OCR
Oxford Cambridge and RSA

GCSE

Mathematics B (Linear)

General Certificate of Secondary Education **J567**

OCR Report to Centres November 2016

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

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

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

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OCR REPORT TO CENTRES

J567/01 Paper 1 (Foundation tier)

General Comments:

Candidates were generally well prepared for this paper. The number of instances where no response was offered was reasonably low and on the whole students attempted to answer all questions. There were very few really low marks and very few really high marks, indicating that the majority of candidates had been entered at an appropriate level. Time did not appear to be a factor, with no evidence questions were missed as a result of not finishing in the time allowed.

Most candidates are showing their methods but working can sometimes be unstructured and a simple calculation is often not stated before a candidate attempts their method of solving. For example, many are reluctant to divide but attempts at repeated addition often result in errors. However, if the division attempted is stated first, in many cases a method mark could be awarded.

Across a number of questions a lack of confidence with calculations involving negative numbers was evident with double signs often being dealt with incorrectly. Poor knowledge of tables, in particular the 6 and 7 times table, caused lost marks for quite a number of candidates.

The question that required candidates to show good quality written communication (Q16) caused problems for many candidates due to a limited knowledge of angle properties. The whole range of marks was awarded. Responses varied from clear solutions which were logically presented with the relevant angle property accompanying a calculation and labelled angle, to scattered calculations without supporting written reasons.

Comments on Individual Questions:

Question No.1
Most tackled part (a) well with showing working. Errors arose from incorrectly dealing with carry figures. A very small number of candidates identified the wrong pizzas usually choosing Margarita instead of Hawaiian. In part (b) errors in subtracting were quite widespread. Most candidates were able to score M1 for showing a calculation of £40.00 – their answer to part (a). Answers of £17.35, 17.45 and 17.65 were errors arising from the most common mistakes made in subtraction methods.

Question No. 2
In part (a) a few decided that a week was 5 days. Some correctly stating 250×7 found problems with calculating this. $7 \times 0 = 7$ was sometimes seen. Many are using a repeated addition in part (b) rather than tackling a division. Those adding a long list of 300s or repeatedly subtracting 300 from 6000 often made slips along the way resulting in answers close to 20. Very few stated the division first so lost M1 even though they knew what to do. The other common error was to assume that 1 kg was equal to 100 g.

Question No. 3
All three parts were very well answered. Reversed coordinates were rarely seen. Occasionally in part (a)(ii) an answer of (–4, –2) was given, part (b)(ii) proved more difficult with some giving the length of the diameter rather than the radius.

Question No. 4
Candidates found part (a) difficult especially part (a)(iii). In part (i) the reflex angle was not often identified. In part (iii) there were 2 conditions to fulfil and most gave either B or F as the answer. Hence they had the “no line of symmetry” correct, but not the “order of rotation”. Part (iv)

produced many correct answers but there were a lot of D and F choices. The table in part (b) was usually filled in correctly with many drawing extra hexagons. In part (ii) a frequent error was doubling their answer to 4 hexagons but many carried on the table and got to 41 correctly. Part (iii) was frequently incorrect. With correct answers for (i), (ii) and (iv) it was common to see ×1 and +5 in the boxes. Some gave ×5 and +6 and quite a number left this part blank. In part (iv) few recognised they needed to go through their machine in reverse, common errors were 506 and 106. A few scored for 96 coming from the error ×1 +5 given in part (iii). Some had the answer 20 even though their flow diagram was incorrect.

Question No.5
In part (a) many picked the correct sector & interpreted the right angle. So 90 was identified or sometimes ¼ or 25%. However these were sometimes the final answer. Division of 260 by 4 was often seen as 260 halved then halved again but arithmetic errors were frequent. Others attempted 360 ÷ 260 or 260 ÷ 360. Fully correct answers in part (b) were very rare. When 210/360 was given, this commonly was simplified to 21/36. 210/260 was a common error and when seen it was often not fully simplified with just cancelling by 2 quite common. Part (c)(i) was often correct. Common errors were not subtracting from 100 giving 86% or misreading the scale and stating 12%. In part (c)(ii) the chart was mostly read correctly leading to many answers of 60%. Some confused 60% with the number of patients and gave 60 as their answer. Those that went on to find 60% of 260 often showed a clear method of 10% then multiplied by 6, or found 50% and 10% to reach a correct answer. Occasionally there was confusion with the pie chart and some thought this was 60% of 360.

Question No.6
Part (a) was answered correctly by many. Those who did not interpret g as $1g$ left their answer as $g + 9g$ or gave just $9g$ as their answer. Rarely, confusion with multiplying led to answers of g^3 and $9g^3$. In part (b) many gained just 1 mark, usually for $6x$ within their answer. Many added terms without regard to signs and $9y$ and 6, -4 or –6 were common. Others left an unresolved +– in front of the $3y$.

Question No.7
In part (a)(i) 25% was well known without working. A few showed 25/100, or drew a pie chart with 4 sectors. Others gave a decimal answer of 0.25. Similarly in part (ii) some simply knew it was 40%, if working seen it showed 4/10, 20/50 or 40/100. A few tried 2 ÷ 5 some answering with 20%.
Part (b) tested many on their multiplication facts. Often a correct method was seen but 42 ÷ 7 proved difficult and 5 × 6 was sometimes given as 35. Some answers of 35 came from 5×7 with no other working seen. Writing the 7 times table out was a common method, some reached 6 but could go no further.

