GCSE

Mathematics B (Linear)

General Certificate of Secondary Education **J567**

OCR Report to Centres November 2014

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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

J567/01 Paper 1 (Foundation tier)

General Comments

The range of marks indicates that the majority of candidates had been entered at an appropriate level. The number of instances where no response was offered seemed to be at a reasonably low level and it was clear that students are being advised to attempt all questions. It is also apparent that students are becoming more aware about the need to accompany certain responses by appropriate working.

Presentation is generally improving but there is still an issue about the more “functional” questions (AO3) such as 18b, 19d and 20. Responses need to be logical and follow a clearly labelled, step by step process in order to score effectively. The spaces allowed for working were often covered with poorly presented calculations that failed to show any real pattern. This not only made the work difficult to mark but it also led to errors in the answers.

The question that required candidates to show good quality written communication (Q20) generally showed reasonable understanding. Errors most commonly revolved around a failure to cope with some of the arithmetic involved as most candidates obtained conversions correctly from the graph. Overall, however, it was apparent that candidates were able to identify this question and most showed understanding of the need to explain each step in the process leading to the final solution.

Candidates were generally able to answer questions on averages and sequences. Candidates showed better skills on long multiplication and percentage skills than in the past, but candidates' skills on long division and angle geometry are disappointing.

Comments on Individual Questions

1 Part (a) was generally well answered; common errors were 950 and 1060 from carrying errors. Part (b) again was generally well answered; the most common error was 505 as candidates found the difference in each column. In part (c) the common errors were the misalignment of the digits. The results of 15.45 from 8.43 + 7.02, together with 8.43 + 0.72 = 9.15 (or 91.5) were the most frequent errors. Many candidates were successful in part (d), however the involvement of 1000 caused problems for some, many multiplied by 100 and answers ranged from 53.20 to 532 000. Part (e) was less well done, again due to a lack of understanding of place value, the zero caused problems, with other candidates truncating the original number. Those not scoring full marks in (f) often scored B1 for 90, but then errors were made finding 5%.

2 Many candidates were given the benefit of doubt in part (a) for some very poor attempts at half a face. Despite this there was good understanding of what was needed to represent the value 18 and the vast majority scored the allocated mark. In parts (b) and (c most candidates read a correct value from the required sections of the pictogram. Part (d) produced more errors mainly due to either incorrect entries in the table (usually only one wrong figure allowing one mark) or failure to add values accurately.

3 Part (a) was well answered with many candidates scoring full marks. Errors were mainly arithmetical; it was pleasing to see very few answers of 12*pq*. Candidates were more successful with the 9*p* term, dealing with the -2*q* proved more challenging The most common errors were 9*p* and 9*p* + 7*q*. In part (b) there was a general lack of algebraic manipulation so few method marks were awarded. (i) was generally correct, (ii) had an extra step and was less well done, a common error was to add 6 rather than subtract it. In part (b)(i) many candidates were unable to deal with the fraction, some calculated 29 – 25

= 4 but failed to put this into an equation. It should be stressed to candidates to state their answer clearly, and not give embedded answers.

4 Many candidates were scored 1 mark for 19˚. Many however did not score the mark for the reason, as they either did not mention the word opposite or they gave a choice of answers. Reflective and parallel angles were common incorrect reasons.

5 Many knew that the figure in part (a) was a parallelogram (although spelling was a problem for most). Trapezium and rhombus were by far the most common of the incorrect names given. In part (b) the number giving four lines of symmetry (including diagonals) was almost as common as those who placed two lines in the correct position. Benefit was often given to lines that were less than accurate.

6 The majority of candidates showed a good understanding of the different types of average. Parts (a) and (b) were well answered. In (c) the majority knew they had to order the list but struggled with the middle pair, some subtracted 11 from 13 and gave the answer 2. One mark was awarded for listing the numbers in order, however some then spoiled this by going on to find the mean.

7 This question was very well answered. In (a) only a small number gave the measurement of the radius. Part (b) was also well answered; the common incorrect answer was perimeter.

8 Many candidates were able to identify $\frac{3}{12}$ in (a). In (b) the majority had correctly shaded 12 squares. Those who did not identify that 12 squares needed to be shaded could have scored 1 mark had they shown method.

9 This was almost always correct. Likely being the most incorrect answer in both parts.

10 A small number of candidates were able to score all 4 marks. A lack of working or explanation prevented many candidates scoring marks, those who annotated their diagram generally did better. There was a lack of knowledge of basic angle facts; many thought the isosceles triangle had 3 angles of 80˚. Some merely added all the four given angles and subtracted these form 360.

