OCR
Oxford Cambridge and RSA

GCSE

Mathematics B (Linear)

General Certificate of Secondary Education **J567**

OCR Report to Centres June 2015

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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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J567/01 Paper 1 (Foundation tier)

General Comments:

The paper proved to be a good test at this level giving plenty of scope for candidates of all abilities and particularly stretching the more able. Marks of candidates covered almost the whole range of marks. The majority of candidates scored between 30 and 80 and appeared to be entered at an appropriate level.

There were very few responses with a majority of questions not attempted. Centres appear to be encouraging their candidates to consider responses carefully and to attempt all questions. While most candidates are including work that adequately demonstrates their methods, there is still a significant number who lose marks as a result of giving an incorrect answer accompanied my no working at all.

The question that required candidates to show good quality written communication (Q16) was generally answered effectively by use of trial and improvement but only a very small minority attempted a solution by algebraic means as intended.

In general, data handling and arithmetic were tackled more successfully than algebraic and geometrical problems.

Presentation this year was better than last year and it is pleasing to see an increase in responses with more working shown and less mess, although some of the pencils used are extremely blunt!

Reading the questions more carefully together with asking themselves whether their answer is a sensible one might have led to more success and helped candidates acquire more marks overall.

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

Comments on Individual Questions:

1 (a) This question was answered very well with most if not all students getting full marks. Part (b) on the whole was answered well. On the rare occasion students scored 0 the bar was outside tolerance, generally being slightly too tall rather than too short. Even more rarely the width of the bar was one square as opposed to two. However, many candidates drew the bar freehand. (c) The majority of candidates answered ‘adventure’ but some confused least with most and the answer of ‘puzzle’ was occasionally seen. (d) Again another well answered question, on the very odd occasion an answer of 28 was given where the candidate added the frequency of the bars as opposed to subtracting. (e) Whilst a majority of candidates scored 2 marks, there were some who gave the answer of 58 and had forgotten to subtract from 60. Candidates should be encouraged to write their sum in a vertical list as this usually leads to fewer addition errors. In some cases candidates clearly had attempted to sum the required numbers but obtained the incorrect total resulting in an incorrect final solution. Had they shown evidence of working, in most of these cases they would have achieved the method mark. These candidates need reminding that methods must be shown regardless of the difficulty of the numerical calculations.

2 This question was answered well by only a minority of candidates with many confusing area and perimeter throughout the question. (a) The answer of 24 was a common error and was the offered response almost as often as the correct answer of 20. The candidates with the answer of 24 often then offered a 3 × 8 rectangle as their response to part(ii). In (b) there was the potential of 4 rectangles to be considered but it was very rare to see the dimensions of the fourth of 1 × 30. The third (2 ×15) was also not that common and as a result full marks were not often recorded. Some work was well thought out and well presented in a logical manner, but other offerings were poorly presented and examiners had to search to find evidence of correct calculations.

3 Part (a) was usually answered correctly especially by the majority who used the column method for addition. In part (b) weaker candidates often failed to cope with the need to "borrow" and simply subtracted the smaller digits from the larger digits to arrive at 222. For part (c) this showed numerous misconceptions with many confusing the methods for multiplying and dividing. (d) The (incorrect) concept of moving the decimal point was general executed well particularly in the multiplication where the problem was not compounded by having to add zeros. The division caused considerably more problems mainly due to a failure to comprehend the need, or process, for adding zeros after the decimal point. Many simply moved the decimal point to its "limit" giving an answer of 0.72548. By far the most common (and successful) approach to part (e) was to break the problem down into parts consisting of 10% giving 3 × 52. Errors in this method usually revolved around a failure to sum the parts correctly. Some did attempt a more formal approach but either couldn't cope with the division and multiplication or confused the operations for the 30 and 100. Part (f) was answered using many different methods other than the traditional long multiplication (including Napier's Bones and various different applications of a grid method). It has to be said that these "newer" methods are relatively successful although many marks were lost through errors in the simple arithmetic required to complete the grids or through a failure to sum the various components correctly.

4 Part (a) was extremely well attempted and the vast majority of candidates achieved full marks. Of those who did not achieve full marks there were issues with copying down the incorrect numbers, putting zero as the largest number and ignoring the negative signs. (b) This question was also very well attempted with most candidates scoring full marks. The most common incorrect answer was 3 (from incorrect counting) and ($^{-}$)8 (from poor understanding of directed numbers). (c) Very few did not attempt this part, but it was not as well answered as parts (a) or (b). The most common incorrect answers were 19 and $^{-}$19.

5 It is not altogether surprising that the most common error here was to confuse rotational and line symmetry leading to answers of 4 and 1 (or 0) respectively. A small number, obviously aware of the concept of rotational symmetry, gave answers in degrees eg 90 or 180.

6 Most candidates attempted (a) with many gaining 1 mark for 2*j* but very few got $^{-}$2*k* or even 2*k*. Instead 10*k* or $^{-}$10*k* was frequently given. (b)(i) The vast majority of candidates answered this correctly. Many were able by inspection to know that the answer was 6. (ii) This part was well attempted but not as successfully as part (i). There was little evidence of algebra so awarding M1 was quite difficult. Candidates who used flow diagrams often failed to write their values at each step and therefore lost the M1 mark. Few candidates did not attempt this part.

