part (b)(i), it was evident that some candidates were not familiar with what to do to find the number in the sample, combining some of the numbers in the question in different ways, such as 1043/93 = 11.215 with an answer of 11. Where correct work leading to 4.45… was shown, the answer on the answer line here was often 4.5 or 5. In the last part, there were many candidates who thought that the advantage would be that it would be more accurate. It was easier for them to spot the <u>d</u>isadvantages with most of the marks for this part coming from these.

7. Most candidates realised that they needed to use Pythagoras' Theorem in the first part and many did so competently. In part (b), whilst measuring the bearing or assuming a 45º angle was common amongst the weaker candidates, most others included some reasonable trigonometry. Obtaining 31º or 59º was frequently seen, although some did not always make it clear which angle they were finding. After succeeding with the hard trigonometry work, determining the correct bearing was a stage too far for many.

8. Many candidates did not know how to construct the perpendicular to the line AB through the given point C on the line. Far too many had drawn the perpendicular without a compass and then tried to fit the arcs around it, centred A and B. There were many who did not use a compass to find the two points on the line equidistant from C for use to draw the arcs for the perpendicular – measuring instead.

9. Constructing the histogram was done well. Most candidates calculated the frequency densities correctly, with some let down by an incorrect plot (0.2 being plotted as 0.02, for example). Weaker candidates usually scored the mark for widths. Many good candidates correctly interpreted the histogram in part (b), with weaker candidates usually giving the frequency density as the answer if they attempted this part. In the last part, very few were able to express themselves clearly and precisely. Most probably did not appreciate what was actually being asked, so most of the better candidates merely argued that £3200 was the maximum sum so £3100 must be possible.

10. Some candidates had good manipulative algebra fluency and in the first part there were some excellent, clear and concise solutions in rearranging the formula. Most candidates gained the first mark for expanding the bracket but then many made a false move next, trying to get an '*a*' term on its own so that on the next line they could write '*a* =' without appreciating that two terms contained the subject, or not knowing how to proceed in these circumstances. Multiple attempts were seen from some candidates, sometimes without it being clear which was their final attempt.

    The work on functions in part (b) was omitted by a few, but those who were familiar with the notation were often able to substitute and obtain the correct answer in part (i). There was more confusion in part (ii), with fewer candidates having any idea of how to proceed. Some candidates who had partly the right idea worked out $3(2x - 5) + 4$ instead of the correct $2(3x + 4) - 5$. Some who had the correct method sadly made errors in simplifying the expression. However, there were a greater proportion of correct answers than when this topic was last tested in this way.

A502/01 Mathematics Unit B (Foundation Tier)

General Comments:

The paper appeared accessible to most candidates. Almost all completed the paper and many scored more than 50% of the available marks. Weaker candidates scored marks throughout the paper.

Candidates' arithmetic skills were too often inadequate, especially where decimals were concerned. Most candidates were unable to deal with even the simplest fractions. Many also were not able to round to 1sf to achieve approximate answers.

The performance on QWC questions was reasonable, even from weaker candidates. Many candidates showed working to support their responses both in the QWC and other questions. Some candidates need to understand that "**Not to scale**" beside a diagram means that answers to questions cannot be obtained by measuring.

Many candidates struggled to write answers that adequately described what they intended. Few could explain why two rectangles were **not** similar and almost none mentioned scale factors or ratios. Similarly, few could write coherent reasons for why a time series might not show a small increase. Candidates need to practise writing to explain their reasons and use technical terms within their answers.

Comments on Individual Questions:

Question No.

1 In part (a) many wrote correct responses. A few used negative numbers such as 7 – 12 = -5.

Part (b) was very poorly answered. Many thought that $\frac{3}{4}$ of 12 was 3, or 4, or even 16 and other apparently unrelated answers such as $\frac{11}{17}$. Similarly, few were able to work out $6 \times \frac{1}{6}$ with common wrong answers being $\frac{6}{36}$ or 6 or 36. Part (c) was well answered with many scoring 2 marks. Some scored 1 mark for reaching 40.

2 This question was quite well answered by many candidates. Few reversed coordinates and many plotted A correctly. Most used a cross that was very close to the intended point and almost all had a pencil. A few candidates confused points B and C, presumably confusing x and y coordinates. Follow through was allowed. Candidates were required to tick the condition that followed from their triangle. Some ticked more than one box and scored 0 marks. A few ticked the impossible 'All these angles are obtuse'.