Question No.8
Part (a)(i) was mostly correct with 2 hours 55 minutes being the most common error. Part (ii) was also very well answered with a few slight slips with hours or minutes such as 9.08, 10.07 or 10.18. Some wrote both the correct and 24 hr clock time on the answer line resulting in 22:08pm from the pm given. Part (b) was well understood with the vast majority fully correct, some repeating the given combination. A few stopped at 3 ways not realising G2 and G3 could be reversed for each G1.

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Question No.9
Most candidates understood what was asked of them in part (a) with only a minority incorrectly using perimeter. A large number estimated rather than systematically counting up areas of small squares and triangles. This resulted in 9 being a very common incorrect answer. Part (b) was found to be more difficult, only about half the cohort scored at least one of the three marks available, far fewer scored all three. The nature of this problem solving question was more difficult. Some tried with sides 16 and 2 and other pairs that were not correct factor pairs, but

didn't recognise that their shapes could not be fitted together to form the larger rectangle. Many candidates attempted to find the area of the larger rectangle rather than its perimeter.

Question No.10
Part (a)(i) was very well answered, just a small number of candidates giving the value –27.2 rather than stating the country. A mix of answers was generated in (a)(ii), about half of which were either the correct 4.6 or –4.6, which was condoned. Many other answers were also in the accepted range with 5.4 and –5.4 being the most common. In part (b) candidates had far more success with the multiplication in (i) than the subtraction in (ii). The majority are giving a negative value in (i) understanding the outcome of multiplying a positive and a negative value. For the subtraction –17 was the most common answer as candidates did not take the double negative into account

Question No.11
Although many candidates were successful in part (a)(i), the second part proved more difficult. Many divided by two as they had in part (i) and many who realised that they should multiply often incorrectly dealt with the decimal fraction part. So an answer of 14.3 was prevalent. In part (b)(i) almost half of candidates reached 75 000 in their working, but rarely was this converted into 750 metres. Some ignored the scale giving 300 m as their answer. The compass direction in part (c) was a problem for many. The range of answers proffered suggested many made a guess. A number of successful responses were accompanied by a sketch of the compass points.

Question No.12
Many candidates attempted this well, scoring at least M1 for identifying the magic number of 30 in their working. Some created difficulty by working with the top row from the start as it included both m and p. This resulted in trials to make numbers fit rather working with the bottom row which included just m. Although harder, part (b) was also quite well answered. The follow through from part (a) allowed some who had tried to work with $2m + p$ from the start to recover.

Question No.13
In part (a) candidates found rounding to decimal places more accessible than rounding to significant figures. A common error was to include trailing zeros to maintain the same number of figures as in the question. Some changed the size of the original number, moving the decimal point so there was just 1 figure behind it in (i) and just 2 figures in front of it in (ii). In part (b) few knew to round each number to just 1 significant figure. A large proportion did not understand the context of estimation and attempted to work out the exact answer to 29.2 × 417. Some rounded both numbers to the nearest 10 whilst others worked through 29 × 420.

Question No.14
In part (a) there were many complete and neatly drawn nets. Some candidates drew just 3 more faces creating the net of an open box. The majority were able to identify the correct net in part (b) mostly by circling, sometimes by ticking.

Question No.15
Part (a) was answered very well. In part (i) some put 4 over the total of other fruits giving 4/9. In part (ii) a few wrote "impossible" as well as 0. A number also gave this answer as a fraction, 0/13. It was very rare to see just worded answers. Most found part (b) too difficult, the majority of incorrect answers were 5 apples and 3 pears. Candidates did not consider the concept of equivalent fractions to solve the problem. Occasionally a mark was awarded for 6 pears, but mostly there was no real working to suggest a method as to where the 6 came from.

Question No.16
Very few gained full marks as often reasons were rarely linked with their calculations. Working was scattered and difficult to follow but angles were usually labelled or marked on the diagram. Many realised that AB and BC were the same length but the word isosceles was rarely used; parallel and opposite being substituted instead. Most candidates were able to gain credit with 2

marks often being awarded for the reasons ‘angles of 180˚ in a triangle’ and/or ‘angles of 180˚ on a straight line’ together with follow through angle sizes. In some cases the triangle was treated as 2 isosceles - so that $w = 42$ and $z = 64$; or they assumed $w = 64$. A common misconception was that 'angles on a straight line' referred to $42 + x + y + z$ leading to $x = 22$ after otherwise correct working. Attempted subtraction from 180 was usually successful and it was clear from these calculations that the required facts of triangles and lines were known, but not always stated as having been used. However, the error of 42 + 64 = 108 caused problems for quite a few and in rare cases, x and were chosen to be 90.

Question No. 17
Most spotted the anomaly in part (a), just a small number did not attempt this part. In part (b) quite a few were joining from point (18, 20) and a significant number thought that the line must go through (0, 0). A small number of candidates joined from corner to corner. Most were able to read off their line successfully but some misread an answer of 12.5 from a line that came down between 12 and 14.

Question No.18
The first part of this question was answered correctly by the majority of candidates. Errors came from 4 squared given as 8. A high proportion of part marks were awarded in part (ii) as candidates were unable to square a negative number correctly but were able to show $5 \times -3 = -15$. The majority of candidates were unable to score any marks in part (b) as they did not write an equation following on from the one given. The vast majority of working showed candidates struggle with their understanding of inverse operations. This led to mistakes when collecting like terms. Others moved everything to one side creating an expression instead. There were some attempts at trials and flow diagrams but the two-sided nature to the problem made it difficult to succeed using these methods.