(iii) This was attempted by many, but only answered correctly by the most able. 36 + 14 = 50 was often seen, but not within an equation and frequently as the final answer. 50 was often divided into 100 to give an answer of 2. Those who did multiply by 100 often did so incorrectly getting 500 or 50 000. When for example *x* = is written on the answer line candidates should give the value of *x*, embedded answers lose marks. (c) If 35 and 12 were seen, they were usually added correctly but there were two big errors here. The first was a large minority giving the answer 91 (from 57 + 34) showing misunderstanding of substitution into an algebraic expression and the other was to leave *g* and *h* in their final answer e.g. 35*g* + 12*h*. (d) Many candidates were able to give the correct answer but the weaker candidates often gave a numerical answer, 18 being a common error.

7 (a)(i) Most candidates gained this mark, with a few giving 14 instead of $^{-}14$ ('two minuses make a plus' when joining $^{-}6$ and $^{-}8$) or an answer of 2 as they added 8 instead of subtracting 8. Some thought the difference was 4 (the $^{-}4$ part of the formula) and so gave -2 as an answer. In (ii) there were some very good responses with some giving the *n*th term of the sequence. Most knew the pattern was to subtract 8, even when they had failed to calculate the next term. (b) A more demanding question where roughly one half of candidates failed to pick up two marks, with only a small percentage gaining the SC1 mark. Many incorrect responses gave 6, 2, $^{-}2$ which show a misunderstanding of the *n*th term and the meaning of *n*, with candidates reading 6*n* – 4 as 'start at 6 then subtract 4 each time'. Roughly 20% of candidates either failed to write an answer or had tried to use algebra to find their answer and then left the answers as algebraic ones rather than simplify them into number values. A small number of candidates gained 1 mark for the first two terms correct.

8 The majority of candidates were able to answer this question correctly.

9 Part (a) was very well answered. Occasionally the given combination was repeated. It was usually systematically done with pairs of combinations where seat 1 is static and the other 2 are reversed etc. Candidates who did not list systematically were more likely to repeat one of the outcomes. In a few cases all the combinations were not given, but generally enough of them to score M1. Very few candidates scored zero. (b) was generally well attempted, however a number of responses were 610.0. Otherwise candidates rounded to the nearest whole number giving answers of 606 and 606.0. Part (c) was not well answered, a common error of 4 800 000 gave the impression that candidates were not proficient in understanding significant figures. Some others who understood 1sf incorrectly rounded to 4 000 000. Other errors seen were to repeat the given number.

10 Part (a) was generally correct. (b) This part was more challenging, with the full range of marks seen. Candidates who scored 0 usually attempted to divide 36 by 2, or employed a strategy of repeatedly halving, showing 18 then 9. Candidates who scored 1 mark often showed an answer of 12, or showed 12 as an intermediate value in their working.

11 Part (a) was well answered with 2 and 5 being given most frequently. Incorrect responses usually involved multiples of 10. Responses for the square root in part (b) were equally successful with the few incorrect answers including 18, 6 × 6, 6^2 and √6. Surprisingly part (c) was not well answered and a completely correct answer of 900 was quite rare although B1 for 100 was a regular occurrence. The two most common errors both involved misconceptions about the nature of the problem. The first gave 30 – 20 = 10 and the second incorrectly applied the "rules" of indices to arrive at $10^3 - 10^2 = 10^1$. In part (d) better candidates seemed to understand the idea of reciprocal and applied it correctly to get 1/7 while a similar number gave an answer of 1 (presumably confusing the need for a number and its reciprocal to multiply and give a result of 1). Other responses included 0.7, 14 and 49. Part (e)(i) showed that most candidates had been taught the principles of BIDMAS and were generally able to obtain the correct answer of 8. The same could not be said about their attempts to explain how an incorrect interpretation could lead to an answer of 86 in (e)(ii). There was a variety of unsuccessful numerical attempts and many simply stated that they had not used BIDMAS. Quite a few simply did not understand what they were being asked.

12 In part (a) many candidates had the correct answer, but some errors were seen in finding 5.5 × 40. 5 × 40 was usually correct but confusion came in when calculating the time required for the final 0.5 kg, especially when adding 5 lots plus a half lot, where 30 minutes was not uncommon. A few tried, successfully or otherwise, to change 220 minutes to hours and minutes. When minutes is given on the answer line candidates do not need to convert the time into hours and minutes. (b) There was a mixture of 24 and 12 hour clock notation used and, happily, 2.15 am was very rare. (c) Many candidates scored full marks but of those who did not, not many scored M1 as they were more used to the method of adding parts of a ratio before dividing. A common mistake was 12/5 instead of 12/3 as was answer 24. Answers in the hundreds were seen, this is a point where candidates need to question whether or not their answer is sensible! Part (d) was well answered by most candidates. Those who knew 1.5 litres is 1500 ml often got the answer right by adding 6 lots of 250 ml but the biggest error was often being unable to perform the calculation 1500 ÷ 250 and another was 100 ml =1litre. In (e) there was a mixture of 24 and 12 hour clock notation used and again it was good to see a lot of candidates are comfortable with time.

13 Candidates must read the question before writing down their answer and answer the question asked, not the one they think it is. Many answered as if they had been asked which bag gave the best value, and so a significant number failed to state in their answer that the cost was £24, referring only to the bag size or to the fact that buying the smaller bags represents a £1 saving. Candidates should be made aware in their learning that they need to summarise their answer in a final statement to gain full marks on this type of question. Several candidates confused half with two especially without a calculator so 20 kg does 10 days rather than 40 again candidates need to consider whether or not their answer is sensible as answers in thousands of pounds were seen.