3 This question was also well answered by many. Instead of the expected radius, the other three options were sometimes chosen with roughly equal frequencies. Many worked out x correctly with 90° a common error. Few showed working.

4 Part (a) was well answered.
Part(b), the first QWC question, was reasonably well answered with many scoring 2 marks from 4.
Many candidates lost marks for not stating that they both read 180 pages on day 9 but simply assuming this in their answer (not a good idea with QWC). Many also could work out 180 × 15p but thought that the answer was £2700, because they did not include 'p' in their working to remind themselves. Others worked out the answer for week 10.

5 This was poorly answered with few scoring marks. Most gave a single digit answer for parts (i) and (ii). Sometimes this was in the correct domain but this was somewhat random.
In part (b), many candidates mistook the instruction to 'tick the set of **all** possible values for x' to mean 'tick **all** the sets that contain possible values of x' and ticked multiple boxes to score no marks.

6 This second QWC question was not quite so well answered as the first. The best candidates wrote "square numbers" and "cube numbers" against lists and showed 9 added to cube numbers or subtracted from square numbers to achieve a final result. Some identified 36 but did not say whether this meant that Tariq's answer was even or not.
Weaker candidates could not work out square numbers and struggled with cube numbers.

7 Part (a) was quite well done and many had a ruler and pencil. Some went to great pains to draw another **similar** rectangle and lost the mark. Some drew a rotation of the rectangle or of an enlarged version. Very few candidates drew a different shape entirely such as a parallelogram or triangle.
In part (b) very few scored a mark. Most simply said, "They are not similar because the first was 4cm by 2cm and mine is ....". Others described rotations, area or perimeter. Almost none mentioned scale factors or ratios between sides.

8 Part (a) was often well answered. In part (i) 0.027, 27 and 2.7 were common wrong answers. In part (ii) 9 and 10 as well as 0.3 were common wrong answers.
Part (b) was quite well answered. Some candidates thought that the spaces had to be filled only with symbols and others only with numbers. The top two cells were often correct.

9 This was well done although some said, "Because there are 30 days in a month" and did complete with 30 × 3 = 90.
Part (b) was generally correct although 0.28, 0.2894, 2.8 and 2894 were all seen in part (i) and 0.3 × 30 was seen in part (ii). Some worked out that 30 ÷ 100 = 0.3 to score the mark.
In part (c), very few candidates understood that the multipliers to be used were to be approximated to 1sf and that the question was about finding approximate values. In consequence, many ended up with difficult multiplications that they were unable to evaluate correctly. However, many candidates did score 2 or more marks.
A common error was to try to find 90 (or 91)% of the answer to STEP 1 rather than of 30.
Some found a final answer in the thousands of pounds but this did not alert them to the need to check their work.

10 This was the first common question with Higher Tier and many found it hard. The common error in part (a) was to describe a combination of transformations which scored no marks. Candidates need to appreciate the reason why **single** is emboldened in the question. Those who did answer with a single transformation often gave a partial description such as rotation, or turn, sometimes with 90°, but did not mention anticlockwise or the centre (3, -3).
Part (c) revealed that many candidates thought that angles were enlarged under enlargement. Some gave poor descriptions such as “It will get bigger”. A full description including “lengths multiplied by 4” or the equivalent was rarely seen.

11 This question, where QWC marks were avaialble, was reasonably answered. The points were difficult to plot but generally they were quite well positioned. In part (b) the correct period was often chosen although some candidates identified 10 year periods.
Part (c) was not well answered although many did identify that the data was rounded to the nearest thousand. Few used figures correctly to support their answers. Some candidates were awarded a mark for saying that small changes would not be seen on the graph or that the prices could rise and fall back during the period. Some scored no marks for saying that the graph did show a tiny rise.

12 Correlation appears to be reasonably well understood, both parts often being correct. However, scattered, neutral and random were not awarded marks in part (a) and some candidates reproduced a fair copy of the diagram in both parts (a) and (b). A few candidates drew positive correlation in part (b).

