Oxford Cambridge and RSA

GCSE

Mathematics B (Linear)

General Certificate of Secondary Education **J567**

OCR Report to Centres June 2016

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

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

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

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General Certificate of Secondary Education

Mathematics B (Linear) (J567)

OCR REPORT TO CENTRES

J567/01 Paper 1 (Foundation tier)

General Comments:

This was a well-balanced paper appropriately targeted at the foundation level allowing many to show a wide range of mathematical ability and giving opportunities for all to score marks. The majority of candidates appeared to have been entered at the correct level. Some candidates could have benefitted from taking the higher paper. The great majority of candidates attempted every question, indicating that they had adequate time to complete the paper.

For many the work was of a good standard and there was a good distribution of marks with candidates scoring between the mid-nineties and single figures. Presentation of work generally is improving with many candidates showing more intermediate steps. The absence of working from some students led to a loss of marks and particularly on longer questions working was not always clearly set out and this often led to mistakes.

Communication in ‘open’ questions still needs to improve as responses were often confused. When solving problems such as in Q17 many candidates are not annotating their work and in questions such as 14 some candidates are not clearly showing supporting methods or explanations.

For some, basic arithmetic skills are not sound, knowledge of tables are not reliable, and there were numerous addition errors. Not all figures are clearly written and some misread their own figures leading to incorrect answers after further calculations.
Topics which proved difficult for many students were manipulation of fractions, bearings, perimeter and graphs, in particular the quadratic function (Q18) which appeared to present the most difficulty with hardly any scoring full marks. The work on reflections, data handling, sequences and squaring/cubing was well handled by most.

Comments on Individual Questions:

Question No. 1
Candidates answered parts (a) and (b) well, giving them the opportunity to demonstrate practical skills early in the paper. In (a) most candidates answered correctly with just a small number choosing “acute” or “obtuse”.
In (b) many measured angle *x* accurately. The most common error was to use the incorrect scale on the protractor and give the supplementary angle. A small number of candidates misinterpreted the question and chose an answer from part (a), mostly “acute”.
Part (bii) was successfully done by many within the accuracy required. However a significant number measured the radius instead of the diameter.
In (c) most scoring statements made reference to the triangle being inside the circle. Few considered the problem in terms of the distances around the outside of the shapes. Common reasons that were not credited referred to 360˚ in a circle and 180˚ in a triangle or stating that the area of the circle is greater than the area of the triangle.

Question No. 2
Candidates responded to the scenario in this question with a high level of success. Many scored full marks in both (a) and (b)
In (a) method marks were awarded for inaccurate calculations as many clearly showed they knew to find 3 lots of £7.45 either by multiplication or repeated addition. Only a minority calculated the cost of tickets for just one child and one adult and rarely candidates did not include the adult cost.

In (b) almost all candidates attempted the subtraction and the majority did this accurately. Where errors occurred in the subtraction process, £8.35 was often seen as a result. A good number were awarded the mark for £8.65.
In (c) the arithmetic was well performed and most answers were given in a form consistent with other entries in the table. Screen 2 time was sometimes incorrectly given as 4 05 and on occasion solutions were one hour out or a time duration was written as e.g. 1:57.

Question No. 3
In (ai) most understood vertically opposite angles whilst a few just measured angle g. A good proportion of students went on to answer (aii) correctly but more found difficulty. Common errors were 90 – 35 = 55 or 180 – 2×35 = 110. As with (ai) some measured angle h.
In (bi) there was good recognition of the isosceles triangle. A few calculated 180˚ –73˚. In (bii) angle sum of a triangle was applied well. Where no marks were achieved candidates had used measuring or had provided no working.

Question No. 4
A long question with a range of skills involved.
Part (a) allowed candidates to demonstrate their chart reading abilities and some tolerance was allowed when reading values. Part (i) was answered well with only a few giving the incorrect value of 15. Part (ii) was also answered well with a small number giving a total for the men or the women rather than both. The increased difficulty level in part (iii) meant few marks were awarded. Those who gave a correct fraction usually converted this to a percentage. Many answered 16, 16/50 or 32% having read from the "25 to less than 40" bar only. Others correctly added the two bars but either did not write the corresponding fraction or did not use 50 for the total number of women. 37% was a common wrong answer from candidates not considering there were 50 women surveyed. Difficulties in interpreting the graph meant that many struggled to compare the wages in (iv). A lot of candidates seemed to think that the bar heights in each group were showing actual wages, rather than the number of men/women with earnings in that range.
Many candidates were able to state that 'men earned more than women' fewer supported this with figures from the graph. When data was used to support their argument it was not always appreciated that they needed to compare like with like. For example data for women in one interval was sometimes compared with data for men in a different interval.
All (b) parts were answered very well. In (i) a small number of candidates picked out the middle reading (25) of the list given. Where the data was re-listed in order, an occasional slip was made either by listing one number twice, or by omitting one. The concepts of range and mode were well understood by most, though one or two got them muddled. Occasionally the range was incorrect due to the smallest term misidentified as 16.

Question No. 5
All but a few of the candidates coped successfully with this question. A few offered further terms for the sequences and very occasionally the *n*th term was offered instead.

Question No. 6
Many candidates demonstrated reading of the graph correctly, and drawing lines with a ruler resulted in more accurate answers. Part (a) was mostly correctly answered. Part (b) was the least well answered as many misread the graph giving an answer in the range 50 – 55, reading the height at 1 month instead of 1 year. In (c) a common error was from using the first line above 70, so reading from 72 instead of 71. This led to an answer of 10. Other common errors were answers in the range 8 – 8.4. In (d) the correct method was used by nearly all candidates with the majority of incorrect answers just outside range.

Question No. 7
In (a) the majority recognised the scalene triangle. Isosceles was perhaps the most common error with a few suggesting right – angled.

Part (b) was successfully drawn by most and although reflecting in a sloping line proved more difficult in (c) many not scoring full marks gained a mark for the side at 45° drawn correctly.

Question No. 8
Many correct answers in part (a). There are still candidates confusing area and perimeter with an error of 20 most common. In (bi) '0' was seen quite often and 2 or 4 were common errors. Part (bii) was more successfully answered with some errors of 2, 1 and 90°. Part (iii) proved challenging for many students and a range of incorrect methods were used. Following on from part (a), many students calculated 4 × 21 from the four rectangles making up the shape. Others knew how to calculate the perimeter though relatively few worked out the key missing length. A common misconception was to measure the diagram ignoring the 'not to scale' information. Others avoided multiplication by showing all sides in an addition of 7 + 3 + 4..., a significant number missed off a side.

Question No. 9
Many students found it hard to convert fractions to decimals and although part (a)(i) was answered correctly by many, 0.34 , 3.4 and 0.25, were common incorrect responses. Slightly better answered than the first part, 0.021, 2.1 and 21.0 were common inaccuracies in (aii). In part (b) some candidates confidently found a solution to 0.625 ÷ 5. Others stated this but did not take it further to reach a solution or made errors ending with result 0.1 to 0.15. A common error was to divide by 8.

Question No. 10
In part (a) some left their answer unfinished as 21 + 30 or calculated 21 and 30 but then showed 21*x* and 30*y* on the answer line. Others added the 3 and 7 or created 37 and 56 giving an answer of 93.
In part (b) £60 was usually seen and most realised the need to multiply 420 by 50 or 0.5. Calculating 420 lots of 50p caused errors for many. There was great confusion with units and working in a combination of pounds and pence led to many unrealistic answers; as a consequence, due to insecure knowledge of place value, there were several candidates who gained 1 or 2 rather than 3 marks.