14 Part (a) very few were awarded all 3 marks. Finding the sum of 108, 90 and 30 was common but then knowing to and correctly subtracting from 360 was a step too far for many. The next step of subtracting from 180 was attempted by even fewer candidates.
(b)(i) The correct angle of 68 was often seen but the reason proved to be elusive for many. When correct the reason of alternate angle were seen in equal numbers. (ii) Very few full marks were awarded as many failed to work out the angle as 95°, the terminology used by the candidates was poor: ‘angles in a circle’ or ‘a triangle adds up to180’ are examples of incomplete expressions. In giving their reasons many candidates used expression such as X, Z or F angles. These will not be allowed in the future GCSE and centres are encouraged to ensure all candidates know the correct terminology.

15 A very high proportion of the candidates showed understanding of the concept of a net, with a significant number scoring all three marks. The majority of those who used sides of 3 cm, even for the height, justly scored 1 mark for the correct lid in the correct position. Many recognised the need to have identical opposite sides (in pairs) and managed to score two marks for correct sides and top only. Occasionally, there was credit given for one correct side. Many of those who gained no marks tried to draw an isometric view of the cuboid. It was extremely rare to see superfluous rectangles.

16 Overwhelmingly, the successful approach was trial and improvement, very few marks were awarded for formation of algebraic expressions. Some sporadic examples of attempted algebra were at best only part correct and wisely abandoned. [eg "Daisy = 6*x*" for *D*=*M*+6.] Most candidates who got the right answer had at least one other trial and so gained full marks. For 3 marks candidates earned this mostly for 3 numerical attempts which also included getting the girls in the correct age order. Candidates earned 2 marks usually for attempting two trials before apparently giving up. Occasionally Molly was youngest and Rosie oldest earned 2 marks but usually if candidates had identified this through their numerical attempt, all the daughters were in age order. Candidates who did quite well were usually those who had a 'have-a-go' attitude. Those that earned 0 marks it was often for 51 ÷ 4 quite or 51 – 6, $^{-}4$ etc. Some candidates had worked in an organised way and presented their work well, however a significant number of

candidates had working for this question all over the page and it was not structured well and often it was difficult to decide which attempt was their final answer.

17 Part (a) was not well answered. Most commented on the fact that people might not remember what it was like five years ago, that there were not enough boxes or that some people may never use public transport. Many thought the time gap of 5 years was a problem or that the question didn't state the type of transport. Others thought there should be more boxes some commenting that there was no tick box for disagree. All of these answers were not relevant to a biased or leading question and students clearly did not recognise bias in the question. Those who demonstrated some idea of what was wrong found it difficult to explain themselves successfully, often offering how to correct the question rather than explaining what was wrong with it. Others attempted to answer the question as though they were being asked themselves, hence the response; "Yes, it's better and cleaner" being seen. The majority scored at least 1 mark in part (b) for writing a sensible question with appropriate boxes but lost marks mainly for an overlap of values with a smaller number missing out key values (often zero). A small number failed to answer the question by concentrating on the wrong aspect (frequently referring to the quality of transport).

18 Most candidates attempted to plot the 4 points. Quite a number made errors in the scale on the *y* axis and so failed to gain full marks. 1 mark for 2 or 3 points plotted was common. Some candidates were careless in their plotting and others had points which were far too large, candidates should be encouraged to use a sharp pencil for completing graph work. Part (b) was very well answered. It was pleasing to note that the correct term (positive) was used to describe the correlation rather than a sentence to describe what was happening. Very few incorrect answers were seen; they included an even selection from negative, no correlation, wordy answers e.g. "goes up". In part (c) most candidates were able to describe the relationship correctly though the use of English was generally poor. Incorrect responses often failed to focus on the relationship, some had attempted to describe the nature of each measurement numerically as opposed to stating how one affects the other e.g. the height is always bigger or the height is bigger than the width, but this was infrequent. In (d)(i) very few incorrect lines were seen. A minority drew zigzags, or a rough freehand curved line etc. Many were then able to use their line to gain a correct answer in part (d)(ii). The final part of this question showed that candidates had a good understanding of outliers, almost all candidates identified the correct point. Some had circled the point (29,18) thinking that the outlier was the point furthest to the right.

19 Many candidates gained one mark for drawing a correct enlargement in the correct orientation, often with one vertex at ($^-3$, 5). Few candidates were able to give a correct response. Candidates who understood the need to use a centre for the enlargement frequently made other errors such as incorrect scale factor or simple did not "project" each point consistently. Most understood the orientation of the shape does not change as a result of enlargement.

20 The correct answer was rarely seen. Some candidates did not spot the symmetries even though they were directed to this information. The most frequent mark given was for 13 × 13, 13 × 10 or 7 × 7. The decimal/fractional lengths of 1.5 were very badly dealt with and few candidates gained marks for any multiplication involving 1.5 and frequently 1.5 × 1.5 became 3. There were some very large answers from multiplying all the figures they could find. The solutions were often extremely difficult to follow as work was not attempted using a logical approach. Many candidates tried to find the perimeter rather than area. However many candidates should be pleased they got some marks for this question which had no scaffolding. There is confusion about perimeter and area, especially when candidates started to partition off the shape. The most successful candidates annotated the diagram dividing it into areas which they then attempted to calculate.