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 although a number of weaker candidates answered no questions after Q8 indicating a lack of familiarity with the A and A* topics. Many candidates were able to obtain over 50 showing real competence with the various techniques. Most of the candidates seemed to have been well prepared for the examination 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 being entered for the Foundation Tier rather than the Higher Tier paper.

Generally, candidates showed the working used in order to obtain their answers and so were able to obtain part marks for questions even when their answer was incorrect. The question relating to the quality of the candidates written communication (Q6) was generally answered well although weaker candidates struggled with using three points to specify a particular angle. Most candidates used rulers where necessary.

Comments on Individual Questions:

Question No.

1. In part (a) most candidates made a confident start to the paper with few mistakes seen. The few errors which occurred were usually in the tens digit or applying the wrong operation such as adding instead of subtracting.
In part (b) (i) most candidates correctly showed a division of 60 by 0.05. A few wrote it the wrong way round or multiplied and some used 1 (min) instead of 60 (seconds). Others used 100 seconds in the minute. For part (ii), some candidates found how many taps there were in a second and then multiplied by 60 to gain the answer which generally proved a successful method. Others chose to attempt the division noted in part (b) but this often gave rise to errors in the decimal place. Those candidates doing 60÷5 then multiplying by 100 were the most successful.

Answer: 59, 28, 63, 6, $60 \div 0.05$, 1200

2. The vast majority of candidates were able to correctly answer parts (a) and (b), a few lost out by answering $m \times 5$ in part (b). Only a minority of candidates successfully answered part (c) correctly with most appearing to guess randomly.

Answer: 6, $5m$, ✓ _ _ _
_ _ ✓ _
_ _ _ ✓
_ _ ✓ _

3. The best answers to part (a) had a clear mention of clockwise or anticlockwise and centre along with 'rotation'. A minority of candidates spoiled their answers by adding another transformation.
The drawing of the translation was usually correct in part (b) although some weaker candidates could only manage one of the components.

In part (c), most candidates recognised that enlarging a shape had no impact on the angles. The best solutions were concise and make a clear reference to both the sides and angles. Weaker candidates tended to just comment that 'both had increased by 4'.

Answer: Rotation, 90° anticlockwise centre (3, -3), lengths $\times$ 4, angles unchanged

4. Candidates were generally able to plot accurately and only a small minority failed to score fully in part (a), and even those tended to score 1 mark for at least 2 correct plots. Part (b) was also answered correctly by the majority.
The best answers to part (c) recognised that the prices were rounded to £2000 and gave an example of how the price could have increased; for example, from £1700 in 1952 to £2400 in 1957. Some noted that the figure was rounded or to the nearest £1000 but did not show how that could have produced an increase. Some had the wrong idea that the price given was an average and that there would be a variation in the prices of houses which made up that average but this misses the significance of the price being to the nearest £1000.

Answer: 2002 to 2007

5. Part (a) was answered well with nearly all candidates able to convert litres to millilitres, however, many were unable to then write a correct division for part (b). Common wrong answers were to use litres or $\times\frac{1}{6}$ or $\div\frac{1}{6}$. Part (c) is best answered using fractions and those who did this were generally successful. The best answers were very concise showing only $\frac{7}{4}\times\frac{3}{4}=\frac{21}{16}$ before giving the correct answer. However, nearly all chose to use decimals which involved long calculations, which were often wrong, and very few gave their final answer as a mixed number as required.

Answer: 1750, $1750 \div 6$, $1\frac{5}{16}$

6. This QWC question was answered well by many candidates. Most showed a good understanding of the rules of angles although many struggled to explain them adequately. The best explained reasons were for angles in a triangle and angles on a straight line, the problematic ones concerned angles in parallel lines. There is still common use of F and Z angles instead of the correct names and many think it is enough to say they are parallel lines and not state the explicit rule they are using. A lot of answers were well laid out with clear sequential reasoning which generally looked like this:

DGH = 59° Angles on a straight line = 180°
BDE = 59° Corresponding angles are equal
DEB = 74° Angles on a straight line = 180°
x = 180 – 59 – 74
= 47° Angles in a triangle = 180°

but there is still a significant number of candidates who need to improve the layout of their work to ensure they get full credit for this type of question. Candidates should not assume that the 'angle C' is uniquely defined. The weaker candidates did not give many or any reasons in their working, and did not know how to communicate their understanding well. Few candidates did not write their angles on the diagram, and the majority were able to achieve at least 2 marks.