Question No. 11
Part (ai) mostly correctly answered with a few errors of West. In (aii) many answers indicated accurate measuring and the scale seemed well understood by over half the candidates scoring full marks. Part marks were usually awarded for a correct measurement but errors in calculations to convert values such as 4.3 × 200 = 800.3 or 803 demonstrated that decimal multiplication proved challenging. A common error not accurate enough to score was to state the length as 4 cm leading to an answer of 800 m.
The majority of students found finding the bearing in part (b) more difficult with few correct answers. There was Confusion over which was the angle required with many answers below 90°. Others made no use of a protractor giving a compass point, most commonly south east.

Question No. 12
In part (a) attempts at simplification often stopped at $\frac{6}{15}$ and a common error was to divide the numerator and denominator by different numbers resulting in $\frac{3}{5}$.
In part (b) most candidates made an attempt to write mixed numbers with many identifying the whole number correctly. Obtaining the correct fractional part proved more challenging. Some candidates just flipped the given fraction to $\frac{6}{23}$. Another common error was to transpose the correct 3 figures resulting in answers of $5\frac{3}{6}$.
In part (c) most candidates gained one mark by placing 3 fractions in order. The fraction most misplaced being $\frac{37}{40}$ which appeared most often in the last or first position. Little supporting work was in evidence and just a few candidates compared values by converting to decimals or

percentages. Candidates who successfully wrote the fractions to some common 'denominator' usually attained the full 2 marks.
In part (d) the most common answer was $\frac{4}{9}$ where the candidates had added the given numerators and the denominators. Many are identifying a common denominator; some were not fully converting both numerators and consequently fractions such as $\frac{3}{14}$ and $\frac{1}{14}$ were seen.

Question No. 13
Only a minority of candidates found the square root of the large number in (a). Errors given were 9, 300 and 450. Part (b) was more successfully attempted with many knowing to do 14 × 14. Some found difficulty in the various methods of multiplication tried. Grid methods had errors and some just multiplied 10 × 10 and 4 × 4 giving an answer of 116. Many attaining no marks usually did 14 + 14. Candidates performed well at finding a cube number and 2×2×2 was often seen in the working, although 6 was a common error.

Question No. 14
Many candidates found the volume successfully, some encountered problems with their multiplication and some in error calculated the surface area. The most common problem was not stating an explicit conversion between litres and centimetres cubed and candidates need to take care to give enough detail in their answer to support their conclusion.

Question No. 15
Part (a) was very well done with the majority giving fractional answers. Fewer incorrect forms were seen and in (i) if 'likely' was stated it was often accompanied with the correct fraction. In part (ii) $\frac{0}{9}$ was very commonly stated. As with part (i) fractions were sometimes accompanied with 'impossible'. Part (b) was far more challenging and few completely correct tables were seen. Of the three answers, the probability was more often correct and most errors were made in finding the number of counters.

Question No. 16
In (ai) most candidates demonstrated clear understanding of 2-way tables either providing a fully correct grid or gaining 1 mark for a partial correct solution, usually the values of 50 and 94. In (ii) about two thirds of candidates gave a correct ratio, often left as 100:150 or partially simplified to 50:75. The order was mostly correct with only a very few giving ratios of 3:2 or similar. In (iii) few candidates were able to use the values in the table to arrive at a correct fraction, however a number were able to simplify their own fraction successfully. 45 often obtained for the numerator was seen with incorrect denominators of 150 or 95.
In (b) about half the candidates either made no attempt to estimate, performing a complicated multiplication to work out the exact answer, or found it difficult to choose the most suitable approximations for estimating.
Some candidates who used £8 and 90 made errors in multiplication leading to answers such as £630, or in simplifying the calculation to 8 × 9 left their answer as £72.

Question No. 17
Many candidates found this QWC question very challenging. It is important for candidates to consider how they intend to set their work out before starting any calculations. For example in this question candidates may have found it advantageous to work in two columns one for Voucher A and one for Voucher B. There was a large number of candidates making multiple arithmetic errors and providing structured clear responses proved difficult. Candidates often missed the details of the question, such as only including the cost of one ice cream. Omitting to add the cost of drinks to get the final total in voucher A was a very common occurrence. In determining the bill using voucher B further addition errors were sometimes incurred by adding in the cost of one lemonade rather than two. There were many attempts to find 20% of their food total. This was nearly always done by first finding 10% and then doubling it. Finding 15% proved more challenging, but the process was much the same – start with 10% and use that figure to

determine 5%. Some candidates rounded their totals before calculating the percentages, so their percentage discounts lost accuracy. There were few responses which clearly compared the voucher prices to indicate the better deal. Not many got fully correct discounts for both vouchers and even fewer went on to state the final bill for their chosen voucher as requested in the question.

Question No. 18
Few candidates dealt with this quadratic function successfully. Most errors in completing the table were at $x = -1$ with its double negative, but errors were also made at x = 5. Little supporting working was seen. Many were able to plot their points correctly but only a few managed a parabola. Most often points were not joined or a ruler was used rather than a freehand curve. Reading off the graph to solve the equation graphically was a concept beyond most candidates understanding. The line $y = 3$ was not drawn. Some gained a mark for the answer 4.5 unsupported with no evidence on their graph.

Question No. 19
Few candidates were secure in the knowledge of exterior and interior angles. There were attempts at diagrams and 360 ÷ 9 was seen at times but arriving and stopping at 40° was rare. Candidates demonstrating some understanding were often confused between interior & exterior angles and did not realise they totalled 180°.

Question No. 20
Responses to this question generally lacked strategy and structure. Those who used trial rarely had the approach of ‘improvement’ and trials were quite random. Whilst many candidates gave a correct answer this often followed very little systematic working. Trials were rarely totalled and a common error was to correctly calculate a value for Eva but to then double this to calculate a value for Dan. It was rare to see algebra attempted and for those who did go with an algebraic approach they didn’t include x in their equation for all 3 ages. So $2x$ and $x + 5$ (or $2A$ and $A + 5$) was stated but then commonly lead to $2x + x + 5 = 35$. Although they were often successful in solving their equation there was no evidence of then testing their solution to see if it satisfied the criteria.

J567/02 Paper 2 (Foundation tier)

General Comments

The marks indicate that the majority of candidates had been entered at an appropriate level - very low or very high marks were rare.

Despite this being a calculator paper some candidates appeared not to have one or not know how to use one effectively. Some candidates also lost marks for not using a ruler. Premature rounding was evident in several questions.

It is apparent that some students are more aware than others about the need to accompany their answers by appropriate working. Many candidates struggled to form methodical and logical answers to the more functional questions and it was often necessary to search for a correct method in order to award marks. Responses need to be logical and follow a clearly labelled, step by step process in order to score effectively. Candidates need to be encouraged to check if their answers are realistic, on functional questions for example, some candidates had many kilograms of mince to feed 18 people! A significant number of candidates are not showing any method.

Presentation was relatively good with the main issue being the spelling of mathematical words such as rhombus, isosceles and cuboid. 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. Candidates need to ensure they read the questions carefully, if the question asks for an answer as a fraction a decimal or percentage answer will not gain full credit.