Question No.19
The two difficulties candidates experienced were incorrectly sizing their arc around B, often drawn with a circle of radius 4.5 rather than 5 cm, and not having a compass to use. Various attempts and methods to do arcs by eye and hand were seen. Many scored at least 1 for getting the arc around point A correct, or having produced intersecting arcs the majority shaded in the correct region. A few shaded the whole of the region inside one or other of the circles as well as both. Several squares were seen drawn around the schools rather than circles.

Question No.20
Most knew what a stem and leaf diagram was and that the table had to be ordered. It was sometimes difficult to read the figures as they had been crossed through in working out a different question part. Very few used two diagrams or two listings. An occasional error was to write e.g. 62 as 6 on the 6 row, or to omit the odd figure, typically 27, 31, 53 or 62. In part (b) many candidates wrote the numbers out again to work out the median and then crossed them out to find the middle one(s). 37 was the answer seen most frequently. Sometimes the values weren’t ordered at all. When the stem and leaf table was used sometimes candidates forgot to translate the value, giving the answer 8. A few calculated the range. In part (c) many could identify 5 but then gave this as an incorrect percentage. Errors were 20%, 4%, 5% or not converting 5/20.

Question No.21
Few realised the significance of the ratio and many just used the ratio as the multipliers. The relative size of each bag was not taken into account. Many used the ratio in the mode familiar to them adding 5, 3, and 2 and then working out the cost of 10 of each bag. Many small arithmetic errors were made in working such as 1.90 × 2 = 2.80. 17.60 + 2.15 = 18.75. Others doubled each value getting to 900 g but then incorrectly added another bag of cranberries or added part bags to make up the extra 100 g required. £19.75 when seen usually followed well set out workings.

Question No.22
Most struggled to get started in part (a) with 0.9 and 0.09 common answers offered with no working. The few who divided properly generally stopped at 0.1 or 0.11 not recognising the recurring property. Very few correct answers were seen in part (b). Many set the 1 aside dealing with 1/3 and 2/5 separately, leading to the common answer of 1 and 2/15. Those who correctly reached 4/3 x 2/5 often changed to a common denominator but then found the larger denominators harder to deal with. A few inverted the second fraction.

J567/02 Paper 2 (Foundation tier)

General Comments

It was pleasing to see that the majority of candidates attempted all the questions. Candidates appeared to have been entered at an appropriate level.

Students are clearly being advised to accompany their answers by appropriate method although a significant number still do not show method. A small number appeared not to have a calculator, or not to know how to use a calculator to calculate a percentage.

Although QWC questions will not be evident on the new specification papers there will still be a need for candidates to present working in a logical manner. In particular, responses to the more functional questions are often spoiled by a failure to adopt a logical method of approach to a problem.

Time did not appear to be a factor and there was no evidence that questions were missed because of this.

Comments on Individual Questions

Question No. 1
Part (a) proved to be an accessible opening question and both parts were answered correctly by the overwhelming majority of candidates. Most were able answer part (b)(i). Many of those who gave wrong answers appeared to have used an incorrect order of operations on their calculators. Part (b)(ii) proved to be more difficult. Most were able to arrive at the answer 8.22 or 8.225, but many struggled with the rounding. The weakest candidates often gave answers that were several orders of magnitude greater than the required answer, indicating an insecure understanding of the concept of rounding. Part (c) proved to be a challenge. A large number of candidates approached this as if they did not have a calculator available and proceeded to attempt repeated addition or subtraction. Such methods were frequently afflicted with calculation errors and consequently did not score. Those who did identify that division was required frequently did an incorrect division – apparently opting to divide the larger by the smaller number rather than considering what was being calculated here. Those candidates who used an efficient method almost invariably scored full marks in this part.

Question No. 2
Mathematical names of the three figures in this question were generally well known despite some problems with spelling. The majority of candidates succeeded in gaining full marks. Common errors were (a) hexagon, (b) cuboid and (c) isosceles.

Question No. 3
This was a very accessible question that was answered correctly by the overwhelming majority of candidates. Most produced good quality, accurate diagrams with clearly ruled edges.

Question No. 4
Part (a) was the least well answered. The fact that the number of pink tickets was much higher than other colours led many to believe that the probability of picking this colour was “likely”. Those that considered the 10 pink tickets as part of a set of 20 reached a correct conclusion. Parts (b) and (c) were well answered with “impossible” correctly stated almost without exception.

Question No. 5
Most were able to identify the pattern and use it to find the next term in part (a). Some candidates struggled to explain their method, often resorting to showing a series of calculations.

In part (b), there were many good answers, but some weaker candidates seemed unsure what to do when given a term to term rule.

Question No. 6
Stronger candidates invariably answered part (a) correctly as did a good proportion of those scoring at the lower end of the scale. The only incorrect response worthy of note was 0.7 although it was difficult to decide the nature of this error. Errors in part (b) were equally rare among better candidates but a little more common elsewhere. Incorrect responses included 23%, 11.5%, 63% and 0.43%.

Question No. 7
A significant number of candidates found it difficult to interpret the bus timetable. Most could identify the number of buses in (a) and calculate the journey time in (c), although 1 hour 55 minutes was a common error. Part (b) was answered correctly by the majority, but a significant number of errors were seen, the most common of which was to assume that the time required was the final one in the column (1600). In part (d), a significant number suggested catching the 1445 bus, failing to realise that this time did not refer to the required stop and that the bus did not actually stop at Eastville. Many of the weakest candidates suggested times that were after 6pm, indicating that they had experienced some difficulty in interpreting the question.