J567/02 Paper 2 (Foundation tier)

General Comments:

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

Most candidates are aware that they need to show some working and attempted to communicate how they obtained their answer. There are still a small number of candidates who just write down the answers and consequently, probably, miss out on marks that they may have obtained from showing their method. It is worth noting that many candidates could have scored more marks had they written down what they keyed into their calculator and the full answer given. For example in question 16b an incorrect answer of 0.8 with no working shown probably came incorrectly from 3.6 – ($^-$2.8)which had it been shown in full or in part would have scored M1 and not 0. In 16a, 1.6 scored 0 but probably came from 1.608219245 which if it had been shown scored M1. Also there was one mark available for candidates who had an incorrect answer but rounded this correctly to 2 decimal places. The unrounded version had to be seen, so this mark could not be earned if working was not shown.

There was little evidence of candidates not having a suitable calculator to use. Most had access to measuring equipment, although some had difficulty using them appropriately.
A small number did not respond to questions that needed measuring equipment, suggesting that there was no such equipment available for them to use.

Candidates, as always, need to consider if their answer is sensible. For instance in question 15 it was common to see answers of more than £800 for each charity when this was all the supermarket had to distribute altogether.

Comments on Individual Questions:

Question No.1(a)
Many candidates measured the radius correctly; some were confused as to the difference between radius and diameter and gave an answer of 8 cm.

Question No.1(b)(i)
The ability to measure angles successfully was demonstrated by many. The fact that no side of the angle was horizontal proved difficult for some to use their angle measurer correctly.

Question No.1(b)(ii)
Again many candidates measured the angle correctly. The fact that the angle was obtuse confused some when using their angle measurer and they gave an answer of 80° rather than 100°.

Question No.1(c)(i)
Many candidates described the angle correctly as obtuse.

Question No.1(c)(ii)
Candidates could not generally identify the triangle as isosceles, with many giving a response of scalene. Some were confused as to the difference between angles and triangles and gave answers such as acute, obtuse or reflex.

Question No.2(a)
Many candidates understood fully how to complete the directions and obtained the full three marks. Few candidates did not achieve at least one mark.

Question No.2(b)
Only a minority of candidates could give a sensible estimate of the metric distance one can walk in 14 minutes from the choices given. 6.8 km was a common incorrect response.

Question No.3(a)
Nearly all candidates successfully drew the next diagram in the sequence.

Question No.3(b)
The table of the sequence was completed correctly by nearly all candidates.

Question No.3(c)
Most continued the sequence, successfully finding the number of grey squares with 16 white squares. Some candidates doubled the number of grey squares with 8 white squares getting an incorrect answer of 24.

Question No.3(d)
An understanding of how to find the rule for the sequence was demonstrated by many. There were a few candidates who did not know what was required and gave no response.

Question No.3(e)
The majority of candidates gave the correct response here, even if their rule was incorrect or missing in part (d). Some added rather than subtracting 4 and gave an answer of 100.

Question No.4
Many candidates understood what was required in this question. It was just a matter of whether the candidate was aware of the definition of each quadrilateral in each part and being able to solve the problem with the limited number of tiles.
(a) Finding the parallelogram was the least successful part of the question with only a minority finding a correct response.
(b) Most candidates found a correct rectangle.
(c) About half the candidates identified an appropriate square.
(d) It was encouraging to see that some candidates were aware of the definition of a trapezium with many of these obtaining a correct solution.

Question No.5(a)(i)
Nearly all candidates were able to read off the correct maximum temperature.

Question No. 5(a)(ii)
The majority of candidates were able to read off the correct minimum temperature. A small number left off the negative sign.

Question No.5(b)
Candidates usually gave a response that showed some understanding of the changes of temperature on the graph through the year, although few gave a detailed enough explanation to gain two marks. Some only compared March and December and gained no marks for this.

Question No.5(c)
Most candidates found the difference in temperatures correctly.

Question No.5(d)
In this part of the question a difference between a positive and a negative temperature was required; many found the correct answer, but some found the difference between the absolute values and gave an answer of 29.

Question No.6(a)
Recipes are well understood by most candidates and nearly all gave the correct response.

Question No.6(b)
Many tried to get the answer by building on to the given recipe in some way, but only about half the candidates found a method that would lead to a correct response.

Question No.6(c)
Most candidates found a sensible strategy to solve this problem and obtained the greatest number of bread rolls that could be made.

Question No.7(a)
The table showing equivalence between fractions, decimals and percentages was understood well by candidates with many scoring well. Nearly all completed the equivalences for one half and three quarters successfully. Some candidates could not find the fraction equivalences to 97% and 0.03. Common errors for the latter were 3/10 or 3/1000.

Question No.7(b)(i)
Many candidates appreciated that you need to have a common denominator to add fractions and gave the correct response. A common error was just to add the numerators and denominators and give a response of 2/6.

Question No.7(b)(ii)
It was pleasing to see candidates doing better on questions of this type than candidates in the past.
The solutions were often not very elegant with candidates using 98^{th}s rather than 14^{th}s, but nevertheless the majority of candidates found a correct solution.

Question No.7(c)
Most candidates showed some understanding of percentages when answering this question. Those who chose to use their calculators to find 0.76 × 480, quickly obtained the correct response.
Many, though, used a method that was more appropriate on a non-calculator paper, by finding 50%, 25% and 1% for instance. Some obtained the correct answer by using such a technique, but others made errors and consequently lost marks.
Candidates would benefit from being aware of the first method, not only to facilitate answering questions of this type but also to answer questions of a more demanding nature involving percentage increase and decrease.