Answer: 47°

7. In part (a), shading above the line $y = x + 3$ was generally very well answered. Candidates had understood to shade the area not required. Drawing the line $x + y = 5$ in part (b) was less well answered. However, many candidates who did not draw the line correctly still recognised the need to shade above their line. Common wrong answers were to draw the line $x + y = 4$ or the two lines $x = 5$ and $y = 5$. Although candidates' success in part (c) was largely dependent on whether or not they answered parts (a) and (b) correctly, many were still able to gain one or two marks simply by drawing $y = 2$ and shading below the line.

Answer: $x = 1$, $y = 3$

8. In part (a), most candidates correctly applied the tariff for cleaning 10 windows. Just a few misunderstood the costing assuming each window cost £5 plus 60p so finished with an answer of £56. Most answered part (b)(i) correctly and in part (ii), many candidates were able to provide a full algebraic solution, the most successful being the ones who simply equated the expressions. Many of those who chose to solve this as a standard simultaneous equation problem involving elimination of the variable *w* first, often failed to find the correct coefficients of *c* and thus went wrong. Some candidates who were unable to carry out the appropriate algebraic manipulation were still able to find w = 7.5 by trial and thus scored 1 mark. Most had a non-integer answer to part (b)(ii) but very few were able to then apply this to a real life situation and focused their answer to part (b)(iii) on who was best value, with varying degrees of success, rather than simply that they can never charge the same.

Answer: £11, $C = 0.2w + 8$, 7.5

9. This question was answered well by most candidates. The most common error was dividing 4 into 11 to reach an answer above 2 and not be aware that they must be incorrect. The use of notation for recurring was generally good with just a few writing 0.363 as the recurring part.
The answer 0.4r was fairly common and not supported by any working. The best solutions contained a clear short division to 3 or more decimal places. Instead of a division, some candidates multiplied numerator and denominator by 9 to obtain the correct recurring decimal. Arithmetic errors in the division process were not uncommon.

Answer: $0.\dot{3}\dot{6}$

10. This question differentiated well with some stronger candidates successfully arriving at the correct answer. Many gained a mark for knowing to multiply $\frac{30}{\sqrt{2}}$ by $\frac{\sqrt{2}}{\sqrt{2}}$ but many of these did not get the second mark for cancelling $\frac{30\sqrt{2}}{2} = 15\sqrt{2}$. While others gained a mark for knowing $\sqrt{50} = 5\sqrt{2}$ many spoilt this by adding the 8 and writing $13\sqrt{2}$ instead of $8\times5\sqrt{2}$.

Answer: $55\sqrt{2}$

11. Only a small minority of candidates managed to provide a fully correct expression. Many understood the required process in starting the question and were aware of the correct function notation, but unfortunately were unable to handle the simplification, most commonly forgetting to square the 4 when simplifying $(4x)^2$ and also evaluating -3(-4*x*) as -12 or -12*x*.

Answer: $16x^2 + 12x + 1$

12. Most candidates knew that the resultant of the two vectors involved addition and answered part (a) correctly. Part (b)(i) was more problematic with many not understanding the associative law for this addition. Common errors were the inability to add negative numbers or to add the vector **p** + **q** twice. Part (b)(ii) was found easier than part (i) with many correct answers from multiplying the vector by a constant. The errors came from an inability to multiply by a negative number.

Answer: $\begin{pmatrix} 6 \\ -6 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 10 \end{pmatrix}$, $\begin{pmatrix} 4 \\ -12 \end{pmatrix}$

A503/01 Mathematics Unit C (Foundation Tier)

General Comments:

The performance of the candidates was very widely spread across the mark range, from very able candidates who may have been suitable for Higher Tier entry to very weak candidates struggling with the basic skills required at Foundation level. Work was generally well presented and logically set out in many cases. Candidates generally try to show a method where parts of questions are worth more than one mark. Many still do not use a calculator to answer questions - leading to unnecessary arithmetic errors. Candidates made good efforts at the more demanding overlap questions and were scoring right up to the last question. Units seem to be a recurring issue for most candidates.