11 Part (a) was answered successfully in a large majority of cases, in (i) the most common approach was to break down the time into sections – usually 40 + 15 minutes or blocks of 10 or 5 minutes. The fact that the time span in (ii) covered more than an hour caused greater difficulty often resulting in a mark lost for an incorrect number of hours (usually 2h 50m or 4h 50m). Another misconception was to subtract 13 -9 and 15 – 5 leading to an answer of 4h 10m. Dealing with a negative value in (iii) rarely caused any problems. In part (b) it was evident that many students did not understand the process for estimation and many tried to use long multiplication to work out the exact answer. Around half of those who did use the correct estimate were unable to evaluate correctly and frequently obtained the figures 48 with an incorrect number of zeros.

12 Part (a)(i) was generally answered correctly. In (ii) many did not appear to understand substitution or the order of operations with 65 being a common incorrect answer from 40 + 25, or 71 from adding 6 to 25 as the first step. In (b) many failed to write $P =$ but gave an expression rather than a formula. Some thought $2r + 2r$ was $4r^2$. Others simply wrote $2r + h$ and ignored the sides which were not labelled on the diagram.

13 The majority of candidates scored at least 1 mark in part (a) very few attempted a three dimensional drawing. A common error was to add three faces of 6 × 3, this often then lead to the sides being incorrectly drawn. A small number of candidates only added four faces.

Many candidates gained full marks in part (b). Some were unable to correctly evaluate 30 × 40 × 60 but were able to gain 2 marks. Candidates should be encouraged to check their answers as some gave the correct numerical answer but then gave a contradictory reason.

14 There were a multitude of acceptable methods for obtaining a correct final cost in part (a) but, in order to obtain full marks, a logical approach was required. Only a small minority managed to score full marks with many candidates failing to complete the process often by failing to take account of the fact that two dogs were being accommodated. Arithmetic was also a major problem here especially when trying to multiply their cost per day by 16 without the aid of a calculator. A common method for this calculation was to write down, and add, their daily rate 16 times with a varied degree of success. It was quite common to come across responses where work was scattered at random around the page with little awareness of its relevance. Although failure to score at all was quite rare, many weaker candidates only managed to obtain the cost (without discount) of two dogs for one day (£17).
Part (b) caused similar problems with the understanding of the arithmetic involved especially as fractions were involved. The majority failed to correctly use 3/5 or 6/5 with many giving 3/5 x 2 as 6/10 or 3/5 x 16 as 48/80. Again there were those who failed to comprehend that two dogs were involved giving an answer of 9 or 10 tins. Most of the small number who reached 19.2 realised that they had to round up to 20. In part (c) many candidates were unable to convert from kilometres to metres, answers of 300 and 30 were quite common.

15 Many candidates did not understand the term reciprocal. Common answers were 10, 25 and 0.5. In (b) the majority of candidates attempted this by using a factor tree and many were awarded at least 1 mark. Only a small number put 1 in their tree. Several candidates thought 9 was a prime number.

16 Part (a)(i) was almost always correct. The majority were correct on (ii) but some had failed to give a direction stating the difference is 6. Part (b) was less well answered with common answers being 2, 7 and 12 or 7, 14 and 21. In part (c) some gained 1 mark for $3n$. A common incorrect answer was $3n + 2$.

17 It was rare to see lines extending to the point (0, 1) or the point marked. But many candidates gained 1 mark from correctly writing the coordinates of their centre of enlargement, often (5, 5). Candidates who scored no marks had usually indicated more than one point on their diagram. Part (ii) was usually correct. In (b) several correctly gave the correct answer with the most common incorrect answer being 25.

18 In part (a) there was little understanding of the methods that would enable a comparison be made between the data in the pie chart and the different sample in the bar chart. Many simply referred to the figures 4 and 36 although there was a reasonable number who picked up a method mark for stating that the total number of letters in Andrew's first sentence was 25. Lucy's data was frequently interpreted as 36% for the percentage of 'e' in her sentence or that 'e' appeared 36 times. Although 2 marks could be awarded for 4/25 or 36/360 it was quite rare for both of these proportions to be seen and only a small minority ever reached the point where these values could be compared. In part (b) few candidates referred to the fact that only the first sentence was sampled and that the rest of the book should be surveyed in order to obtain an accurate result. Many other factors were quoted including accuracy of data, the fact that he had made an error in his calculations or stating that he was correct. By far the most common error was to say that he was wrong because "other" was the most common letter – "other appears 12 times and 'e' only appears 4 times".