Question No.8(a)
Many candidates understood the notation for squaring a number and hence calculated the correct response.

Question No.8(b)(i)
Most candidates appreciated that there was a pattern and gained both marks. A small number gave 2 × 8, but then did not continue the pattern and continued with answers such as 4 × 5.

Question No 8(b)(ii)
This tested their problem solving skills. Few gave an answer from spotting that 198 could be obtained by adding 100 to 98. Many of those, who found the correct solution, computed $100^2 – 98^2$ on their calculator, obtaining 396 and then halving this result.

Question No.9
Few found the correct result of 18 teachers; candidates needed to read the question carefully and see that a bus could only seat 46 passengers, which would have to consist of 43 pupils and three teachers. On the other hand most scored at least some method marks. Those candidates who set out their method carefully, showing all the stages and the full result of any calculations made inevitably gained most of the method marks available.

Question No.10(a)
Most candidates had a good understanding of how to apply a flow chart and gained both marks.

Question No.10(b)
It was pleasing to get so many correct solutions to this question. Dividing by a decimal does not come naturally to many students, but candidates knew that they had to reverse the flow chart and many gave the correct response. There were some who did not understand that the inverse was required and simply multiplied 850 by 0.625.

Question No.10(c)
Converting from pound to euros was understood well by most candidates and there were many fully correct responses.

Question No.11(a)
Nearly all candidates knew how to identify the mode on a pie chart.

Question No.11(b)
Many candidates appreciated that to find the required number of students you divided the total number of students by 4 and obtained the correct response.

Question No.11(c)
There were a few students who gave good responses, demonstrating a sound understanding of how a pie chart works. Some did not realise that they needed to measure the angle and use proportion, for which the arithmetic was quite straightforward. A few attempted to divide the circle into parts without measuring the angle but this approach lacked accuracy and resulted in answers such as 9 students.

Question No.12(a)
Most students understand that the probability in questions of this type needed to be given as a fraction.
(i) Only a small number gave answers as words such as unlikely, ratios or 1 in 12 etc, which were not acceptable.
(ii) Again a very small number gave an answer of impossible without the numerical value 0, which was not acceptable. Many candidates gave an answer of 0/12 which, although inelegant, is condoned.

Question No.12(b)
There were many fully correct responses, demonstrating a clear understanding of how the equivalence of fractions ties in with probability.

Question No.13(a)
Most candidates attempted to give a name to the polygon with about half finding the correct response. Hexagon was a common incorrect answer.

Question No.13(b)
Responses to this question were mixed, some had a clear understanding of what was required, others realised that an algebraic expression was required, but used indices rather than powers

giving an answer of $x^2 + y^4$. There were some who had little idea as to how to find a suitable response.

Question No.13(c)
Many, who had demonstrated algebraic skills by getting the response to part (b) correct, also tended to do well in parts (c) and (d), demonstrating some problem solving skills.

Question No.13(d)
A few gave the formula for a rhombus rather than a kite.

Question No.14
To earn full marks on this QWC question a complete method was needed with appropriate reasons given to support their method. A few candidates found good solutions that satisfied this standard. Others endeavoured to write out a clear method, but their solutions lacked the detail required and, consequently, they were unable to gain full marks. Many solutions lacked coherence and were difficult to follow, but these often gained some marks for odd pieces of their method or some reasons given. A common error was to assume that the sum of the angles in an octagon were 360°and then to divide by eight giving an answer of 45°. There were a significant number of candidates who not get started on this question and offered no response.

Question No.15
Many candidates, who did not necessarily have great skills on questions involving proportionality, saw that half of the money should go to the Children's Hospice and gained a mark. Some candidates showed some idea of how to approach the solution but became confused as to their method and divided when they should multiplied or vice versa, consequently there were some unrealistic solutions Some, that did have a sound method, rounded too early in their working using, for instance, 0.6 for 0.666… which led to inaccurate answers and so they only earned the method mark. A good check on questions of this nature is to see that the total of your answers reflects the total in the question, in this case £800.

Question No.16(a)
There was evidence that many candidates had the calculator skills necessary to carry out this calculation, but some had problems rounding the answer to two decimal places.
5.93 and 5.94 were seen occasionally as incorrect answers suggesting that these candidates had problems using their calculators effectively.

Question No.16(b)
Substituting numbers in the algebraic expression was generally done well with a fair number of correct responses. Some candidates had difficulties subtracting the negative number and consequently 0.8 was a common incorrect answer.

Question No.16(c)
Some candidates found the correct answer and we were generous in interpreting the notation used for a recurring decimal. Candidates must try to use standard notation.
Answers such as 0.77777778 were common incorrect responses, presumably from calculator displays.

Question No.17(a)(i)
Many candidates found the largest texts sent, demonstrating that most knew how a stem and leaf diagram works.

Question No.17(a)(ii)
There was an appreciation by many that a middle number needed to be found from the ordered data. Errors in this were common, so answers of 14 and 15 were often seen as well as answers of 4.5 from those who forgot to add the ten. Consequently the method mark was often awarded with only a few gaining the accuracy mark as well.

Question No.17(a)(iii)
Only a few candidates knew how to approach finding this fraction. Most of those who correctly found 3/30 went on to simplify it correctly.