The question that required candidates to show good quality written communication (20a) generally showed reasonable understanding. Responses were not always communicated effectively but candidates were still able to pick up marks by identifying key information.

Comments on Individual Questions

1 A straightforward start to the paper with most candidates scoring at least two marks in this question. The better students identified the pentagon in part (a) with hexagon being the most common incorrect answer. In part (b) the majority correctly responded with cone although triangular prism and sphere were common misconceptions. Cube and rectangle appeared regularly as responses to part (c). Spelling of key words was an issue throughout the question.

2 One of the more successfully answered questions. A very large majority scored the mark for coordinates in part (a) with the only error of any note being to transpose the figures giving (3, 1). Equally in part (b) the point was invariably placed correctly with a very small number plotting at (-2, 5). In (c) isosceles and equilateral were stated in roughly equal numbers but spelling of the former was a problem for most.

3 Another question that was generally well answered although the concept of capacity seemed to be better understood than weight. In part (a) it was obvious that many students were aware of units of measurement but found it difficult to estimate correctly – 4 g and 40 kg were quoted regularly for a tin of soup. Answers to (b) and (c) were more often correct.

4 Only a minority commented on the diagonals as required in part (a) and many failed to score because they simply referred to sides and angles of a square being equal. In other responses the word ‘bisect’ was incorrectly used instead of ‘diagonal’ and failed to gain credit. Failure to provide a coherent written explanation was a barrier for many students. In part (b) better students correctly identified the rhombus but a large majority stated parallelogram, kite, trapezium or rectangle.

5 In part (a) most candidates scored 1 mark for having four or more factors with few marks lost for incorrect factors - the most common omissions were 1 and 18. Candidates clearly understood the question with very few giving multiples instead of factors although a small number used the product of prime factors. The large majority scored the mark in (b), often with 14 and 21, but a significant number thought that 1 was a multiple of 7. Part (c) was well answered and one of the three correct prime numbers was usually given – the most common error being 9. Some gave all three numbers (7, 11, 13) but candidates need to be aware that if more than one answer is given then all alternatives have to be correct. Few gave prime numbers outside the specified range.

6 A high number of candidates were able to correctly reach the answer of 32. Generally those who did not get full marks were able to calculate that one fifth was 12 sweets so attained 1 mark. Only a few were awarded M2 as a common misapprehension was to work out one third of the original 60 rather than one third of the residual 48 leading to the most common incorrect answer of 28. From those who used 48 a sizeable number either found 1/3 of 48 but stopped there, leaving an answer of 16, or found 1/3 of 12 leading to an answer of 4.

7 A high number scored full marks in part (a) and successful students often compared the numbers by adding zeros where required. There were often issues with 7.37 placed earlier in the list and place values were easily confused especially with 7.037, 7.30 and 7.37. Many candidates however scored 1 mark for misplacing just one value. Both parts of (b) were answered well with very few mistakes. A common error in the second calculation was to use 16^2 instead of 16^3 leading to an answer of 238. Those few who failed to get full marks often picked up the single mark available for 4096 (or less often 18). Similarly, part (c) caused few problems although there were those that worked out 6^5 as 7776 giving just this as their answer. The large majority obtained 486.71 in (d) and left this figure as their final answer for 2 marks. It was very rare to see a correctly rounded version for full marks. Far too many candidates used non-calculator methods with limited success due in the main to conceptual errors and failing to complete all the parts required for 17%.

8 Only a relatively small number answered this question successfully with a large proportion placing their arrows in wrong positions. There was no real pattern to the incorrect answers as the placements often seemed to be quite random, but placing P at the three quarter mark was quite common. A significant number simply indicated the positions with letters only for which a mark could be awarded or an unlabelled arrow which was ambiguous and could not score. Successful students often labelled the divisions on the scale with 6, 12, 18, etc. which helped them to locate the correct position.

9 This question was mostly well answered in both parts. The most common error in part (a) was failing to include the minus sign. 13 and -13 were seen as some candidates had attempted to add or subtract the numbers. In (b) a small number worked out the difference between 3 and 4 rather than -3 and 4 giving an answer of 1 or -1.

10 A well answered question and the majority scored 3 marks for a completely correct enlargement. Marks were usually lost as a result of drawing the horizontal and/or the vertical lines at an incorrect length. This resulted in the diagonal lines (particularly the lower one) being wrong. Scale factor and orientation were rarely misunderstood.

11 Better candidates were able to interpret information from the table of distances but an equal number found it quite confusing. Students generally achieved full marks or no marks for part (a)(i). An answer of 150 was as common as the correct distance of 413 presumably because many felt that Edinburgh was the heading for the row below. Equally in part (ii) 413 + 218 = 631 came from reading the row below the required mileages. Some managed 1 mark here for one correct mileage but a small number used multiple distances and failed to score. Part (b) was generally well answered with only a relatively small number multiplying the given values rather than dividing. Part (c) proved to be more of a challenge where only a few candidates gained both marks. Responses often appeared with no supporting work sometimes seemingly at random. Among the most common incorrect answers were 5 (from 180 ÷ 36) and 64.8% (from 36/100 ×180). The conversions in part (d) were handled well by a large majority of students. Most found (i) straightforward and the main misconception in (ii) was to use 200 × 5 ÷ 8 and give an answer of 125.

12 This question tested algebra and was tackled well by most candidates. The majority of candidates answered (a)(i) correctly with a few failing to fully simplify their answer leaving responses such as $2j + 8j$, some just added all the values and $16j$ was seen quite often. Most scored at least 1 mark in (ii) with about half getting full marks. The most common mistakes involved confusion about signs with many getting $8r$ and $8s$ by ignoring the negative signs and adding instead of subtracting. The equations in (b) were generally solved correctly especially the simple example in (i). Incorrect answers in (ii) more often resulted from a failure to re-arrange correctly and obtaining $8x = 12$ as a first step. The idea of inequalities was only understood, and correctly annotated, by the very best candidates and $x = 2$ or single figures of 2 and 3 were the most common responses. The expansion in part (c) was also completed successfully in a large majority of cases. Among common incorrect responses were $5x + 4$ and $25x$ showing that an incorrect attempt had been made to collect terms.

13 Candidates were usually very good at identifying 90º in (a) and a large number gave the correct fraction (usually simplified). Many did not give their answer in fraction form and some seemed to want to use the fraction and actually work out the number of people it represented. This often led to an answer of 36 having evaluated a quarter of 144. Others gave the fraction as 90/144. Part (b) introduced a variety of different methods many of which could score M1 for a first step in a correct calculation. There often appeared to be confusion about how to proceed with the results of this calculation and many failed to gain any further credit. The calculation 360 ÷ 150 × 144 appeared as a common error. The concept of the required answer being a fraction of 144 was not often fully realised and many examples of incorrect mixing of degrees and people were seen. The 90º angle was often equated with 36 people without further progress being made. A correct answer sometimes resulted from totally incorrect working and, as such, scored no marks.