19 In part (a) most candidates were able to correctly plot the two points. Some would benefit by having a sharp pencil. (b) was usually correct with only a few candidates answering negative. In (c) many candidates were able to draw their line within tolerance; some however did not rule the line and did not score the mark. Only a small number of candidates joined all the points. In (d) many failed to realise they needed a reading from the graph to answer this part, of those who did several were unable to correctly interpret the scale using 1 square as 5 not 50. The majority scored 1 mark for 2400 × figs 5.

20 This question probably caused more problems with presentation than any other, particularly with the lack of distinction between the two units involved (£ and €). Most conversions, using the graph, were within tolerance and, with a mark allowed for a correct conversion, it was very rare that a candidate failed to score at all. Most errors came from a failure to correctly calculate the delivery charges especially if €40 was converted to £32 or £33 before attempting to find 5%. Many who worked out the appropriate delivery charges in the UK and France failed to convert one of the currencies to enable a comparison to be made and scored 3 marks for €42 and £35. One correct total charge (often £35) and a relevant conversion was another common response. A regular misconception was to give 1/6 as 6% and then attempt to find 6% of £35.

J567/02 Paper 2 (Foundation tier)

General Comments:

Candidates were generally well prepared for this paper and were able to attempt most of the questions; few appeared not to finish due to lack of time. There were few really low marks and few really high marks suggesting that candidates had generally been entered at an appropriate level of entry.

The majority of candidates are aware that it is in their interest to show their working and consequently, if their answer is incorrect, can still gain marks from showing a correct method or a solution that is partially correct. Inevitably there are candidates who could have gained further marks but failed to do so as there was no evidence of how they had obtained their result.

Techniques have been developed by many candidates to carry out numerical calculations without the use of a calculator. On a calculator paper these techniques are not always the most effective way of finding a solution and they can be prone to error.
This was particularly true in:

- Question 11 – finding percentages and fractions of quantities
- Question 15(b) – manipulating fractions
- Question 17(b),(c) and (d) – calculator technique

Calculators, used effectively, can make a question more accessible and simplify the calculations involved.

Comments on Individual Questions:

Question No1(a)
The majority of candidates could give the correct compass directions.
A few did not understand the terms 'compass directions' and gave a distance as an answer.

Question No.1(b)
Most candidates made a fair attempt at this question and many found the correct distances in metres; converting these to kilometres was more of a problem, consequently a total of three out of the four marks was common.

Question No.2(a)(b)
Nearly all candidates could give the correct coordinates, with only a very small number reversed.

Question No.2(b)
Many candidates found a point that satisfied two of the conditions, which were practically always that both coordinates needed to be negative and that the triangle formed needed to be right angled. A significant minority found the point that satisfied all three conditions.

Question No.3(a)
Nearly all candidates could put the directed numbers in order.

Question No.3(b)
Most candidates put the decimals in order of size correctly.
The main error was to put 1.4 in the wrong position.

Question No. 4
Most candidates could find the appropriate unit for this everyday setting.

Question No.5
There were different ways of addressing this problem. Those who found the total amount of money collected and divided by 2.5 were generally successful, although there were many who tried this approach that did not use their units consistently and muddled pounds and pence.
A small number of candidates tried to group the coins into lots of £2.50, but were usually not successful as they became confused with the number of cars and the amount of money left.

Question No.6(a)
Most candidates gained at least one mark here, although it was clear that some were working with line symmetry rather than rotational symmetry.

Question No.6(b)
Not all candidates were clear what a regular octagon was.
There were many correct answers, but common errors were to give 4 or 1 as answers.

Question No.6(c)
The concept of line symmetry was well understood with most candidates gaining both marks.

Question No.7(a)
Most candidates substituted the value into the expression correctly.

Question No.7(b)
The majority of candidates substituted the value successfully.
A small number gave an answer of 15 + 18 not realising that they needed to take this a stage further. Others treated the expression as $3y + 6$, ignoring the brackets, and gave an answer of 21.

Question No.7(c)
Again there were many correct answers for this question.
A few worked out 18 – 8 to get 10 as an answer for which they were given some credit.
Others found 24 – 18 rather than 2 × 4 – 18, showing a conceptual misunderstanding.

Question No.8(a)(i)
Most candidates read from the graph correctly.
The main error was to give an answer of 6 rather than 6000. Candidates need to think of the reasonableness of their answer.

Question No.8(a)(ii)
Less than half gave a fully correct answer of 4400.
Many achieved one mark by showing 4.4 or 4200.

Question No.8(b)
Most candidates interpreted the graph correctly.

Question No.8(c)
A good explanation was given by many candidates.
A few described the way the graph changed each year, rather than just in the first quarter.

Question No.9(a)(i)
How to use different quantities of the recipe to make more muffins was generally well understood and most candidates gave a correct answer.