The weaker areas included the topics of trial and improvement in a problem solving context, relative frequency, surface area of prisms, problems involving manipulation of fractions, unit conversions. The stronger areas included money, simple probability and the probability scale, unitary ratio, solving simple equations, rounding to integers or decimal places and coordinates.

Comments on Individual Questions:

Question No.

1. Part (a) was usually correct. A few struggled to interpret the context and subtracted or multiplied rather than divided.
   In part (b), a number of candidates left their answer in cm. Though many correctly converted to metres, in correct conversion factor ÷10, ÷1000 and ×100 were often seen.

2. There were mixed responses in interpreting the probability line. Parts (a) and (b) were answered well but common errors for (c) and (d) were B and F.

3. Parts (a) and (b) were answered very well with fewer candidates making errors with the coordinates than in previous sessions.
   Responses to part (c) were much weaker and many candidates appeared to not understand the term ‘bearing’.
   There was a range of incorrect responses including 90°, 180°, and some who measured the distance between the points A and C.

4. Both calculations were generally well done. A few candidates did not round their answers correctly with truncation a particular issue, for the second mark. A few did not follow the correct order of operations on their calculator.

5. This question tested candidates’ understanding of measures and their conversions.
   Part (a) was answered well by many. Common errors included 670 cm, 705 g or misplacing the digit 5 e.g. 7500 7005, £47 and 1.4 litres or 140 ml. A few gave the correct value for part (iv) but omitted to include the correct unit with their answer.
   Part (b) was well answered, with the common error being to confuse the order of 1 km and 1 mile. It was pleasing to see the strategy of attempting to convert the metric units to a common unit.

6. The equations were well answered by most candidates. Parts (a) and (b) were worth 1 mark and a common error was to give the answer 6 for part (b) by dividing by 4 rather than multiplying. Part (c), was worth 2 marks and was less well answered and many candidates went straight to an answer without showing a method step so part marks

were not often awarded where the answer was incorrect. Candidates should be encouraged to record their answers as x = ... rather than embedding the solution within the original equation.

7. Part (a)(i) and (ii) were answered very well. In part (a)(iii), many candidates were successful in interpreting the scale but common errors included -4.75, -5.5, -5.2 and 5.25. Part (b)(i) was answered very well but part (ii) caused difficulty and required a more problem solving approach. The common error was to give the answer 11 rather than -11.

8. This was answered very well with most using the unitary method successfully to calculate the cost of one bottle of lemonade before multiplying by 9. The most common error was to divide 14 by 12.04 when finding the cost of one bottle.

9. The question involved interpreting the vocabulary of probability and candidates scored reasonably well on the question. Part (a) was well answered. The only common errors were to give' likely' for part (i) and 'impossible' for part (ii).
Part (b) was more challenging and required a more strategic approach, many were successful in addressing the three conditions and almost all were able to address at least one of the conditions to gain partial credit.

10. Part (a)(i) was answered extremely well. The scale on the graph was correctly read by virtually all. In part (ii), many had no idea what was required. Some read a point on the line (x, y) and then divided the two values either y/x or x/y. There was some misreading of the scale in this part. Many did not consider whether their answer was sensible. £50 and £407 for one unit of electricity did not seem to be of concern. A few used the origin as a point on the line which did not take into account the fixed charge and gave answers such as 22p.
In part (b)(i) the table was correctly completed by many candidates, but for some, it did not seem to be of concern that the values calculated could not fit onto the graph. 1000x4p = £400 was common.
When the points were calculated correctly in part (b)(i) then the graph was usually drawn correctly in part (ii) and follow through marks were also available here from the previous part. Some gained the follow through marks here but many could not fit the incorrect points on the grid.
Part (c) was very well answered by those who had drawn a linear graph in part (b). Some gained follow through marks here where their line stayed on the grid. For those with a line off the grid, many tried to estimate an answer for this part.

11. It was surprising to see how many candidates did not attempt trial and improvement. Many misinterpreted the question and used the sum of the ages instead of the product. Many divided 1221 by various values in an attempt to reach the solution and those who chose a sensible starting point were often successful. The very best candidates had clear and concise trials and outcomes often presented in a table, before selecting and interpreting the answer.