Question No. 8
Although the large majority realised that km was the unit required for distance in (a) there was a widespread misunderstanding of the number required with a very common response being 35 000 km, it may be that candidates had decided that distance is measured in km and they had chosen the first option containing km. Candidates should ensure they read the whole of the question. In part (b) units of volume were equally well known and only a small number failed to score by using ml instead of litres. The pattern continued in (c) with the height of the door occasionally quoted as 240 metres.

Question No. 9
Many candidates had apparently positioned their protractors reasonably accurately, but then read values from the wrong scale. There was considerable variation in the answers offered, suggesting that a fine level of accuracy in positioning the protractor had proved to be beyond the reach of many. In part (b), the most common answer was obtuse, but many scripts suggested that the angle was acute or a reflex angle.

Question No. 10
This question required an explanation of averages and in particular mean and median. Better candidates understood the different calculations and were able to compare the figures given in both parts while providing clear evidence to support their conclusion. There were others who simply considered mean as the only measure of average and consequently provided a correct response for part (a). In part (b) their incorrect calculation gave them an answer of 6.8 and this was either discounted or deemed to be acceptable by the use of "rounding" or truncating to 6. A number of candidates lost a mark due to providing a description of the process without giving a full set of the numbers used in the calculations. A small number thought that the appearance of 6 was significant – it appeared in the first list so correct but not in the second list so incorrect.

Question No. 11
Part (a) was generally done well, the most common error was to give a multiple of 8 rather than a factor. In part (b), there were many correct answers, although a significant number thought that 45 or 49 would be prime. Only a minority gave answers outside the given range. There were many correct answers in part (c), with the most common error being to handle the negative sign incorrectly in (i), or to reverse the subtraction in (ii). Few candidates showed any working. Part (d) proved to be challenging for many. A significant number appeared to be sorting the values based on number of decimal places, or by looking at the figures rather than the place values.

However there were also some excellent answers, so that the majority of answers were either completely correct or completely wrong, very few scored part marks.

Question No. 12
Part (a) required relatively simple calculations to adjust the various amounts of ingredients required to provide lamb curry for different numbers of people. On a calculator paper the multiplication and division of single digits rarely caused any problems. Any loss of marks usually occurred in part (a)(iii) due to a failure to convert from millilitres to litres. Part (b) was more challenging but generally answered well. The two main approaches involved the figure of 437.5 g (with 400 g not enough) or 393.75 g and stating that this will only serve 9 people. In addition to errors in working, the most common mistake was to double the amount of rice required for 4 people (giving 350 g) and declare that only 8 people could be served.

Question No. 13
Part (a) was done well by the majority, although a number of answers lacked any indication that the candidate understood what was meant by 'anti-clockwise'. Most indicated a sensible route, although a small number drew an arrow straight across the lake. Measuring or drawing the bearings correctly seemed to be the sole preserve of the most able candidates. Only a minority attempted to draw north lines. Those who did frequently gave an acute angle, rather than a bearing measured clockwise. Drawing the 5 cm line was accessible to the majority, but a surprising number of answers did not meet the standard requirements for accuracy of ±2 mm. When plotting bearings candidates should be encouraged to mark a small dot or cross at the exact point and then label the point.

Question No. 14
Part (a) was well answered requiring a very simple conversion from distinct divisions on the graph. A clear explanation in part (b) was only provided by a minority of candidates with many failing to understand the need to read an appropriate figure (in dollars) from the graph, convert it into pounds and multiply by a factor of 5, 10, etc. Others used the graph to provide two conversions but failed to mention the need to add the results while some simply explained a method of conversion that didn't involve the graph at all. Others suggested using a reading of above $150. The correct line was rarely seen in part (c) and even those who knew how to draw the line often failed to score due to inaccurate points at either end.

Question No. 15
This question proved to be difficult for many candidates. Most could use the formula to find the cost in part (a)(i), but very few were able to manipulate it efficiently to complete the other parts successfully. The majority of attempts involved very inefficient methods that did not utilise calculators effectively. For example, in part (a)(ii), repeated addition and trial and improvement were very popular strategies. Unfortunately, many candidates using these strategies failed to understand that adding the costs of various numbers of days is not a correct method, for example the cost of 4 days plus the cost of 7 days does not give the cost for 11 days. Repeated addition frequently led to arithmetical errors. In part (b), many used non calculator methods to find 12%, but this was frequently done incorrectly. A significant number of the very weakest candidates appeared to be finding 56 –12 or 56 – 0.12 rather than attempting 12%.

Question No. 16
This algebra based question was tackled quite well especially in part (a) where the solution of two simple linear equations was required. Weaker candidates failed to cope with the rearranging of x terms and numbers often arriving at $8x = 8$. It is pleasing to see very few candidates giving embedded answers. In part (b) the expansion of brackets was well understood with a small number failing to multiply the second term resulting in $4x – 3y$. The other common incorrect answer was $4x + 12y$. Better candidates coped well with a relatively simple factorisation in part (c) but it was obvious that many weaker students didn't grasp the concept of factors and the need for brackets.

Question No. 17
This question was the least likely to be answered correctly on the entire paper. The most common way for candidates to score was for finding the volume of the cuboid, although only a minority could do this. Several got as far as 512, but few were able to make any further progress. There were very few instances of cube root being used, only of trial and improvement being used to find the cube's dimensions in a small number of cases. The majority tried a variety of calculations, often involving multiplication or division, but did not appear to have any real understanding of what their answers might tell them in the context of the problem.