Question No.9(a)(ii)
Those who simply saw that the recipe needed to be one and half times bigger to make 18 muffins found the manipulation of the figures much easier than those who divided by 12 and then multiplied by 18. The majority found the correct quantity of milk. Some candidates gave

very large amounts for this and, if they had considered how reasonable their answer was, they may have realised that they had made an error.

Question No.9(b)
Most candidates appreciated how to solve this problem. Some made errors in their calculations, but most went on to find the correct number of muffins.

Question No.10(a)(i)(ii), (b)(i)
There were several candidates who did not understand consecutive numbers.
Perhaps if they had looked at the examples, that were given, carefully, they would have had a better appreciation of this.
Notwithstanding this, there were many correct answers in these parts of this question.

Question No.10(b)(ii)
The majority of candidates scored the mark on this question. Explanations were not always clear and mathematical terms were not always used correctly, but if there was some understanding shown, credit was given for this.

Question No.11
This was one of the QWC questions and was generally answered quite well.
Many candidates showed good technique when finding fractions and percentages, although some made errors when using a non-calculator technique to find 14%.
As always, candidates need to set their work out clearly with sensible explanations and a detailed method, showing units where appropriate, if they are to gain full marks.
A few candidates appreciated that you do not need to find how much Sophia and Oliver saved and that it was sufficient to just compare 2/15 with 14%; again those who used this approach did not always give a full comparison to gain full marks.

Question No.12(a)(i)
Using a flow chart to generate a series was well understood and nearly all candidates found the next term correctly.

Question No.12(a)(ii)
The majority continued the series to find the third term.

Question No.12(b)
There was a little confusion by some as to which term is which and some wrote down the fourth term as the answer for which they were given some credit. Again understanding how the flow charts generate the series was good, but the terminology let some candidates down.

Question No.13(a)
Many candidates found the mean correctly. A small number found a different measure such as the mode, median or range.

Question No.13(b)
Only a very small number of candidates appreciated what was required here and these often gave a detailed method with a good explanation. Many candidates just added 20.5, the mean of the original four temperatures, to 19.7 and divided by 2.

Question No. 14
Most candidates realised that you needed to multiply the length by the width to find the area of the rectangle, although a small number found the perimeter for their area.
Some were confused as whether to multiply or divide by one thousand to convert from square metres to hectares.

There were a sizeable minority who successfully found the area of the field in hectares; some of these truncated their answer rather than rounding correct to one decimal place as required

Question No.15(a)(i)
Most candidates gave the correct answer of 1/6; a significant number gave a response of 2/6, which was disappointing. There were a few answers given as ratios in part (a), which obtain no marks.

Question No.15(a)(ii)
Nearly all candidates gave the correct answer. A small number gave words such as ‘evens’ in the three parts of part (a). When the question says ‘work out the probability that …’ a numerical answer is required.

Question No.15(a)(iii)
Most candidates gained the mark on this question. An answer of 0/6 was condoned.

Question No.15(b)
Many candidates had some idea with this question, but the working was often confused and difficult to follow, consequently relatively few marks were scored except, for those that had found the correct solution.
Using a calculator to compute 1 – (3/20 + 1/4 +2/5) should be relatively easy, but very few had the inclination and the skills necessary to do this.

Question No.16(a)
Only a few candidates knew how to find the required angle. Many measured the angle; when the question says ‘Workout …’, a calculation will be required to obtain the solution.

Question No.16(b)
This part was done a little better, following through from part (a); although the method used to obtain their solution was rarely seen.

Question No.16(c)
Very few candidates realised that the solution for this could be obtained using the answer to part (b).

Question No.17(a)
The use of powers was understood by many and most candidates obtained at least one mark, with the majority gaining two marks.

Question No.17(b)
This question was generally well answered with many using their calculator effectively to obtain a sensible solution. Many candidates truncated their answer rather than giving their answer correct to one decimal place.

Question No.17(c)
Few candidates could use their calculators to find a cube root. Those who attempted this usually either divided by three or found the square root.

Question No.17(d)
Finding a reciprocal was not understood at all by most candidates with very few correct answers. A few got as far as 1/1.25, but then stopped there.

Question No.18
Few candidates had the algebraic skills needed to find a solution to this equation algebraically. Working was often confused and piecemeal; this is a QWC question and the method needs to be step by step and coherent. A few candidates used a trial and improvement technique to

obtain a correct solution for which they were given some credit. Some tried a reversed flow chart approach, which will, of course, not be successful with equations of this type.

Question No.19(a)
Manipulating an inequality was not understood by most candidates. By treating the inequality as an equation many candidates gave an answer of 3 in some form and gained a mark.