12. This question tested a range of simple algebraic simplification and substitution producing a range of answers. Part (a)(i) was answered very well, a common incorrect answer was 9*a*. Most gave the incorrect answer 5*p* to part (ii) and did not realise that the *p*' s cancelled in the division. Part (iii) was answered well by many but errors with the directed terms led to incorrect collection of one of the terms for others.
Part (b) was answered well by many. Others did not appreciate the order of operations for the calculation and gave an answer of 1000.

13. In part (a)(i), by far the most common solution was 78 from the product of 6.5 and 12 instead of using the perpendicular height of 5.2 for the calculation. Part (ii) was usually correct but a number of candidates found the area instead of the perimeter.
In part (b)(i), many correctly found the area of the triangle; some forgot to halve the correct product and few thought that all three lengths of the triangle needed to be used in the calculation. Part (ii) was only occasionally answered correctly. Converting between units of area is an area to improve. Multiplying was the most common error.

14. Part (a) was very well done, There were many correct and concise solutions. Some stopped at 17025 and some rounded the values given and used 3000, 50, 200, perhaps to avoid using a calculator.
An error for some was to multiply 9353 from 199 × 47 by 12 giving an unrealistic expensive solution.
Part (b) was well answered by many. Some problems occurred when candidates did not give their answer in a correct money form. Some rounded prematurely after doing 8000÷15. Some candidates did not appreciate that the required number of litres of fuel was obtained from 8000 ÷ 15. Again, there were many unrealistic expensive solutions.

15. The QWC question proved to be more accessible to some candidates than in previous years as more candidates gained marks. Working was usually concise and accurate but there were many who used the false volume approach, dividing the volume of the storage box by the volume of the DVD for which partial credit was given. The correct method resulting from the placing of the cases in the box was also considered by a large number of candidates who scored full marks on the question. Some who did the correct divisions of dimensions went on to add their values rather than multiplying. Others merely added all the dimensions in each case and others found the areas of faces.

16. In part (a), there were many fully correct answers although 1.4 was a common incorrect answer. Some got part way through the calculation and then lost their way with the numbers particularly when at the final stage. A number seemed not to be using a calculator.
In part (b), there were some correct answers following a correct calculation and correct rounding. Some used ‘pencil and paper’ percentage methods, often leading to errors. A number did not understand how to find 83% of 209.

17. In part (a), some very sensible arguments were put forward to justify their decision. A common error was to assume that there were 2000 counters in the bag.
In part(b)(i),there were some correct answers for the probabilities but errors occurred when rounding. Common incorrect approaches were to divide the frequency by 10, 100 or 1000. Some divided 2000 by each frequency and did not reflect on the appropriateness of the answers. There were many omissions throughout part (b). In part (ii), common errors were to say that the probabilities added to 1 or to explain what the relative frequency meant. Part (iii) was mixed, There were many correct answers but just as many omissions. The final part had a few good answers following a correct method. Once again there were many omissions and a few answers that appeared to be guesswork.

18. Many candidates correctly split the shape into two rectangles and went on to show the areas added to 17. A small number incorrectly used the fact that adding some of the lengths could also total 17 (7+5+4+1).
In part (b), there were many good attempts. Often one or more sides were missing or incorrect in the total. A very small number of candidates multiplied all the lengths together or added them.

19. In part (a) many candidates gave 25/100 as their solution and did not correctly convert to a common unit before forming the fraction.
In part (b), the more able candidates scored well and showed clear method before interpreting the final solution. Often, for others, the only mark awarded was for the addition of 2/3 and 3/4. Most then went on to find the product of their fraction and 13. A number used a 'counting on' method. This was usually inefficient and prone to error and using a calculator with the fractions would have led to greater success.

A503/02 Mathematics Unit C (Higher Tier)

General Comments:

The standard of work demonstrated on this paper was impressive; the majority of candidates were well prepared for the examination. Candidates found the paper accessible and were able to attempt all questions to show their knowledge of the specification content. All candidates had sufficient time to complete the paper.

Work was, in general, well presented and candidates communicated clearly their approach to each question. In contrast, many are not good at expressing their explanations when a question requires an answer to be justified.