Question No. 18
Those candidates who were familiar with the idea of grouped data generally scored well, although a large number failed to use the correct mid-points (eg 3, 8 15, 20). Some obtained a total of 365 correctly and then spoiled the method by dividing by an incorrect number (usually 4 from the number of groups). Others simply added the frequencies and divided by 4. Many who understood the need to use mid-points didn't know what to do with them once they were found. Another common misconception was to consider the problem to be related to cumulative frequency (identified by figures of 26, 38, 48, 50).

Question No. 19
Only a minority of candidates seemed to realise that this was a structured question in which the answer to one part would assist with the next. Consequently, although most found the correct values in part (a), only a small minority made any reference to these in part (b). Some calculated the value from $x = 1$ to be 1 possibly from 1^3 given as 3 and others gave the value from $x = 2$ to be 6 or 5 from 2^3 as 6. Very few showed any working, presumably doing all the calculations on their calculator. The most common attempts at part (b) involved simply restating the given information, so these did not score. A surprising number of candidates started part (c) by completing trials for $x = 1$ and/or $x = 2$, despite having done these in part (a). Very few were able to produce a completely correct solution. A common error was to give the absolute value of y for trials of eg $x = 1.1$ or $x = 1.2$, omitting the negative sign. Many candidates ignored the instruction 'to 1 decimal place' and gave answers to 2 or more decimal places, or moved immediately from a trial with a number to 1dp, to trials with increasing numbers of decimal places, often without identifying whether these were likely to be in the correct interval to yield a correct answer.

Question No. 20
In part (a) It was surprising how many had problems putting 22 ÷ 50, or its equivalent fraction, into a percentage. The common error was to use 22 ÷ 100 instead. Some used the value 14 instead of 22. In part (b) those who obtained 44 in part (a) usually followed through correctly to obtain 0.44 and many others arrived at a correct answer by subtracting 0.56 from 1. A common answer was 0.14 presumably from using the value 14. A correct answer of 192 in part (c) was only evident in the responses of better candidates. Most failed to understand the link between a relative frequency of 0.12 and 1600 and those that made the connection frequently tried to divide 1600 by 0.12 (or 12) often arriving at an answer of 13 or 133. Many others simply divided 1600 by 10 (dress size) to obtain 160.

Question No. 21
Finding the area proved to be challenging for many. Some candidates clearly did not know how to start from the diameter to find the area and simply substituted it for the radius in the formula. A significant number seemed unclear on what should be squared, offering answers that involved $(\pi r)^2$ or $\pi^2 r$, or $\pi^2 d$ etc. Others found circumference. The most able candidates showed clear methods, with areas of the whole circle calculated, before going onto find the area of the semi-circle. A wide variety of units were seen, many correct, but some in cm, cm^3, or other units. Some candidates seemed to feel that the split on the answer line was for the whole number and decimal parts of their answer. Several did not give any units.

Question No. 22
This functional questions required a logical, step-by-step approach. The very best candidates understood the need for Pythagoras and used a correct method to obtain √361 leading to an answer of 19. Weaker candidates failed to use the squares of the sides and usually added or multiplied various combinations of the values given on the diagram. Others managed to pick up some of the method marks often for the correct use of *their* $BD^2 + 15.2^2$ gaining 2 of the 5 marks available. In most cases *their* BD^2 was usually obtained by adding 12.35^2 and 4.75^2 rather than subtracting as required. Another common error was to treat ABC as a right-angled triangle and then add 15.2 and 4.75 to assume a "hypotenuse" of 19.95 before applying their version of Pythagoras.

Question No. 23
The first piece of information that had to be found was the number of females, 65 – 25, and many of the candidates did not calculate this correctly, or they attempted 65 – 25 – 6 or even 65 – 25 – 6 – 4. The majority however did arrive at a figure of 40 women. There were some excellent clear two-way tables summarising the values. The question asked about the proportions of left-handed players, so it was not sufficient just to look at the raw figures as many did. They needed to produce a fraction, decimal or percentage using the totals of males and females or to scale both figures up so that the totals are the same. A significant number seemed unclear what was meant by proportion. Hence, for example, 4/25 and 6/40, needed to produce percentages (e.g. 16% and 15%) or to find a common denominator such as 200 (e.g. 32 and 30). The candidates should be communicating their method clearly which many did not do. There were many candidates placing too many figures randomly all over the page. There were many other methods, using common bases or fractions, which were suitably rewarded if they were executed correctly. The majority of candidates attempted this question, with several scoring all 6 marks, and a significant number scoring at least 1 mark.

J567/03 Paper 3 (Higher tier)

General Comments:

Most candidates attempted a reasonable proportion of the question paper and solutions were often well presented.

In general, candidates were well prepared for the earlier questions in the paper which were testing more straightforward topics such as basic algebra and statistics. Candidates also made good attempts at the more challenging questions that were set in a familiar format, such as the tree diagram and the vector calculation. It was clear that there were a number of candidates entered who had not studied topics such as circle theorems, coordinate geometry and surds.

Many candidates had difficulty with questions set in a problem solving context such as using ratio in question 6 and solving the area problem in question 11. In this type of question, candidates would benefit from planning a strategy, setting their work out in an organised manner and annotating calculations to make it clear what they are doing.

On a non-calculator paper it is important for candidates to be able to calculate using negative numbers and fractions and some candidates lost a number of marks due to errors in these areas.