Question No.19(b)
Only a small number of candidates had the skills needed to rearrange a formula.
A common incorrect answer was to transpose the p and the r and give an incorrect answer of $r = 3p - 7$

Question No.20(a)
Most candidates knew how to go about completing a stem and leaf diagram.
Some failed to put the data in order and others made errors or omissions.

Question No.20(b)
The technique for finding the median was well understood by many candidates, although some made errors. A few candidates found the mean or the range.

Question No.20(c)
The majority of candidates gained at least one mark, with most understanding the principle involved.

Question No.21(a)
Only a minority of candidates completed the table correctly. The manipulation of negative numbers caused problems, which presumably led to the common incorrect answer of -10. Another common incorrect answer was 0.

Question No.21(b)
Most candidates plotted their points correctly.
Few candidates drew a curve through their points and consequently only gained one of the two marks.

Question No.21(c)
Using the graph to solve this quadratic equation was only understood by a small number of candidates.

Question No.22
Only a very small number of candidates appreciated that you would need to use Pythagoras to solve this problem. Many saw the circle and immediately started finding areas and circumferences, which did not, of course, help find the solution.

J567/03 Paper 3 (Higher tier)

General Comments:

The candidates seemed to have enough time to complete the paper. Most seemed able to access the questions. The quality of the candidates' work was good in terms of layout and presentation with most showing a sufficient amount of working. However the working on the two QWC questions was still difficult to follow at times and lacked the structure expected. There were too many responses with numbers seemingly randomly placed on the page. However it was a pleasure to see algebraic manipulation used with confidence. A number of candidates failed to score credit through not reading the questions carefully. In answering the question on finding angles many did not give the reasons for the angles they found. In the question on proportion some used the incorrect type of proportion although their method was sound. There were two questions on numerical and fractional calculations and these were attempted very well.

Comments on Individual Questions:

Question No. 1
In part (a) the correct expression was usually given, the common error was to write $n + 3$. However in part (b) they often multiplied the brackets out first incorrectly to $10n + 1$ and then substituted the values for n, thus responding with 11 21 31.

Question No. 2
There were a number of methods, typically the traditional line method and thankfully very few missed the zeroes, the grid method and methods such as $(3.56 \times 4) \times 6$. It was usual to see a small error, often involving multiplication tables, but most attempts were rewarded with part marks.

Question No. 3
Part (a) differentiated the candidates well, with the full spectrum of answers seen. Most candidates scored credit for $\frac{4}{25}$ or $\frac{36}{360}$, some did have difficulty dealing with the pie chart and we often saw $\frac{360}{36} = 10$. A few candidates did put the percentage sign with this and hence scored credit. However the main error was in not realising that there had to be a conversion in order to compare them. A common denominator was not often seen, but 50 would have sufficed. The question was set so that percentages would have been easy to calculate and most successful responses did do that. In part (b) most candidates stated that the sample was small and they gained the credit for this. It was also pleasing to see that some mentioned that the small sample was not representative of the whole of the book.

Question No. 4
In part (a) most did obtain the correct numbers. It was surprising that those who did not get the correct numbers, failed to check the totals carefully otherwise they would have noticed that there was an error. In part (b) most gave the correct fraction. Some candidates, however, did not simplify their answer.

Question No. 5
Not all candidates realised that the use of prime factors would help to answer this question. Candidates often stopped at 27 and 39 with an answer of 4 or only partially split the numbers into factors often missing 12 times 9 or 13. A poor knowledge of times tables did not help some. A few had fully correct factor trees but did not know how to proceed from there and the odd candidate added 108 and 156 and worked from 264. Common wrong answers seen included: 8,

11, 13, 16, 18, 38, even 66 and 132. Again some were hindered by poor layout and presentation.

Question No. 6
In part (a) we often saw −12 – 20 with an answer of −8 or 8. In part (b) thercorrect answers was often seen, the only error was to omit the product with the second term in the bracket. In part (c) many took out a partial factor such as x or 2 rather than $2x$. In (d) the common error was not doing the inverse of operations, so $8x = -7$ was a common stage reached.

Question No. 7
In part (a) few knew how to draw the rays between the corresponding vertices of the two triangles to find the centre. However most knew the scale factor was 3. In part (b) most knew the perimeter was enlarged by the same scale factor.

Question No. 8
There were many fully correct answers and many more that only made a small error, such as reading the conversion graph slightly inaccurately or making a slight arithmetic error. Often both costs were found and a comparison made without a conversion being attempted. A common error was seen with the cost of delivery, often 6% used not $\frac{1}{6}$ or using 10% or 20% but not 5%. Some were hindered by poor layout and presentation.