Question No.17(b)
Only a minority of candidates knew how to approach finding the mean from a grouped frequency table. Of these many found an estimate for the total length of calls,180, but then either did not know what to do with this and left it or divided it by the total number of intervals, 5, rather than the total frequency, 50. There were a few good solutions. A common error was to find the total frequency, 50, and then divide this by the total number of intervals, 5.

Question 18
Candidates found this locus question challenging. Some draw an arc of a circle with the centre at C and with the correct radius. Not many drew the perpendicular bisector to AD and of those that did virtually no one used arcs to carry out the construction. A small number were able to use their arc and perpendicular bisector to identify the area in which the tree could be planted.

Question 19(a)
Few candidates understood the concept of relative frequency. Answers were often greater rather than smaller than 1.

Question 19(b)
A small number of candidates gave a good clear method with a correct response.
Many did not know how to approach this question. Some thought that 'estimate' referred to rounding the figures rather than using expectation to estimate their answer.

Question 20
To earn both marks on this QWC question candidates needed to show a full method with a correct solution using an appropriate algebraic form and only a few were able to do this. Of those that did show a correct solution, a well laid out flow chart with the reverse process clearly shown was a good way to demonstrate a full understanding of how to rearrange the formula. Those who tried to use a step by step approach nearly always made errors in 'balancing' their formula.

Question 21(a)
There were some correct responses to this translation. Many confused the translation vector with coordinates and moved the triangle so that one of its vertices had coordinates ($^{-}3$,1).
A few moved the triangle $^{-}3$ down and $^{-}1$ across for which they were awarded 1 mark.

Question 21(b)
About half the candidates were able to give the scale factor of the enlargement correctly. Candidates need to try and give a response of scale factor 3 rather than three times as big etc, but they were not penalised if they did this.
Only a few attempted to give a centre of enlargement.

J567/03 Paper 3 (Higher tier)

General Comments:

The vast majority of the candidates were appropriately entered for this paper and they were well prepared. Overall the work was at a higher level than in previous years which is pleasing to see.

The weakest element was still using the main four operations with numbers and in this paper simple multiplying and division with fractions. Candidates do not help themselves by not choosing the best and most efficient strategy. In Q3(a) it is easiest to work in pence, in Q3(b) it is easiest to multiply up to 150 g or 300 g and not try to find the cost per gram or amount for a penny. In Q6(a)(ii) it was the intention to use the table in part (a)(i) and divide by 2 not to use the graph and divide by 2 hours and 20 minutes. In question 9 there are ways to split the shape without involving too many decimals and in Q15(b) it is easiest to add together the second two fractions first, so $\frac{3}{20} + \frac{2}{15} + \frac{4}{15}$ becomes $\frac{3}{20} + \frac{6}{15}$ or even $\frac{3}{20} + \frac{2}{5}$ which is easier to deal with than 15ths and 20ths.

In algebra candidates were very good with the manipulation and with ‘completing the square’ being attempted much better this time. However when the algebra is hidden within a problem such as question 7, then they seem to struggle to produce linear expressions when later in the paper they were handling quadratic expressions and equations.

In shape and space reasoning for some candidates is a bit loose and we do like to see correct statements such as “vertically opposite angles” rather than just “opposite angles” and “angles on a straight line add to 180°” rather than “a line adds to 180”. We soon will require the correct terms for alternate, corresponding and allied angles and we will soon not accept terms such as “Z” and “F” angles. The angle properties of a circle are not well known despite the fact that they are regularly tested.
Statistics and probability is normally well answered, except when fractions have to be multiplied and added as in the case of Q15 in this paper. Again the selection of an efficient strategy is important to avoid lengthy calculations.

Comments on Individual Questions:

Question No. 1

In (a) some candidates having found the unit share of 40 then did not multiply by 5 thereby finding the amount of cement. In part (b) many divided by 9 instead of 2 and they therefore experienced problems with the division.

Question No. 2

In (a) many gave the correct value of the angle but they did not give the correct reason. The expected reason was ‘alternate angles’ however any correct reason was accepted providing evidence was offered that they had used that rule. In (b) the common error was to give an answer of 112° from 180° – 68° or 180° – 17° – 51°. In giving their reasons many candidates used expressions such as X-angles or F-angles. Such expressions will not be allowed in the new GCSE and centres are encouraged to ensure all candidates know the correct terminology.

Question No. 3

Part (a) was very well answered with most using the most successful method of finding 10% and 5% and adding those on to the 80p. A few attempted to multiply by 1.15 with varying degrees of success and a few forgot to add the 15% on or some even subtracted it. Part (b) was best answered by finding the costs for 150 g or 300 g for each packet as this involved simpler multiplication. Some however attempted to find the cost per gram, or even the grams per penny which are both methods more suited to the calculator paper and were rarely successfully due to the harder division involved. Many answers lacked structure and were difficult to follow, particularly those that were trying the harder calculations. Most attempted to compare all three packets but often struggled with packet A. Very few arrived at the wrong conclusion for their figures.

Question No. 4

The expansion of brackets was answered particularly well with almost all getting this right. The factorisation was also done well with just a few not fully factorising it. The most common error here was to try and factorise into two brackets with variations of $(3x \pm 3)(x \pm 4)$ being the usual attempt.