14 A correct answer was given by a large majority in part (a) although a small number seemed to misread the question giving an answer of 75 or 800. In (b)(i) most realised that 400 had to be multiplied by 4.5 and were able to complete the calculation correctly. Most did not seem to recognise that they were working in grams and that the answer was required in kilograms thus 1800 was a common answer for 1 mark. Some experienced problems when converting from grams to kilograms, dividing by 10 or 100 was common. Part (b)(ii) was not generally well answered. Many simply subtracted £8.75 from £20 while others despite being a calculator paper rounded 1.8 to 2 and then subtracted

£17.50 from £20. The two most common answers were 11.25 and 2.50. Some candidates had a total of more than £20 and often hadn't realised their answer could not be correct.

15 In part (a) candidates struggled to select the correct location of the two corners and many did not even attempt it. Many indicated edges or faces suggesting that the term vertex is not understood by many. The majority of candidates struggled with part (b) and a common mistake was to re-draw the net of the shape. Although a few candidates did not offer a response, most did attempt the question by drawing a 3D shape. However, a considerable number of these did not appear to understand how to use isometric paper and faces were inaccurate. A few candidates were awarded 2 marks for a correct diagram drawn freehand.

16 The whole question was generally answered well and a large majority scored full marks for completing the table correctly in part (a). The very small number who scored only 1 mark tended to give a value for $y = 0$ when $x = 0$. Plotting rarely caused any problems in (b) but a mark was commonly withheld due to failure to join the points with a straight line. A small number of candidates thought the line needed to go through the point (0, 0).

17 Competent use of a calculator was evident in most cases and a correct answer was obtained by most candidates. Common mistakes were to divide 18.62 by 2.78 and then to add 6.72 before square rooting the result giving 3.663…or to only apply the square root to the numerator ($\sqrt{18.62} \div 9.5 = 0.4542\ldots$). Candidates who failed to gain full marks often gained M1 for finding 1.96 or 9.5. Working out was often missing making it difficult to work out the derivation of incorrect answers.

18 Another high access question with a good majority of correct answers. Very few showed calculation of 1 - 0.85 even when the correct answer was given. Most candidates scored 2 or 0 but those who gained the method mark usually failed to add 0.38 and 0.47 correctly. There were a few students who used percentages then did not use the percentage sign.

19 One of the more functional questions on the paper – better students at this level coped quite well with the organisational skills required but many others struggle to present their work logically. A significant number were unsure of the formulae for a circle, giving equations for both the area and the circumference and sometimes even using both to try to calculate the required area. Some then multiplied 14 by 4 to find the area of the square! Some, having correctly found the areas of the square and the circle and subtracted them, didn't then halve their answer to find the required answer. Full marks were scored by strong candidates but premature, or incorrect, rounding often lost the final accuracy mark.

20 Part (a) was the question testing the quality of written communication and better candidates understand the requirement to state their case clearly. Ultimately it was an inability to calculate and interpret data in the tables that causes most problems and it was extremely rare to find a response worth 6 marks. Perhaps the easiest aspect was the range and those that considered this issue generally scored at least 2 or 3 marks. Calculations of mean or median were rare and the majority who tried got these wrong. A small number referred to the mode but not the modal group as required. The most common correct evidence used was the highest values of 169 cm and 165 cm but they were rarely supported by an appropriate comment. Many failed to interpret the stem and leaf diagram correctly and quoted incorrect heights for highest, lowest and consequently ranges. There was often an assumption that the highest values always appeared at the bottom of the diagram. There were often misunderstandings of the context including comments that it was the fertiliser growing, that there was only one tomato plant

measured at different periods of its growth or that the data was measuring how fast plants were growing rather than how tall. Candidates also saw the difference in sample size as relevant in their comments. A high proportion of candidates simply described the stem and leaf diagrams row by row without necessarily appreciating exactly what the data represented. Several candidates did not attempt to give two different comparisons. Part (b)(i) usually produced a correct answer of 3.7 but some read the wrong scale giving 169 from the height axis. Similarly (ii) was well answered with a correct answer of 11 and the only common errors were 0 and 12 (probably due to a miscount). In (iii) most candidates could identify the correlation and describe it as positive but some simply described it as increasing or getting bigger. In (iv) the line of best fit was within the allowed tolerance in most cases. Only a few failed to score for being out of tolerance or due to either insufficient length or joining the points. A small number did not rule their line. Using the line, most answers in (v) were also within the acceptable range.

21 Most candidates were aware of methods for trial and improvement and scored some marks on this question. Those that scored the highest marks set their trials out systematically and clearly displayed their results before selecting the appropriate value. A common error was to substitute different values into the two terms in x and quite a few candidates assumed that $6x$ was equivalent to 48 (from 6×8) in every trial. Others attempted to find a solution to 2 decimal places and write this as their final answer, often 7.69. Weaker candidates simply performed the calculation on 7 and/or 8 without trying any numbers in between.

22 This question caused problems for the majority of candidates and was not answered well. Few gained both marks and most scored one mark at best by calculating the lower bound. The large majority were unable to correctly calculate the upper bound and would commonly answer 23.4 or 23.49. Very few gave 23.499 or used recurring decimal notation and even fewer gave 23.5.

23 The best candidates understood and used Pythagoras effectively and achieved a correct result. However, most responses displayed no use of a correct method and simply added or multiplied the figures given on the diagram. Method marks were rarely required as those who knew what to do did it successfully. It was obvious that some did not know where to find the diagonal. The most common incorrect answers were calculating the area or perimeter of a rectangle or area of a triangle.

24 The most common calculation for this question was to divide the larger value by the smaller value often resulting in students putting C as their answer. Others divided the smaller by the larger value and more frequently gained full marks. Many scored 2 marks as they produced relevant calculations but clearly did not understand the significance of the figures and opted for the wrong recipe. A large number simply subtracted the quantity of pineapple from the total and gave the answer as the one with the highest value. Whichever method was attempted there was a tendency to write down the biggest number as the answer. A few made fractions out of the numbers but didn’t convert to decimals or obtain a common denominator in order to be able to facilitate a comparison. Many just had a guess and put A, B or C as the answer with no working at all. Presentation for this question was generally good with candidates separating the working so that it was logical and relatively easy to follow.

J567/03 Paper 3 (Higher tier)

General Comments:

A majority of candidates were well prepared for the paper and demonstrated a good understanding of most of the topics covered in the paper. Most candidates used their time efficiently and attempted all of the questions. Most candidates were entered appropriately for the Higher tier, although a small number of candidates would have found entry at the Foundation tier a more rewarding experience.

The standard of presentation was generally good, although there were occasions when candidates did not show clear working. If working is set out in a haphazard manner it is difficult to follow the candidate's method and award part marks. Candidates would benefit from training in the presentation of well-ordered methods with each step of working set out on a new line. In multi-step problems it would be helpful for candidates to include a few words to identify what they are finding in each calculation, for example total cost of food or sector radius.

Many candidates demonstrated good algebraic skills. Graphs and diagrams were generally clear and candidates had access to the appropriate equipment. It would be beneficial for candidates to check their arithmetic: in many cases marks were lost due to errors in basic arithmetic, particularly when negative numbers were involved, and in the manipulation of fractions.

Candidates demonstrated understanding of basic Statistics and Probability, although responses requiring explanations were often vague. Successful answers generally involve use of mathematical language, for example the use of the word chance or random rather than luck.

Comments on Individual Questions:

Question No. 1
In part (a), most candidates reflected the triangle correctly in the *x*-axis with only a small minority reflecting in the *y*-axis.