Question No. 9
Angle ABC was usually found correctly and the reason was given, however many did not use the correct term of alternate angle. Few knew that the opposite angles of a cyclic quadrilateral add up to 180°, although many recognised that it was a cyclic quadrilateral. They often attempted to use the fact that the angles of a quadrilateral add up to 360°. Many found angles without giving reasons.

Question No. 10
This question was answered well and particularly in parts (a), (b) and (c) where there were few errors. In part (d) most attempted 50p × 2400 but many used long multiplication rather than treating 50p as £½ and working out half of 2400 which would have been easier. For 20 days some read the vertical scale incorrectly from the graph.

Question No. 11
In part (a) a successful technique was to write out both numbers in full in a fraction and cancelling the zeroes leaving 18 000 ÷ 3. In (b) many doubled the power of 10 as well. Those who did reach 15×10^8 sometimes failed to write the answer in standard form.

Question No. 12
In part (a) there were many correct answers. Some candidates inverted the first fraction rather than the second one and some added the numbers rather than multiplying them. In (b) most candidates used the correct method but some did not convert the mixed numbers correctly to improper fractions. In converting to a common denominator some made arithmetic errors with the numerators. It was surprising that very few separated the whole numbers and the fractions which would have reduced the demand for arithmetic competence.

Question No. 13
In (a) it was a pity that some candidates were caught up with the units and so the numbers became rather large. The intention was that they used the scale factor 5 and the units took care of themselves. In (b) the problem was division, even though division by 4 can be effected by two halving operations.

Question No. 14
In the first part most gained credit for the first pair of branches however it was surprising that then many did not get the second branches correct, many writing $\frac{1}{5}$ on the first branch and $\frac{1}{10}$ on the second. In (b) this was answered poorly, with many not realising that they must include two faults. Often, when the correct routes through the tree diagram were selected, candidates could not deal with the fractions with many adding them. Some candidates added the probabilities then multiplied the answers or added all the way through the question. Those candidates that used the tree by writing the probabilities at the each branch did tend to do better than those who didn't.

Question No. 15
Most worked out the scale factor was 2 but they then used it to find the volume as 1000 ml. Many did not convert their amount to litres. Some used 2^2 for the volume scale factor but a few candidates answered it correctly.

Question No. 16
Many worked out a to be 3 but they could not work out b. Common answers seen were $(x + 3)^2 + 3$ or $(x + 3)^2 – 3$. It was not common to see a candidate check their answer by expanding the brackets and simplifying which would have shown them that their answer was wrong.

Question No. 17
In part (a) a common approach was direct proportion so we saw $4 \times 40 = 160$. A few did obtain the correct answer. In part (b) candidates often used x or inverse proportionality to x^2. Some started correctly with $y = kx^2$ but then they substituted the values of x and y, however they would obtain $y = k \times 10$ and then $k = 25$.

Question No. 18
It was surprising that part (a) was answered incorrectly by most candidates, because they did not know the rule to find the midpoint. Some could not work out $-6 + 3$ and then halve the answer. In part (b) the horizontal component was often incorrect and we did see 3 given as the answer. In part (c) they often had the incorrect figures from (b) but they were able to gain some credit. However many did not recognise the need for Pythagoras' Theorem and many made little progress towards the answer.

Question No. 19
Some attempted to solve simultaneous equations whilst others adopted a trial and improvement approach. Still, only a few were successful and this question was found to be challenging.

Question No. 20
There was much good clear work seen with many getting the correct answer. A few spoilt a fully correct answer by incorrectly cancelling various terms in their answer, whilst others had the correct method but failed to simplify fully or made just one small error. There were many who knew that they had to do some sort of 'cross multiplying' but could not get the denominators correct.

Question No. 21
We would only expect to see the more able candidates answer this question and some excellent concise work has been seen. Some eliminated y and formed a quadratic equation and factorised correctly but then failed to solve from that point. Others made an error when factorising but then solved correctly from their brackets. There were some candidates who attempted to solve their quadratic equation by using the formula. This is a rarely used technique in this paper and finding factors should always be the first attempt.

J567/04 Paper 4 (Higher tier)

General Comments:

Candidates were generally well prepared for this paper and had the time to attempt all of the questions. Their solutions were usually well presented, often with clear method shown. Most diagrams and graphs were neatly drawn using the correct equipment.

In general, candidates performed well on the questions at the beginning of the paper which were testing the more straightforward topics. Candidates also made good attempts on the more challenging questions on box plots, rates and volumes. Those candidates who were familiar with the formulae sheet were able to gain marks by quoting the appropriate formula and substituting the values given in the question.

In general, candidates used basic algebra well but had more difficulty in dealing with complex algebra. Those who could set their work out in logical steps were able to gain credit for correct steps shown.