Question No. 5

Nearly all candidates attempted to draw a net and lines were generally ruled and neat, a tiny minority thought this meant making a 3 dimensional drawing of the rectangle. The most common errors were to draw the net for an open box or for a 6 by 3 by 3 cuboid, although this did have some correct sides. Extra faces or flaps were rare.

Question No. 6

Part (a)(i) was answered well except those who went for 770. However in part (a)(ii) the intention was that candidates simply had to use their answer to (a)(i) and divide by 2, the majority however went back to the graph and read the distance and time from it. The majority used 770 and the time taken 2 hrs 20 mins. Many candidates were understandably unsure how to deal with 2 hrs 20 mins, with common incorrect attempts including 220 minutes and 2.2 hours. The demand does clearly state “use your table” which few did. To ease the numeric demand some converted to minutes or even seconds and the units mark was dependent on the units used by each candidate.
In part (b) many did get the correct answer, but some gave 09 50 by subtracting one hour whilst others gave 15 00 taken from the final time. Part (c) was answered better still however some looked up 200 miles instead of 280 miles. There is a small number of candidates who still confuse the 24 hour clock with the 12 hour clock showing times such as 15 00 pm.

Question No. 7

This question was set to allow the use of algebra to solve the problem. However the most common method was using trials and although some did find the correct answer after only a few trials, less secure candidates often reached their solution after a significant number of trials presented randomly over the page. They tended not to use the evidence of the outcome of each trial effectively in guiding the choice of starting point for the next trial. A common error in the attempt at algebra was to fail to write the expressions with a single common variable, candidates then struggled to structure their algebra, often abandoning it part way.

Question No. 8

The whole question was answered well, in part (a) the plotting was usually accurate with a few exceptions. In part (b) most answered with ‘positive’ and in part (c) they usually gave a correct description of positive correlation in this context. The line of best fit was usually accurate although some were too steep. Estimates were accurately read from the line of best fit and the outlier correctly identified by many.

Question No. 9

The most successful responses were the ones with a systematic approach and with a clear labelled diagram. There were some who used a correct method but made careless numerical errors such as $13 \times 13 = 109$ or 269. There was no one single dominant method for splitting the area up, the errors were more common when there was a lack of a diagram or a poorly constructed diagram.

Question No. 10

In (a) the collection of terms and numbers was usually done successfully; however, 18 was a common result on the right-hand side in some responses. There was some careless division such as $\frac{22}{4} = 4.5$. Most attempts used algebraic manipulation, which is pleasing to see. In (b) the first step was crucial and the errors seen in this stage included dividing by 4 and square rooting. It is also important that the square root symbol covers both terms.

Question No. 11

In (a) many candidates were not aware of the concept of “leading question“. We did allow any suggestion of this type. In (b) many responses had over-lapping categories and some omitted the option of 0 journeys. The use of inequalities was rarely successful, unless used by the most able candidates. However we are sympathetic to this approach and we do condone consistent symbols. Candidates should be advised that the use of words or the hyphen is probably simpler. In (c) A was also quite a popular choice. In (d)(i) candidates did not always concentrate on the place being the important element. In (ii) this has recently become a current topic in the news media which we could not foresee. The intention was to focus on the lack of response, possibly through no-one answering the telephone and the chance that anyone could answer so introducing a biased element in the sample. In both parts we did widen our range of accepted answers.

Question No. 12

Many candidates seemed to be unfamiliar with the use of an unlabelled grid. However we do have to ask a certain number of unstructured questions. Some picked up the method mark with their own grid and some shapes correctly reflected, but even then could not express the transformation in the correct form. Many responses showed the ‘x’ lines as vertical.

Question No. 13

In part (a) almost all candidates attempted to equate coefficients by multiplying one equation by a scalar, with most correctly dealing with all three elements of the respective equation. The elimination of a variable proved challenging for some and a number chose the wrong operation, however there were the usual errors in dealing with negative numbers. Candidates that equated the coefficient of y were usually more successful than those that equated the coefficient of x in their elimination. Relatively few attempted to use substitution but usually good manipulation of the equations was seen and any errors made involved dealing with the directed number or the bracket manipulation. It seems as though fewer candidates have used trial and improvement this time. Most candidates could not answer part (b) correctly. In many successful attempts candidates wrote $(x - 5)^2$ clearly and then expanded it to x^{2} - $10x + 25$, which then made it possible to find the value of b.

Question No. 14

In (a) most gave the correct answer of $^{-}2$, the alternative was $^{-}3$ when they did not involve the 1^2 at the beginning. The plotting was usually good though some points where rather 'thick' and some curves had many lines looking like multiple attempts had been made. The important factors are that the curve is hand-drawn, goes through all the points and has a single line. Part (c) was asking for the points where the curve crosses the x-axis and it was surprising that some candidates misread the numbers on the axis, particularly for the negative solution where they still count left to right when it should be right to left.

Question No. 15

Most candidates completed part (a) correctly, a few did repeat ¾ and ¼ (or ⅓ and ⅔) in both parts. However in part (b) many did not know which branches to consider, and then they usually added all the fractions. The more successful ones wrote the products on the tree diagram and it was easier to keep the numbers as fractions rather than try to convert them into decimals. As three branches form the solution it was surprising that very few used the method
1 – P(pass+pass) which would have been much easier to work out.