In part (b), most candidates translated triangle A correctly. Some candidates misread the question and translated triangle B rather than triangle A, which was given partial credit if correct. Almost all triangles were orientated correctly, demonstrating understanding of the term translate, but some candidates made errors in one, or both, of the movements.

Question No. 2
Most candidates completed the two-way table correctly in part (a)(i). Candidates who made errors had not checked that both the rows and the columns gave the correct totals.

In part (a)(ii) almost all candidates identified the correct ratio, 100 : 150, from the table and simplified correctly to reach 2 : 3. Some incorrect or incomplete simplifications were seen, with 10 : 15 being a common partially correct response.

In part (a)(iii), many candidates selected the two values required from the table, the number of females over 60 and the total number of people. When the correct fraction was identified, it was usually simplified fully to $\frac{9}{50}$. It was more common in this part for candidates to select an incorrect pair of values to use in their fraction. Candidates usually knew that the numerator should be 45, the number of females over 60. They had more difficulty in identifying the correct denominator and common errors involved the use of 95, the total number of people over 60, or 150, the total number of females. Most candidates were able to cancel their fraction to its simplest form, and they were given credit for this process if both the unsimplified and the simplified fractions were seen.

Most candidates answered part (b) well. They demonstrated sensible rounding to one significant figure and showed their calculation 8 × 90 to obtain 720. On a few occasions the answer given was 72, suggesting that they felt that they needed to use a conversion factor of some sort in their answer. Very few candidates used the alternative 8 × 85 = 680. Many candidates rounded to obtain 87 × 8 which was awarded 1 mark if the correct result of 696 was seen. Other choices for rounding such as 10 × 90 or 10 × 87 were less frequently seen. A significant number attempted to calculate an exact answer, ignoring the instruction to provide an estimate and this was given no credit. It was clear that a significant number of candidates did not consider one significant figure to be their first choice of method for rounding the figures. Some candidates made arithmetic errors in their multiplication of 8 and 9.

Question No. 3
Nearly all candidates were able to construct the triangle accurately using ruler and protractor. Incorrect triangles usually had either the line AC or the angle CAB correct and gained 1 mark. Incorrect angles usually appeared to result from incorrect use of a protractor with an angle of 50° rather than 40° drawn.

The majority of candidates understood the meaning of the term ‘perpendicular from A to BC’ but it was rare to award full marks in part (b) because the line was often drawn by eye with correct arcs seldom used. When 2 marks were awarded the arcs were usually drawn centred on A, radius AC, and centred on B, radius BC. In other cases, where arcs were drawn, these were often the construction arcs for an angle bisector.

In part (c) those candidates who realised that the perpendicular constructed in part (c) was intended to be used in the calculation of the area using $\frac{1}{2}$ × base × height usually found the correct area. Some candidates measured their perpendicular but then used an incorrect formula, usually base × height.
It was common for candidates to take no measurement from their diagram and attempt to use just the 7 and 10 given in the question leading to the answer 35. It was also common to measure side BC as 6.5 cm and to use that in an area calculation. A small number of candidates complicated the question by dividing the shape into two right-angled triangles and adding the two areas, which often resulted in arithmetic errors.
Some candidates attempted to use Pythagoras’ theorem in their answer or to use the formula $\frac{1}{2}ab\sin C$ from the formulae page, despite this being a non-calculator paper.

Question No. 4
Most candidates demonstrated a very good understanding of what this question required in order to solve it. Candidates scoring the higher marks set out their calculations in a clear and logical manner. In a well-presented response the candidate had often divided the working space into two columns headed A and B which explicitly showed which calculations were related to each voucher.

Only a minority of candidate scored the full 5 marks. The final mark was usually lost due to a poorly set out method with a lack of annotation, by candidates who had omitted the final cost of the meal using voucher A, or because of one or two arithmetic slips made in an otherwise fully correct method. The slips were usually in the addition to find the total cost of the food items or in the calculation of 15% for voucher B. It was common to see 10% of £55 correctly worked out as £5.50 but then 5% calculated as £2.25 rather than £2.75. The calculation of 20% of their total for voucher A was usually carried out correctly. It was common for candidates to give a meal cost of

£38 for voucher A using the correct discount, but failing to include the drinks total in their answer.

Candidates who gained 3 marks had often made a non-arithmetic slip, usually including insufficient ice creams or drinks. Some dealt with the discounts for food and drinks, or even each item, separately which made the percentage calculations far more difficult, leading to arithmetic errors and inaccurate final answers.

Responses scoring 3 or fewer marks were often poorly presented, with calculations spread haphazardly over the working space with no annotation to identify what was being calculated. Most candidates did manage to correctly find either 15% or 20% of one of their totals which was sufficient for 3 marks if identified clearly. Very few candidates made no further progress than calculating the total cost without discounts.

Question No. 5
Most candidates correctly expanded and simplified the expression in part (a). A correctly expanded expression was usually seen with the most common error being collecting the + 15 – 6 as –9. A small number of candidates had + 6 rather than –6 in their expansion of the second bracket. Correctly simplified answers were rarely spoilt by trying to collect the 5*p* and 9 terms.

Part (b) was answered well with many candidates scoring full marks. Candidates knew to collect terms in *x* on one side of the inequality symbol and numbers on the other, and only a few errors were made at this stage. Some candidates replaced the inequality symbol with an equals sign during the working. While most recovered this in their final answer, others used > or = instead of <. Some candidates used the trial and error approach of substituting values into the inequality which often led to an incorrect answer such as $x < 3$. A common incorrect answer was $x < 2$ following $3x + x < 8$ which could gain partial credit if the working was shown.

Candidates found part (c) more challenging than the previous parts of the question. Many correct answers were seen, however misunderstanding of order of operations led to the addition of 6 first before multiplication by 5 in a large number of cases. Candidates who used this incorrect method often omitted brackets in their answer when multiplying by 5 and so $r = 5(t + 6)$ and $r = t + 6 \times 5$ were common wrong answers.

Question No. 6
Many candidates showed the correct calculation of $360 \div 9 = 40$ in part (a). It was clear that there was some confusion about the term ‘exterior angle’ because the correct answer of 40 was often spoilt by subtraction from either 180° or 360°. Some candidates thought that the sum of the exterior angles was 180 which led to the incorrect answer of 20°. Candidates who initially tried to find the interior angle were rarely successful, because even if they did remember that there were $n - 2$ triangles, they made errors in the subsequent arithmetic or gave 1260, the sum of the interior angles, as their answer.

In part (b) many candidates knew the link between exterior angles and interior angles and so gained a follow through mark even if their previous answer had been incorrect. Visualisation of the polygon and its interior and exterior angles may have helped candidates identify which angle should have been 40° and which 140°.

Question No. 7
In part (a), many candidates obtained the correct answer of 72. Some candidates identified that the required calculation was 18×4 because 50 went into 200 4 times, but made errors in their multiplication. Some candidates rounded the figures and gained an approximation that was usually within the acceptable range for 1 mark.

In part (b)(i) candidates who understood that the question was asking about different results being expected when repeating an experiment often gave an acceptable explanation involving probability, chance or randomness. Incorrect answers had usually missed the point of the question and often included comments such as ‘there's an equal probability to get blue or red’, ‘he has picked out more blue counters than Roma’ or ‘he may have picked the same counter up twice’. Some referred to one or other of them doing the experiment incorrectly or the fact that they had not replaced counters.