In the quality of written communication question many candidates showed their calculations clearly but very few of them used any words to indicate what each calculation was for. Where a question requires a candidate to show a result, they are expected to show a clearly laid out method that reaches the required value, rather than to start with the value they have been asked to show and work backwards.

Comments on Individual Questions:

Question No. 1
In part (a) most candidates used their calculators correctly to reach the correct answer but some truncated the answer rather than rounding it correctly to one decimal place as required.
In part (b) many candidates used the correct calculator key to find the cube root, although common errors were to find the square root or to divide by 3.

Question No. 2
In part (a) most candidates correctly solved the inequality. Full credit is only given when the final answer is given as an inequality, in this case $x > 3$. Some candidates find it easier to solve an inequality by rewriting it as an equation but they must then give their answer as $x > 3$ not $x = 3$ or even just 3.
In part (b) candidates generally showed correct steps to rearrange the formula, often reaching the correct result.

Question No. 3
In part (a) most candidates understood that a stem and leaf diagram should be ordered and it was generally completed correctly. Candidates generally understood that the median was the middle value, but some had difficulty dealing with an even number of values. It was common to see answers of 41, the 10th value, or 42, the 11th value, when candidates did not realise that they needed to find the value midway between these two. In part (iii) most candidates found the correct fraction and reduced it to its simplest form.
In part (b) many candidates had been trained to complete the columns in the table with the midpoints and the products and then go on to use these to calculate the mean correctly. Common errors were to use points within or at the ends of each interval rather than the midpoints, to divide by the number of groups rather than the number of students or to use group width rather than the midpoints of the group.
In part (c) candidates showed a good understanding of ratio and could both reduce the ratio to its simplest form and divide the amount in the required ratio.

Question No. 4

In part (a) most candidates could calculate the missing value in the table and then use the given values to correctly draw the required graph. Most curves were reasonably smooth, although some candidates joined with ruled lines or omitted to join the points at all. Most candidates understood that to solve the given equation they needed to read the values where their graph crossed the *x*-axis and these were generally accurate.

In part (b) candidates demonstrated that they could substitute correctly into the given equation and generally showed an appropriate number of correct trials with their outcomes given to a suitable degree of accuracy. Candidates who gave a final answer to more than the one decimal place required did not gain full credit.

Question No. 5

Most candidates attempted to draw a ruled 8-sided shape using a central angle of 45°. Some did not measure the angles accurately with a number of them outside tolerance. Only a small number of candidates showed the calculation leading to 45°.

In part (c) many candidates calculated the exterior angle of the polygon, with the answer 30° more common than the correct interior angle of 150°.

Question No. 6

When describing a transformation, candidates should use the correct word, in this case rotation not turn. Those who identified a rotation generally gave the correct angle of 180°, but the centre of rotation was sometimes either incorrect or omitted. It should be noted that when the question asks for a single transformation, candidates are penalised for stating a series of transformations.

In part (b) very few candidates drew the first transformation of shape A on the grid and so had difficulty in describing the second transformation. Some simply described the single transformation from A to C. Those who identified the correct reflection often found it difficult to describe the *x*-axis: 'the line $y = 0$' was acceptable but it was clear that some thought that the *x*-axis could be described as 'the line $x = 0$'.

Question No. 7

Many candidates used the efficient method of 5340 × 1.033 to reach the correct answer in part (a). Some candidates used non-calculator type methods of calculating 1%, 3% and 0.3% and then adding these to the total, which was sometimes successful but commonly led to errors. It was clear that some candidates had difficulty in dealing with a non-integer percentage as a significant number of candidates found 133% rather than 103.3% of the required amount.

Many candidates did not identify that a reverse percentage calculation was required in part (b) and the most common answer was £2441.18 which was 94% of the given salary.

Question No. 8

In part (a) few candidates realised that they should use either Pythagoras' theorem or trigonometry to show the required result. As there was a circle in the diagram, they tried to use either the area or the circumference of the circle. Of those candidates who attempted a correct method, many started with the value 4.24 rather than trying to reach it using the 6 cm diameter. To gain full credit, candidates were expected to make a correct statement using Pythagoras' theorem or trigonometry involving either 6 cm or 3 cm with an unknown for the side of the square and then simplify this to reach the value of 4.24 correct to two decimal places.

Candidates were more successful in part (b) with many gaining some credit for calculating the area of the circle, the square and hence the shaded area. Some candidates had not read the question carefully and gave their answer as the shaded area rather than finding the percentage of the area that was shaded. Clearly laid out working was often seen in this part.