Comments on Individual Questions:

Question No. 1
Most candidates correctly identified the outlier on the scatter diagram.
Many candidates drew an acceptable line of best fit and used it to read the correct score. Candidates should be aware that a line of best fit does not need to go through the origin and these lines were not acceptable.

Question No. 2
In part (a) most candidates correctly evaluated the expression using $p = 4$. Candidates had more difficulty substituting $p = –3$, and although $5p$ was usually evaluated correctly, squaring –3 often led to –9.
Most candidates correctly factorised the expression in part (b).
In part (c) many correct solutions were seen. A common error was collecting the constants incorrectly leading to $3x = 6$ after subtracting 9 from 15 rather than adding it. Most candidates showed correct algebraic working and method marks could be awarded.
In part (d) the formula was often rearranged correctly. In this part, the most common error was to add 3 to the left-hand side of the formula rather than subtracting it.

Question No. 3
In part (a), most candidates identified that two intersecting arcs were required to define the region and shaded the correct part of their diagram. Some candidates did not use the scale correctly for the 2.5 km radius, using a radius of 4.5 cm rather than 5 cm.
In part (b) most candidates calculated the time taken as 20 minutes. Candidates who identified that 20 minutes is one third of an hour, so multiplied 1.8 by 3 to find the speed in kilometres per hour usually reached the correct answer. Most candidates attempted to divide 1.8 by 20, which was found challenging on a non-calculator paper. Having done this calculation, many did not realise that they then needed to multiply by 60 in order to convert to kilometres per hour.

Question No. 4
Most candidates completed the stem and leaf diagram correctly. As there was an even number of values, the median was midway between the middle pair. It was as common for the median to be given as one of the middle pair, 37 or 39, as it was to see the correct answer of 38.
In part (a)(iii) most candidates identified the correct fraction 5/20, but some could not convert this correctly to a percentage.
Candidates knew what was required in part (b)(i) with most giving a sensible question with a range of option boxes covering the whole time range. It was common, however, for candidates to have overlaps between their time ranges, such as 0600 to 1000 followed by 1000 to 1400 or to have gaps between them, such as 0600 to 0900 followed by 1000 to 1300.
Candidates who understood the term representative stratified sampling usually gave the correct answer to part (b)(ii).

Question No. 5
Candidates who showed a calculation involving (change in y) ÷ (change in x) made some progress in this question, but gradients given were often positive rather than negative. It was common to see (change in x) ÷ (change in y) calculated, or to see no calculation at all with the answer given as either the x- or the y- intercept.
In part (b), candidates who drew a table of values using the given equation and used this to plot a graph usually drew a correct graph, although some lines were too short to gain full credit. Lines were usually ruled. Some candidates correctly identified the y-intercept as –1 but then drew a line passing through (0, –1) and (2, 0).
Most candidates correctly read the coordinates of the point of intersection from their graph in part (c).

Question No. 6
Many candidates gave a fully correct response to this question. Some candidates showed the correct calculations but made arithmetic slips, often in the addition of the costs of the three items.
It was common however for candidates to completely misinterpret the question and not to deal with the ratio correctly. One common error was to ignore the ratio completely and combine the items to make a quantity as close to 1 kg as possible, usually by adding two bags of each item to give a total of 900 g of the mix and then attempting to add in some part bags to make the extra 100 g. The other common error was to assume that the ratio meant that there should be 5 bags of cashew nuts, 3 bags of almonds and 2 bags of cranberries, ignoring the fact that 1 kg of the mix was required.
In this question it was common for candidates to show many disorganised calculations making their work very difficult to follow. It is helpful if candidates add some annotation to indicate what they are attempting to calculate.

Question No. 7
Most candidates did not know how to write the fraction in part (a) as a decimal and it was rare to see an answer using recurring decimal notation correctly. Answers such as 0.9 or 0.09 were more common than the correct answer.
Many candidates knew that the first step in part (b) was to convert the mixed number to an improper fraction. Many candidates then went on to attempt to use a common denominator, even though this is not required in multiplication. Common errors were to then add the numerators, or to multiply the numerators but fail to multiply the denominators.

Question No. 8
Many candidates were able to show correct algebraic working to reach a solution of 5.5 in part (a), however some answers were given as $y = 5.5$ rather than the correct inequality $y > 5.5$.
Some candidates understood the notation used in part (b) and listed the correct integers. Many did not distinguish between the open and closed circles and included both 2 and –2. Some gave an inequality rather than the list of integers required.

Question No. 9
Most candidates drew the correct views in part (a).
Candidates who were able to interpret the coordinates usually gave the correct answers for both points C and D.

Question No. 10
Many candidates gave the correct scale factor for the enlargement but did not attempt to give the coordinates of the centre of enlargement. Some candidates attempted to describe a translation as well as the enlargement.
In part (b) some candidates identified that the two individual rotations would combine to give a rotation of 180°, but few could identify the centre of rotation. Those candidates who used the grid and carried out the two rotations on one of the given triangles or their own triangle often gained 2 marks even if they were unable to describe the resulting transformation.

Question No. 11
Most candidates found this question very difficult and did not know how to approach it. Some candidates set up an expression for the area of the rectangle and correctly expanded the brackets, but it was rare to then see a correct equation formed by equating this with $2x^2$. Some candidates did arrive at a value of x which they then used to evaluate the length and width of the rectangle. Candidates who used a trial and improvement approach were rarely successful because they needed to evaluate the area of both the square and rectangle for a given value of x and then compare these. As this approach was seldom carried out in an organised manner, it rarely reached the correct result. A large proportion of candidates formed expressions for perimeter rather than area.