In part (b)(ii) most candidates gained at least 1 mark, usually for two values totalling 200 or for the values 42 and 58 in their calculations, and many were completely correct. Some candidates do not understand that when they are asked to estimate a probability they are expected to use the values given from the experiment to reach the estimate rather than to round the values given in the question.

Question No. 8
Most candidates correctly calculated the value of y when $x = 5$. They usually substituted into the equation to find the value of y when $x = –1$ rather than using the symmetry of the table, and the result was sometimes incorrect due to inability to deal with –1 correctly. For $x = –1$, values of $y = 3$ or –3 were common.

Candidates almost always plotted their points correctly and attempted to join them with a smooth curve. Very few candidates failed to join their points or joined them using ruled line segments.

In part (c), candidates who understood that the solutions to the equation were the x-values when $y = 3$ on their graph usually gave accurate answers, although some omitted the – symbol from the negative solution. A common error was to solve the equation $y = 0$ rather than $y = 3$ and some candidates did not recognise the need to use the graph and attempted to solve the equation algebraically.

Question No. 9
Many candidates understood that they needed to convert the mixed numbers to improper fractions and then multiply the numerators and the denominators to reach the answer. Some candidates reached the correct improper fraction and either failed to convert this to a mixed number, as required by the question, or did not simplify it fully. Answers of $\frac{70}{12}$, $\frac{35}{6}$ or $5\frac{10}{12}$ were common.
There was evidence of some understanding of what was needed but also of confusion between the methods for multiplication and addition. It was common to see the correct improper fractions being written with a common denominator. This produced numbers too big to multiply and, even when successful, writing the result as a mixed number in its simplest form proved a step too far for many.
Some candidates converted to a common denominator but then added. Some candidates attempted to multiply the integers and fractions separately.

Question No. 10
Almost all candidates made a good attempt at this question with most opting to use a trial and improvement method. Few candidates set out their trials in a table; a more haphazard approach was common. There was some confusion with Eva’s amount which was sometimes given as Dan + 5 in error; those who used Alex + 5 were usually successful and earned all 4 marks. Candidates attempting an algebraic solution were usually successful if they started with the correct expressions. Common errors included the omission of Alex from their original equation or

treating Eva as $2x + 5$. If they had checked that their final answer fitted the original conditions, they may have been able to identify, and correct, their error.

Question No. 11
Many correct answers to part (a) were seen, written in a variety of acceptable forms. The most common error was to give an incorrect index when using standard form.

In part (b) many candidates performed the correct calculation and gained at least 1 mark. To gain full credit, the answer had to be given in standard form and candidates whose final answer was not in this form gained 1 mark for an answer with the figures 73. Candidates who showed a correct method could also gain 1 mark, even if they had made arithmetic slips, which were common when figures were not carefully aligned.

In part (c), many candidates understood the need to round the figures and those who rounded both values to one significant figure, leading to a calculation of 4 000 000 ÷ 20 000, had the most success in reaching a correct final answer. Other rounding options, especially rounding to 17 000, tended to produce divisions too difficult for many. Errors in the number of zeros in the final answer were common, with few candidates referring to the context to identify an incorrect answer, such as 200 000 pupils in a primary school. Some candidates used the total number of pupils in all schools in their calculation rather than the total number in primary schools. Only a small number of candidates attempted to calculate the exact value of the mean.

Question No. 12
Most candidates read the value of the median correctly from the cumulative frequency diagram in part (a)(i). In part (a)(ii) many candidates correctly read the cumulative frequency for a height of 175 cm from the diagram, but a significant number gave this as their answer rather than subtracting from 80 to give the number of boys who were at least 175 cm tall.

In part (b) many candidates correctly identified whether each statement was true or false, however many gave vague or long-winded explanations rather than a succinct explanation with clear reference to the appropriate aspect of the data. In the first reason, candidates were expected to relate their previous answer of 30 to the sample size of 80 and compare this with one third. Many identified that the median would be an appropriate measure of average from a cumulative frequency diagram and quoted the correct values in their second reason but omitted a comparison. Quoting ‘Boys have a higher median’ was enough to score but ‘They have a higher median’ was not sufficiently clear. Most were able to score the mark for the third reason since the idea of range was well known, although some simply quoted the tallest and shortest heights for each.

Question No. 13
Many candidates struggled to make much progress with this question. The method of listing sequences of distances was used by a large majority and those who started correctly with 30 and 0 after 10 seconds reached the correct answer if they avoided arithmetic slips. The method of listing distances for every 10 seconds proved to be an efficient method that tended to avoid the arithmetic slips which were common when listing distances for every 1 second. Some matched up two values of 120 for both runners but did not realise that this was the solution. Many candidates incorrectly matched 30 and 4 at a time of 10 seconds and subsequently the whole page was filled with the sequence for R and N following on from there. Some simply calculated a distance, such as $3 \times 10 = 30$, for some value of time but then did not know that they needed to compare the distances for the two runners. Some failed to read the question carefully and failed to realise that N started 10 seconds after R, and assumed they both started at the same time. Some paired up 33 and 4 at 11 seconds and went on to match up 120 after 40 seconds but then went on to give the distance for 41 seconds when N had passed R. Algebraic solutions were rarely seen.

Question No. 14
In part (a) it was clear that many candidates knew that $y = mx + c$ is the equation for a straight line and that m is the gradient. The most common answers in this part were 3 and –3 as candidates did not rearrange the equation to its explicit form, and simply quoted the coefficient of x. Candidates who did attempt the rearrangement generally gained at least 1 mark for getting the correct answer of–1.5 or for the answer 1.5.

In part (b), candidates generally gave the correct value for the intercept if they had reached an explicit equation in part (a).

In part (c) many candidates did not realise that the coordinates of the point of intersection would be found by solving the simultaneous equations. Those that realised this and attempted an algebraic solution usually reached the correct answer. Many candidates omitted this part completely or attempted to manipulate the equation given for line M to reach a pair of values for x and y. Some candidates attempted to sketch the graphs, but this seldom led to any creditworthy work.

Question No. 15
Those candidates who knew that frequency density was required for a histogram often calculated the values, drew the bars correctly and remembered to include the scale. Some candidates attempted to calculate frequency densities but made errors in the division of 8 by 20 and 6 by 20. Some attempts at calculating frequency density involved multiplying frequency by the class width or dividing class width by frequency. A large number of candidates just plotted the frequencies, but they were given partial credit if they had included a linear scale starting from 0 and their bars were of the correct width.

In part (a)(ii) many candidates gave a reasonable estimate of the number of apples, but some gave a non-integer answer such as 33.5 which was inappropriate. Common incorrect answers were 23, the number of apples under 110 g, and 44, the number under 120 g.

In part (b) it was common for candidates to gain 1 mark for finding the probability that the first apple had a mass greater than 130 g was $\frac{6}{60}$. It was rare to see the candidates attempting the product of two probabilities and even rarer to see candidates appreciate that there was no replacement. Only the very best candidates reached the correct solution. Some candidates attempted to draw a tree diagram, which sometimes led to a correct calculation, but in general most did not know how to access this unstructured probability question.

Question No. 16
Candidates who had some understanding of vectors often reached the correct answer in part (a)(i), although answers of **a** + **b** and **a** – **b** were also common.