Question No. 9

Candidates were intended to use algebra to solve this angle problem, but it was more common to see a trial and error approach. This often led to the correct answer which gained full credit. Those candidates who used trial and error and did not reach the correct answer often gained very few marks as their working was not laid out sufficiently clearly for examiners to follow. It was clear that some candidates thought that the opposite angles in the quadrilateral should sum to 180. Those candidates that attempted to use algebra often wrote expressions such as $b = 2a$, $c = b + 40$, $d = c/2$ and $a + b + c + d = 360$ but then did not know how to combine them to solve the problem.

Question No. 10
The box plot was generally drawn accurately with candidates able to use the given upper quartile and interquartile range to work out where to position the lower quartile.
In part (b) candidates could only gain full credit if they made one comment comparing the medians and one comparing the spread of the data using the context of the question and quoting all relevant statistics. Few candidates met all of these requirements, with many giving vague comparisons which were not backed up with the values of the statistics. It is not sufficient to state, for example, 'the median for boys was bigger than the median for girls' as this does not offer any interpretation: a better comparison would be 'the boys were taller on average with a median of 174 cm compared with 164 cm for girls'.

Question No. 11
Many candidates were unfamiliar with the method for finding the equation of a given line. Values of both the x- and y-intercepts were read from the graph, and these were often used in an attempt to form an equation. Those candidates who did find the gradient did not always know what to do with it, and equations were not always presented in the form $y = mx + c$.
Although one inequality had been given in the question, candidates sometimes gave answers as equations rather than inequalities in part (b). Where inequalities were given, few candidates realised that they should be using the equation they had found in part (a) to form one of them. Few correct answers were seen to this part and only a minority of candidates gave one correct inequality, most commonly $x \le 3$.

Question No. 12
Many candidates identified that trigonometry was required in this question, but often made no further progress. Some candidates identified the right-angled triangle ACD and used trigonometry correctly to show the required result in part (a). Some candidates used long methods of Pythagoras' theorem or tangent to find CD and then sine to find AC, which was given full credit if values used were sufficiently accurate.
Those candidates who identified that the sine rule was required in part (b) often reached the correct result. Those who quoted the formula from the formulae sheet and showed it with values substituted gained a method mark, even if they could not rearrange it further.

Question No. 13
In part (a) many candidates did not know that they should first eliminate the fraction to solve the equation. Those that attempted to do this often made sign errors in their expansion of the brackets or did not multiply both the right and left hand sides of the equation by 6. Where clear algebraic steps were seen, candidates could be awarded a method mark for a correct final step even if other steps had been incorrect. Many candidates did not write the stages of their working as equations and in these cases method marks could not be awarded.
In part (b) candidates needed to use the quadratic formula, which is quoted on the formulae sheet, to solve the given equation. Many candidates quoted the formula but were unable to substitute all of the values correctly, often making errors with the negative values, thus failing to reach the correct solutions. Some candidates did not give their solutions to the two decimal place accuracy required by the question.

Question No. 14
Those candidates that understood what a histogram was usually found all frequencies correctly. Some candidates just read the frequency densities off the axis, which were not always read accurately.
In part (b) many candidates gave a good explanation relating to the range of ages of 80 to 100 for the oldest patient.

Question No. 15
In part (a) candidates usually identified that another parabola was required, but it was commonly translated upward rather than to the left.
In part (b) candidates did not always realise that they needed to use their calculator to find the first value of x, and so could not find the required values. Having got an answer of 113°, candidates did not always know that they had to subtract this from 360° to find the other solution.

Question No. 16
Candidates performed reasonably well on this challenging question, although very few gained full credit. They generally understood that they needed to find 95% of the full capacity and then use this with the flow rate to calculate the time taken to fill the tank. Very few candidates realised that they needed to use bounds to find the maximum time. Those that did use bounds often used the upper bound of the capacity but then also used the upper bound of the flow rate, not understanding that they needed to divide by the lower bound to reach the maximum time. Candidates also had difficulty in converting a time in minutes to minutes and seconds. Although working was usually clearly laid out, calculations were rarely annotated to indicate what they were: brief statements such as ‘maximum volume in tank’, ‘time to fill tank’ are expected in a quality of written communication question.

Question No. 17
Some clear and correct attempts at part (a) were seen with a correct Pythagoras’ theorem statement leading to the height of the cone seen and then the addition of the radius of the hemisphere to give the total height. Some candidates used Pythagoras’ theorem wrongly and found the height of the cone as 13 cm.
Many candidates gained at least some credit in part (b) for quoting the correct formulae, which are given on the formula sheet, and using them to find the volumes. Some did not realise however that they were finding the volume of a hemisphere rather than a sphere, so did not halve that volume. Although the cone formula was usually quoted correctly, candidates did not always know which value to use as the height, with both 12 and 15.9 commonly used.

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