Question No. 12
Very few candidates were able to access this question because they had little knowledge of the required circle theorems. Some correct working was seen, but it was seldom accompanied by clear statements of the geometric reasons which were required in this question that was also testing quality of written communication. The most common correct reason used was the sum of the angles in a quadrilateral is 360°. Some candidates used angles on a straight line incorrectly and others thought that opposite angles in a cyclic quadrilateral were equal.

Question No. 13
Many candidates could correctly convert from standard form to an ordinary number in part (a).
In part (b) many attempted the correct subtraction, however digits were not always aligned correctly or errors in subtraction were seen leading to incorrect final answers.
In part (c) many candidates did not round the two values to two significant figures as required in the question. This would have eased the calculation greatly and more candidates would have reached the correct answer. Where a question requires an estimate of the answer, the numbers should be rounded before the calculation is carried out, rather than attempting the exact calculation and then rounding the result.

Question No. 14
Candidates who attempted to calculate the coordinates in part (a) usually found at least one of them correctly. Some candidates attempted to read coordinates from the diagram which was inappropriate as it was not drawn to scale.
In part (b) very few candidates knew the method for finding the length of a line from its coordinates and this part was commonly omitted. Those candidates who attempted the correct calculation often reached the result $\sqrt{80}$ but then did not know how to convert it to the required form. Some candidates found the correct sides of the triangle, 8 and 4, and then attempted to combine them to create an answer in the correct form, such as $8\sqrt{4}$.

Question No.15
Most candidates completed the probabilities on the bottom two branches correctly. Some candidates did not appreciate that there was no replacement after a milk biscuit had been taken and used the fractions 6/10 and 4/10 on those branches as well, rather than the correct fractions.
Many candidates identified the correct two probabilities required in part (a)(ii) however some attempted to add them rather than multiply them.
In part (b) many candidates identified that they needed to use the probability 4/10. Some attempted the correct multiplication but did not always reach the correct answer, often having failed to multiply the denominators correctly. As in the previous part, some candidates added the probabilities rather than multiplying them.

Question No. 16
Many candidates correctly found the vector 4**m**, however it was common for them to deal with the negatives incorrectly in finding **m** – **n**.
In part (b) some candidates correctly evaluated vector 2**m** + 3**n**, however few were able to draw this correctly on the grid. Some candidates drew a correct line but did not include the arrow to show the direction of the vector.

Question No. 17
Many candidates used a correct common denominator of xy, but it was less common to see a correct numerator. The most common answer was $1/xy$ resulting from subtracting the terms in the numerator, but some candidates also subtracted the terms in the denominator leading to a denominator of $x - y$.

Question No. 18
Candidates who did not give the correct answer, 1, in part (a)(i) usually gave the expected answers of 0 or 8.
Some candidates reached $\sqrt[3]{27}$ in part (a)(ii) but could not always evaluate this as 3. The most common incorrect answer was 1/9.
In part (b) many candidates squared the two values given to reach 9 + 2 and a final answer of 11, rather than multiplying the brackets out correctly to reach an expression with four terms.

Question No. 19
Some candidates had clearly practised solving simultaneous equations of this type and some correct and clearly laid out solutions were seen. Where errors were made, working was usually laid out clearly and partial credit could be awarded although a number of candidates omitted this question completely.

J567/04 Paper 4 (Higher tier)

General Comments:

There were some problem solving questions on this paper and other questions which tested reasoning and proof. Most candidates demonstrated that they can find a strategy to solve the problem solving questions but most struggled to put forward anything like a convincing proof. There were also quite a number of standard questions such as solving simultaneous equations, trigonometry, repeated percentages and estimating the mean from a grouped frequency table. Many could not answer these questions with any confidence. It was pleasing to see better answers to the histogram question.

Comments on Individual Questions:

Question No. 1
Part (a) was well answered, the common error was not to factorise the numbers in their tree correctly and 2 or an additional 3 were seen as factors. Part (b) was found to be difficult and most just used their calculators to show it is square instead of using the answer from part (a).

Question No. 2
In part (a) most candidates produced both answers correctly, some calculated the value from $x = 1$ to be 1 possibly using 1^3 as 3 and others gave the value from $x = 2$ to be 6 or 5 using 2^3 as 6. Very few showed any working presumably doing all their calculations on their calculator. In part (b) many reproduced the question by stating that $x = 1$ is too low and $x = 2$ is too big or similar. We really needed a reference to the y values, stating that 0 lies between the two y values. In part (c) they need to show the results of their trials to at least two figures and often they gave their answer to more decimal places than requested. The one decimal place referred to the x values and not to the y values. Candidates should be careful in using their calculators with powers of negative numbers and ensure the result has the correct sign.

Question No. 3
It was surprising how many had problems in part (a) putting 22 ÷ 50, or its equivalent fraction, into a percentage. A common error was to write 22 ÷ 100. There were a few who used 14 instead of 22. Part (b) was answered better than part (a) probably because there were two ways to do this part, either 22 ÷ 50 or to add up the fractions and subtract from 1 which appeared to be the favoured approach. Common error was 0.22 from 22 ÷ 100. In (c)(i) a common error was to attempt 1600 ÷ 0.12 whilst many used 10 in their calculations such as 1600 ÷ 10. In (c)(ii) reliable refers to the data representing the population not how correct the calculations are. So there were many answers which suggested checking the other dress sizes and seeing if all the figures add up to 1600. This is where the expected comment was to be “increase the sample size”.