Far fewer correct answers were seen in part (a)(ii) because the directions of the vectors created problems for candidates. Many identified that they needed to combine BA and AD, but they did not understand that BA is not the same as AB. The most common answers were 2**b** – 2**a** from **b** – **a** – **a** + 3**b** and 2**b** from **a** – **b** – **a** + 3**b**, where a bracket had been omitted from (**a** + 3**b**).

The candidates who dealt correctly with the directions in part (a) were usually successful in part (b)(i) in finding $\overline{DC}$ in terms of **a** and **b** to give the correct conclusion. Some candidates found $\overrightarrow{DC} = 3\mathbf{b} - 3\mathbf{a}$ but did not then relate this to $\overrightarrow{AB}$. A mark was available to those who ignored the directions for reaching 3**a** and 3**b** in their working. Some candidates simply defined parallel lines.

In part (b)(ii) proving the triangles were similar was most successfully done through pairing sides. Referring to angles accurately was not well done and reasons for equal angles often omitted. Despite the fact that the parallel lines had been identified in the previous part, few candidates identified that angles OAB and OCD or ABO and CDO were equal because they were alternate angles. Many candidates gained a mark for mentioning the scale factor of 3, although some candidates misunderstood the information in the question and thought that the scale factor was 4. Some candidates stated as many facts about the sides or angles as they could without linking them in a way that would show that the triangles were similar.

Question No. 17
It was rare to see a correct curve in part (a). Very few candidates calculated any values to help them to identify the correct shape of the curve. Some exponential curves were seen that did not go below $x = 0$, and credit was not given for these. The most common answer was a parabola with 3 indicated on one of the axes. Many straight lines were also seen.

Part (b) was also rarely correct. The most common answer was $y = x^2 + 2$. The few candidates who realised that the translation affected the term to be squared often gave $y = (x + 2)^2$ as the solution. Some candidates tried to include f(x) notation in their answer which was not accepted as it had not been used in the question.

Question No. 18
Part (a) was well answered with many candidates correctly factorising and following with the correct solutions. Those candidates who did not gain full marks usually gained two marks for the correct factorisation or for giving two solutions that followed through correctly from a factorisation with sign errors. Only a very small number of candidates used the quadratic formula rather than factorisation.

In part (b) many candidates understood what was required and attempted to use a common denominator and add the fractions. The final denominator was often correct even if candidates had expanded the brackets in the denominator. It should be noted that expansion of the brackets in the denominator is not required in a fraction in its simplest form, but for full credit the expansion must be correct if this form is used. Candidates often showed the correct expression of $5(x + 3) + 4(x – 2)$ for the numerator, however errors in the expansion were often seen, with 15 – 8 often evaluated as –7 instead of + 7. Very few candidates went on to spoil a correct answer by incorrect cancelling. Some weaker candidates simply added the terms on the numerator and the terms on the denominator leading to an answer of $\frac{9}{2x+1}$.

Question No. 19
In part (a) many candidates used the correct method to expand the brackets and gained at least 1 mark. Some errors were seen in one or more of the terms in the four term expansion, for example $4 \times 1 = 5$, $\sqrt{3} \times \sqrt{3} = 9$, $4 \times \sqrt{3} = \sqrt{12}$, but generally at least two of the terms were correct.
Simplifying the surds to reach the correct answer of $7 + 5\sqrt{3}$ was more problematic and many candidates did not know that $\sqrt{3} + 4\sqrt{3} = 5\sqrt{3}$.

In part (b) few candidates realised that $1 = 5^0$ so were not use the laws of indices to reach $k = –4$. Some candidates evaluated 5^4 but did not then know how they could use that to reach an answer. Answers of –3 and 5 were common.

Those candidates who were successful in part (c) usually started their solution by cubing 4 to give a simpler expression to work with. It was common to see an answer of 5 because candidates were unable to identify the powers of 2 correctly.

Question No. 20
The unstructured nature of this question made it essential for work to be well set out if candidates were to be successful. Many candidates were clearly unfamiliar with working with formulae involving pi without the use of a calculator and did not attempt the question, but those who understood that this could be treated as an algebraic problem were much more successful.
Many gained a mark for identifying the fraction $\frac{120}{360}$ but few were able to use this to identify the area of the full circle as 9π and then the radius as 3.
Some candidates also gained a second mark for correctly applying the formula for the length of an arc with their radius which was rarely 3, but often a value such as $\sqrt{3}$. Some candidates reached an answer of $\frac{6\pi}{3}$ but failed to simplify this to 2π.

J567/04 Paper 4 (Higher tier)

General Comments:

The common faults in previous seasons were again evident here. Many did not read the question carefully so some information given was not used and answers were not always given in the required format or to the required accuracy. Generally if an answer is required ‘in its simplest form’ or ‘to 3 significant figures’ then there will be a mark assigned for that. In diagrams, what looks like a right angle is not a right angle unless it is clearly stated to be so. Q11 required them to draw a sketch first, which most were unable to do. In calculations too many candidates are losing credit because they are rounding or truncating numbers too much and too early, often to two figures when the answer is required to three significant figures. They are not showing all their working and are losing marks through this. Trigonometry should start with a simple statement before they attempt to rearrange it to the form required. In using calculators, intermediate answers should be written down to show progression and the final answers should be written down to more figures than is required before rounding is attempted.

Expressions such as F-angles and Z-angles will not be allowed in the new GCSE and centres are encouraged to ensure all candidates know the correct terminology.

Comments on Individual Questions:

Question No. 1
In part (a) most answers were seen as a decimal, 0.15, although some wrote an equivalent fraction and occasionally a percentage. Percentages must include the correct symbol. The most common error seen was to incorrectly add the two probabilities to 0.75 and thus giving an answer of 0.25. In part (b) they often divided 1 by 4 giving 0.25 as the answer, though again this part was well answered.

Question No. 2
In part (a) we were looking for a correct comment with evidence on the average and the spread of the data. We did accept other types of comment as well. Most of the candidates who tried to find the median gave results of 141 and 144.5 from counting left to right rather than from the largest value downwards. The ranges and the biggest and smallest plants were often given correctly though there are still many candidates who think that, e.g. for A, 169 – 129 is the range. Candidates who found the mean usually did so correctly, though this was not intended. Very few candidates attempted to find the modal group. A few did list the repeated values and said these were the mode but they could not progress. Part (b)(i) was answered very well and there were few incorrect answers. In part (b)(ii) a few counted an extra one, in part (b)(iii) they often tried to describe the strength as well as the type of correlation which is fine but not necessary and in (b)(iv) some lines were too steep and candidates should try to draw the line through the middle.

Question No. 3
Most candidates gave the correct answer. A large number of candidates are now not putting down any calculations at all but are relying on the current more sophisticated calculators to do all the work for them. It was common to see the answer as a fraction because many calculators will give the answers in that form. There is a need to select the most appropriate form for the answer and in this case it was as a decimal.

Question No. 4
The working tended to be well set out and the responses more logically argued than in previous papers. There were too many trials with candidates trying values for x to two decimal places

instead of testing 7.6 and 7.7 then 7.65. The main errors were not giving their answer as 7.7, instead trying to find the second decimal place digit, or rounding it down to 7.6.