Few topic areas caused problems, though the understanding of area and volume scale factors continues to elude many. Work on Algebra questions continues to show improvement. Candidates have a firm grasp of the conventions and procedures required. Graph work was pleasing, with many taking their time to draw a curve carefully and clearly. Calculators were used accurately and efficiently, though a few candidates continue to avoid using them and prefer to use pencil and paper methods of calculation, not always successfully.

Comments on Individual Questions:

Question No.

1. The vast majority of candidates knew the required method and could demonstrate it succinctly. Unfortunately, a number gave their answer in an inappropriate money form, £1.4 . Some were confused by the number of different values given in the question and used the change received as the amount of money spent.
   There were many correct responses to part (b); very few failed to round to an integer answer. A small number misread the question and found the number of people who thought the fruit was **not** of excellent quality.

2. There was much confusion in part (a) between 2000 being the number of trials and the number of counters. 'No' and 'yes' were argued equally, along with a supporting explanation.
   In general, candidates seem to know what relative frequency is and gave answers to full accuracy or to an appropriate degree of accuracy. Others gave the answers as percentages but failed to include the percentage sign. A small number divided the wrong way round.
   Part (b)(ii) was not well answered. Though some did mention the large sample size, it was common to see talk of the probabilities adding to one or that they were of roughly the same magnitude.
   The final two parts of the question were answered well. Some candidates reverted to the original data rather than use their answers to part (b)(i). Very few failed to round to the nearest whole number in part (b)(iv).

3. Nearly all candidates divided the shape into two rectangles and found the total area correctly. Many clear, well presented explanations were seen.
   Part (b) was successfully answered. Many systematically found each area, clearly showing their work. Occasionally, one side was omitted or an extra one added. Once again, refusing to use a calculator led some candidates to the wrong answer.

4. All candidates seem to have a good understanding of trial and improvement. The vast majority obtained the correct answer without doing too many unwanted calculations. A number failed to justify their final answer. There was some misunderstanding that it was necessary to find a value of x to give 30 correct to one decimal place rather than the value of *x* needing to be to one decimal place.

5. The whole of this question was answered well. Part (a) was invariably correct with a minority making a sign error when collecting terms.
Some candidates only partially cancelled the fraction in part (b) or left their answer in an inappropriate form eg. $1.5xy^{-1}$.
Again, part (c) was usually correct though a few candidates only took one common factor. There were those who saw the word 'factorise' and the x^2 in the expression and so tried to create two sets of brackets. These were usually unsuccessful.

6. Very few failed to answer part (a) correctly. A small number incorrectly thought there were one hundred grams in one kilogram.
It was pleasing to see candidates working through part (b) in fractions rather than resorting to decimals. Those who did use decimals often rounded and ended with inaccurate answers. A common error was to multiply 13 by $\frac{17}{12}$ rather than divide. Some obtained their answer using daily totals or found totals working with the two cats separately, but these methods often failed due to poor arithmetic. Once again, candidates were reluctant to use their calculator.

7. Very few failed to obtain the correct answer. The only error was giving 1 – 0.95 as 0.5 instead of 0.05.

8. Both parts of this question were usually correct. The common error in part (a) was to have −12 rather than +12 when expanding the second bracket and in part (b) to say $3x \times 2x = 6x$.

9. Most candidates demonstrated their ability to interpret the 2-D diagram into 3-D space. The coordinates of points A and B were nearly always correct.
Pleasingly, in part (b), there were many correct answers. Errors did creep in when candidates used a two-step Pythagoras method. In this case, premature approximation after the first step often led to inaccuracy in the final answer. Less aware candidates found the distance from P to T along the edges of the cuboid, giving 2+3+5 = 10.

10. Very few candidates lost any marks in the first two parts of this question. Values were calculated correctly for the table, points were plotted correctly and, in general, the curve was drawn with care.
Though there were many correct answers in part (c), there were also several problems. Some did not know what the question required, some misread the scales and others confused the *x* and *y* values. A surprising number mislaid the minus sign when transferring −0.8 into the answer space.

11. The vast majority of candidates completed the tree diagram successfully using either fractions or decimals.
There were far fewer problems than in past years when combining probabilities. In general, candidates knew when to multiply and when to add. Many gave the correct answer, though some assumed that the acceptable result included the case in which both spinners showed '5'. There were also those who thought that only one combination was needed.