Question No. 4
Most candidates answered part (a) correctly. In (b) most found $9n$ but they struggled with the constant term, often giving $9n + 3$ or $9n + 12$ as their answer.

Question No. 5
Candidates showed they knew how to manipulate an equation, the best strategy was to expand the brackets before combining terms. Some solutions were spoilt with simple errors, the most common being not multiplying the –3 in the bracket by the 6 outside the bracket.

Question No. 6
There was confusion about whether the formula should be πr^2 or πd. The question also asked for the area of the semicircle so the result needed to be halved. Many calculated the semi-circumference and those who did use the correct formula sometimes wrote their answer to just 1 or 2 significant figures. It is always sensible to write most of the figures down from their calculator before they try to round it. The question does ask for the units which many did not give at all whilst some gave cm or cm^3.

Question No. 7
This was a Pythagoras' Theorem question but some did try to use trigonometry and very few of these were successful. Many who did use the correct method started to find BD by incorrectly using $12.35^2 + 4.75^2$ first, then square rooting it, however they then used their result correctly in the next triangle. Another common approach was to attempt $12.35^2 + (4.75 + 15.2)^2$, however triangle ABC is not a right-angled triangle. Many did not use squares at all and added some or all the sides together.

Question No. 8
The first piece of information they needed to find the number of females, 65 – 25, and many of the candidates did not calculate this correctly or they attempted 65 – 25 – 6 or even 65 – 25 – 6 – 4. The question asked about the proportions of left-handed players, so it was not sufficient just to look at the raw figures as many did. They needed to produce a fraction, decimal or percentage using the totals of males and females or to scale both figures up so that the totals are the same.

Hence, for example, $\frac{4}{25}$ and $\frac{6}{40}$, needed to produce percentages (e.g. 16% and 15%) or to find a common denominator such as 200 (e.g. 32 and 30). The candidates should be communicating their method clearly to the reader which many did not do. There were still too many figures randomly placed all over the page. There were many other methods which were suitably rewarded if they were executed correctly.

Question No. 9
This was a standard question which we have asked on many occasions and yet few were able to answer this correctly. The best method was to do 180 – 156 = 24 and then 360 ÷ 24, most other methods ended in failure especially those who tried to work from the total angle formula.

Question No. 10
In part (a) many confused the terms 'even' and 'odd' with 'positive' and 'negative', otherwise the reasoning was very good. In (b) most did not use the prompt from part (a) and usually they showed some examples or they stated that an 'odd' multiplied by an 'odd' gives an 'odd'.

Question No. 11
It was surprising how many could not calculate the amounts for either bank. Many subtracted the amounts and for the Southern Bank they often calculated the interest for each year based on £5000. For the Northern Bank many used 35% instead of 3.5%.

Question No. 12
(a) This is a standard question which very few answered correctly. Most used the class ends and not the midpoints and when they added their products they more often divided by 4 rather than the total frequency. Some were confused with frequency density which they duly calculated. Part (b) was answered very well, $\frac{14}{60}$ was the common error. Part (c) was answered correctly by almost all candidates. In part (d)(i) the common error was to give 2.3 as the answer, giving the bar height and not the bar area. Part (d)(ii) was answered very well and the common error was similar to part (i) in considering the height and not the area to represent the frequency. In part (e)

the answers were usually correct but some candidates gave a very similar answer to both parts and the request was that the comments should be different.

Question No. 13
This is a standard trigonometric question which was not answered very well. Solutions involved sine, tangent, sine rule, cosine rule and Pythagoras' Theorem as well as some who calculated the angles without any trigonometry. The only method which gave the correct answer was using cosine.

Question No. 14
Most candidates knew how to attempt this question but mainly arithmetic errors cost marks. The common approach was to multiply each equation by a scalar and then to add or subtract them. This approach generally worked very well.

Question No. 15
Part (a) was answered well and the common error was to write the square root only over the numerator of the quotient and not over the entire quotient. In part (b) many had problems separating the x and y variables. It was common to see $6x$ on the left side and errors in the sign of $2y$ or 18.

Question No. 16
In part (a) the intention was that they used the upper bounds of the weights to find the upper bound of the total weight. However if they used any weight up to the upper bound and found a total weight over 24 tonnes, they gained full marks. Common weights used were 84.4 and 68.4. Most worked out $167 \times 84 + 145 \times 68$, which was just below 24 tonnes. In part (b) it was not sufficient to say that all weights vary, we needed to see that the sample was not typical of the population.

Question No. 17
This is a standard 'completing the square' question. The main problem was getting the $(x - 4)^2$ correct and many started with $(x - 2x)^2$ or $(x - 8)^2$. There was a clear problem in calculating the value of '*b'* and it would have served them better to multiply the squared bracket out first.

Question No. 18
The question in part (a) requires a standard proof but very few were able to reproduce it. Most candidates used facts that required the two triangles to be congruent first. This was an ASA, SAS, SSS or RHS question but very few candidates used these 'terms'. Few candidates were able to 'name' the angles correctly and stating 'the angle at B' is not clear enough as there are two angles there. In part (b) many said that the two angles added to 180° but they did not state that angles ADB and CDB were equal.

Question No. 19
Very few knew that they had to find the height of the original cone so they either worked out the volume of two cones with incorrect heights or they worked out the area of the top circle and the area of the base circle. They then used these areas to find the volume of a 'prism'.

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