Question No. 5
The best method was to find the individual savings and total, then to express the total savings as a percentage of the total expenditure and round the answer. A few worked with the reduced prices but this method was less successful. Other errors were in the initial percentage calculations, for example, calculating 10% of 74 rather than 1% or 5% rather than 0.5%. Another common error was to add the percentages together and then to work out 4.5% of 1274.

Question No. 6
This was well answered. Most candidates correctly calculated the area of the rectangle. A common error was then to work out $96 - \pi \times 4^2$. Other candidates calculated the circumference of the circle and then subtracted that from the area of the rectangle.

Question No. 7
The two most common approaches were to divide the pairs of numbers. Those who divided the juice by the total, e.g. 150 ÷ 850, usually answered the question correctly. However those who divided the total by the juice, e.g. 850 ÷ 150 often incorrectly chose the answer as C by selecting the largest value when it should have been the smallest value. Other methods were more likely to include errors in the calculations as well as an incorrect answer.

Question No. 8
Many never used Pythagoras' Theorem but simply added lengths of edges giving an incorrect answer of 70.4. Another common incorrect answer was 44.8 where candidates incorrectly assumed the distance MF was 9.6 and then added this to AC (9.6) and then to CM (25.6).

Question No. 9
In part (a) most answers were correct. For the reason, a few mentioned F-angles, and some showed the angle opposite first and then used 'alternate' angles. However common errors were using PS and RT as parallel lines and so using the 'interior' angles of SPR and PRT. Some did not understand the three letter notation. Some candidates tried to introduce circle theorems and angles in the alternate segment. The most common incorrect answers were 78 and 102.
In part (b) most candidates found angle HKJ to be 85 or HKM to be 95 but were then unable to go on to link what they had found to *y*. The most common mistake was to think that GHJ and LHK were equal, so half of (180 – 32) or 74 was a frequently seen wrong answer.
In part (c) there were more correct answers than in (a) or (b). Some of the reasons given were wrong, and some were completely omitted, but the value of *x* as 48 was usually correct. The two most common errors were those who either thought the angle AOB, or the angle ABC, was 90. There were also those who used BAC as 42, even when it was quite clearly only BAO. The reason 'angles in a triangle add to 180' or 'isosceles triangle' were usually present, whilst 'angle at the centre is twice that on the circumference' was only sometimes present. It should be noted that 'edge' is not sufficient for 'circumference' nor is 'middle' or 'origin' for 'centre'. There were many with the correct answer but gave no reasons.

Question No. 10
Part (a) was very well answered. Most candidates correctly subtracted $4x$ from both sides and added 3 to both sides. They then divided 18 by 8 correctly. The most common errors were adding $4x$ to $12x$ give $16x$, or even dividing $12x$ by $4x$ to give $3x$, and subtracting, rather than adding, 3 to both sides. Another common error was to invert the division, so an expression in the form $ax = b$ gave an answer of $x = \frac{a}{b}$. In general the expression of division was often very poorly written down.
Part (b) was well answered. Almost everyone knew that if a series of numbers increase by a given constant then the general term can be written as 'this constant × *n*' plus '*c*'. So $9n + 3$ was seen nearly every time. Just a few got the two numbers the wrong way round giving $3n + 9$.

Question No. 11
Despite the fact that candidates were asked to 'calculate the distance' very many decided to draw a scale diagram. However some were unable to appreciate how B could be so far to the north-east of A, and yet the line BC end up with C south of A. So the bearing of 030 more often became 060 with the angle BAC 120 rather than 150. Another quite common error was to have the 200 at B all the way round from BA to BC. There were a few good sketches, though, and the sine rule was then applied correctly to calculate BC. Those who drew a scale diagram mostly chose the sensible scale of 1 cm to 10 km, which fitted on the page, and they often then found BC within the acceptable range.

Question No. 12
In part (a) many candidates gave the correct working, some left it blank whilst others clearly guessed at an answer. In part (b) quite a number calculated the moving average for the wrong day often Tuesday hence the most common incorrect answer being 2.5 with (-1+2+6+3) ÷ 4 although many had answers without working. Also 2.25 was quite common probably from an incorrect use of a calculator for -3+2+3+1 ÷ 4 not using brackets or not pressing 'equals' before doing the division. In parts (c) and (d) they usually answered correctly except those who answered them the wrong way round.

Question No. 13
This question was either answered very well or very poorly. Often the only attempt was to give an answer of 43 from using ABD as 47°. Rather than use the tangent twice there were many who tried to use sine rule or just sine or cosine with Pythagoras' Theorem. Some of these longer methods had figures all over the paper and were difficult to follow. Even if the method was correct and easy to follow, the answer often fell outside the acceptable range because there were too many approximations and truncations.

Question No. 14
In part (a) the most common error was to use 95.7 % and multiplying 4025.98 by 0.957 to get £3852.86. In part (b) this was answered well with accurate working shown by the majority of candidates. There has been a significant improvement in the use of calculators in these types of questions. The main error was to add on the same amount each year in a similar way as the use of simple interest.

Question No. 15
In part (a) it was pleasing to see so many correct solutions set out in a logical way. Common errors were to subtract $2x$ then multiply -4 by 3 or to multiply both sides by 3 so giving $24x + 15 = 6x - 12$. Part (b) was again answered well, the obvious errors were to omit '$x =$ ' on the answer line and to square root before dividing by 4. In some cases the square root sign did not cover the expression as it should do.

Question No. 16
The majority used the correct formula and gave the correct answer. A few used the formula for the volume. The most common mistake was to use cm^3 for the unit.

Question No. 17
The use of the quadratic formula was the most common method but some attempted to factorise and found that impossible and then they did not complete the question. The requirement to give the answer to a given accuracy was intended as a hint to use the formula. A few tried to use the method 'completing the square' but not one correct solution has been seen. The substitution into the formula was generally good. Some gave the value of c as 1 rather than -1 resulting in the square root of 13 instead of 37. Others had short fraction or square root lines. Most gave answers to 2 d.p. with -1.84 as a common error in that process.

Question No. 18
In part (a) many saw this as '*y* proportional to *x*' and used ×10 or ×3 to give an answer of 60. The common method was using 20 = k x 2^2 to reach k = 5 then multiplying this by 6^2. In part (b) the usual method was to form the equation $y = \frac{k}{x}$, then substituting x and y values to *get* k = 72 and then substituting k = 72 back into the equation. The common error was to use direct proportion giving a k value of 4.5 while others saw this as y inversely proportional to x^2. Sometimes $18 = \frac{k}{4}$ was reached, this was often followed by k = 4.5. Many did not write a final equation but linked x and y with this notation: $y \propto \frac{72}{x}$.

Question No. 19
Both correct answers were often given but more often there would be one correct and one incorrect answer seen. Some candidates subtracted their 55.08 from 360 or added it onto180. A very common answer of 60 and 120 was seen from a very rough graphical solution . There were few that showed any working.

Question No. 20
The candidates who were the most successful were the ones who recognised that if they wrote the two equations equal to each other they could eliminate the y variable. The most common method was to use the quadratic formula, many not realising that the equation would factorise. Unfortunately those who used the formula made errors in the substitution. The most successful method was those who factorised. The greatest misconception came from those who thought they were solving two linear simultaneous equations, trying to incorrectly equate coefficients of x rather than eliminate the y by subtraction. The method of the substitution of x into initial equation was rarely seen and none of these attempts ever led to a correct solution. Few attempted to check their answers.

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