12. A lot of candidates set their work out clearly, with appropriate commentary and scored full marks. Others spoiled their answers by not indicating which length(s) they were finding. In a QWC question more effort is needed to communicate the method being used and what is being found. Most used Pythagoras to calculate TM and, impressively, a good number found TG from $\frac{30}{\sin 28}$ Some calculated TG by first finding OG and then using Pythagoras in triangle TOG. Errors occurred when candidates rearranged a trig. formula incorrectly or confused lengths and angles and used them inappropriately in a formula.

13. Most answers in part (a) were correct though some thought there were 8 or 10 zeros after the decimal point.
There were also many correct answers in part (b). Some could write the answer as an ordinary number but then failed to write it correctly in standard form. It was common for the power of 10 to be squared but not the decimal.

14. Part (a) was very often correct. Occasionally, the signs in the brackets were wrong or it was treated as an equation and solutions were found. Less aware candidates only factorised the letter parts of the expression and wrote $x(x + 2) – 15$.
Whilst many gave the two correct values, a number only gave the positive solution. Some candidates failed to realise the significance of the word 'hence' and started again, using trial and improvement or the quadratic formula.
Better candidates knew to factorise $x^2 – 9$ first, though a significant number 'cancelled' the x^2 terms either leaving $\frac{2x-15}{-9}$ as their answer or going further with spurious cancelling.

15. The majority knew to divide the volume by the length to find the area of the end but it was common for the volume not to be changed to cm^3 or for this to be done incorrectly. Some divided the wrong way round or even multiplied the two values. Despite the diagram, a number thought the end was circular and tried to involve πr^2.
Most candidates knew a scale factor was needed for part (b)(i) but 5 was often used rather than 5^2.
There were just as few correct answers in part (b)(ii). The volume scale factor was not well known. Some correctly used their answer from part (b)(i) to find the volume but, of these, many failed to convert correctly to litres.

16. Part (a) was usually correct. Candidates were confident in using their calculators.
There were many correct answers to part (b) as well. Often an answer appeared with no working shown. Probably candidates thought it unnecessary to write down their trials. On the other hand, a few wrote down numerous trials. The question was sometimes misread and candidates found **any** time when the number fell below 1 rather than the **first** time.

17. This question was answered well. Most obtained the correct answer and those who decided to give their answer as a decimal usually did so after correctly multiplying out the brackets. Surprisingly, some left their answer as $12 + 7\sqrt{7} + 7$and others had difficulty in finding $3\sqrt{7} + 4\sqrt{7}$.

18. Whilst many got this correct, there were some who just found the length of the minor arc AB and others who added the two radii to the length of the major arc. Many subtracted the minor arc length from the circumference of the circle rather than use the more direct major arc calculation. A significant number used πr^2 instead of πd or tried to involve trigonometry to find the chord AB, thinking this was the minor arc length AB.

19. Not well done. Even if the correct ideas were shown, the working and answers were often not expressed clearly. As expected, many candidates used 'Upper bound of weight of people (604) is greater than lower bound of weight lift can take (595), so No'. There were numerous other comparisons which were equally valid arguments. More often a random scattering of values filled the answer space with no indication of which had been chosen to support the decision. Incorrectly, some decided that by finding just one condition for which it was safe to use the lift they had shown that it would be safe in every event. Though most had some idea of upper and lower bounds it was clear that knowledge was limited. 75.4 as the upper bound for one person and, even worse, 610 and 590 as the upper and lower bound for the lift were common wrong values used.

20. There were a lot of well set out, fully correct answers. Those who correctly found the quadratic equation usually went on to solve it correctly, though a small number failed to give their answers correct to two decimal places. Some thought that $x^2 - 6x + 7$ factorised to $(x - 7)(x + 1)$ whilst others made errors in substituting into, or evaluating, the quadratic formula. Equating the expressions in x was usually done successfully though errors were sometimes made when rearranging into an appropriate form. Subtracting the two equations was far less successful. Some, seeing the words 'simultaneous equations' in the question, thought they had to employ linear simultaneous equations techniques and multiplied each equation by a value and then added or subtracted. This always led to disaster. Many answer spaces were filled with numerous random attempts, with little structure.

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

OCR Customer Contact Centre

Education and Learning
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Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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