Question No. 16

In (a) there was evidence of poor understanding of cyclic quadrilaterals. When the answer 55 was given the reason was often omitted or they used just the words "opposite" or "cyclic". Some even stated that "opposite sides added to 180". A common answer seen was 62.5 from half of 125 with "the angle at the centre", other incorrect reasons seen included "63 with corresponding or alternate angles", thinking AC and DE were parallel, "angles in a four-sided shape add to 360", and "angles in a triangle add to 180". In (b) candidates struggled to work out the answer here clearly indicating that the "alternate segment theorem" is not well known. Those who had already put 63 for part (a) were at a loss how to proceed and many struggled to use the language required to describe their reasoning. Incorrect reasons given included "alternate angles", "corresponding angles", "angles subtended from the same chord are equal" and "angles in the same segment are equal".

Question No. 17

In (a) most candidates recognised that they needed to use Pythagoras' Theorem and gave the correct equation, although a few tried to multiply rather than add while some failed to square the values correctly. The majority reached $\sqrt{52}$ but many could go no further or simply wrote $\sqrt{52} = 2\sqrt{13}$. Successful candidates reduced $\sqrt{52}$ into $\sqrt{2 \times 2 \times 13}$ or more frequently $\sqrt{4 \times 13}$ and a few lost out by writing $\sqrt{2 \times 26}$. In (b) most used the correct equation of $p^2 + q^2 = 7^2$ but few candidates understood the principle behind the question and frequently attempted using 'trial and improvement' with little apparent consideration of the outcomes achieved. Some failed by using integer values above 6 and others gave two pairs of integers or decimals. Others did not appreciate what an integer was and gave surds for both *p* and *q*. Unsimplified surds were fairly common but fortune smiled on those who selected 4 with $\sqrt{33}$ or 6 with $\sqrt{13}$ as they did not need to be simplified.

Question No. 18

In (a) most answered this correctly with common errors of 67×10^4, 0.67×10^6 and less frequently 6.7^5 or 67^4. A very common error in (a)(ii) was 9.2×10^{-4} and less frequently 9.2^{-3}. In part (b) the best responses explained rule for division of powers and illustrated this with the correct 10^8. Many simply stated that the power should be 8 but others failed by indicating the power of 2 was incorrect without showing why this was the case. Some suggested that division by a decimal would increase the number but did not indicate that it needed to be a decimal less than one and a few thought the error was due to not expanding the brackets.

Question No. 19

Many candidates recognised the technique expected, but used $100r = 32.4\ldots$ to achieve $\frac{32}{99}$ while others gave $\frac{324}{1000}$. When $\frac{324}{999}$ was given it was often without previous working. Some simplified as far as $\frac{36}{111}$ but candidates did not seem to be able to recognise divisibility by 3 in larger numbers.

Question No. 20

In (a) many candidates were unsure of the rules for indices. Working was often haphazard and difficult to follow. A common error was $x^9 \div x^{-3} = x^{9-3} = x^6$ leading to a final answer of x^3. Several incorrect methods led to a seemingly correct answer e.g. $x^3 \div x^{-3} = x^6$ or $x^{18} \div x^{-6} = x^{12}$ then $(x^{12})^{0.5} = x^6$. In (b) many candidates did not recognise the quadratics and attempted to cancel terms. It was common to see x^2 being cancelled in the numerator and denominator with $2x - 6$ being a common answer. Those who did factorise usually reached the correct final answer. A few gave an unsimplified answer while others spoilt a correct answer by further wrong cancelling of *x* to give $\frac{5}{3}$.

Question No. 21

Those who used vectors gained three marks showing DE and AB correctly. However, very few were able to make the correct final statement of AB = 4DE or something equivalent. Many thought that it was sufficient to have the answers $\mathbf{b} - \mathbf{a}$ and $4\mathbf{b} - 4\mathbf{a}$ without making a statement or a factorisation attempt. The most common mistake was writing DE as $\mathbf{a} + \mathbf{b}$, not recognising the change of direction, and then AB as $4\mathbf{a} + 4\mathbf{b}$. Often only comments such as 'they are going in the same direction' or 'one is four times longer than the other' were seen. Some did not use vectors and saw this as similar triangles or enlargement with sides in the ratio of 1 : 4 leading to AB being 4 times longer than DE and parallel to it. This was a more difficult strategy but would gain credit if the reasoning was correct.

J567/04 Paper 4 (Higher tier)

General Comments:

Candidates were generally well prepared for this paper and had the time to attempt all of the questions. They demonstrated a clear knowledge of the wide range of topics assessed. Most candidates performed well on the earlier questions in the paper. Their solutions were generally well presented. Diagrams and graphs were usually drawn accurately using the correct equipment.

Where candidates showed clear working, method marks could be awarded for a partially correct solution. In some cases, working was haphazard making it difficult to follow the process and award part marks. In questions requiring an element of problem solving, some candidates found it difficult to identify an appropriate strategy to reach the correct solution. Some candidates used a trial and improvement approach in many questions which sometimes reached a correct answer, but often led to inaccurate results which could not be given full credit. Many candidates would benefit from checking their work carefully and ensuring that the answers are sensible.

Candidates are expected to be able to be familiar with their calculator and use it efficiently on this paper. They should not round or truncate intermediate answers, which can lead to an inaccurate final answer, but should use the accurate values from their calculator. Some candidates used non-calculator methods to find percentages rather than using the more efficient multiplier method which is the appropriate method when using a calculator.

In the question testing quality of written communication, many candidates laid out their calculations clearly. They should also make it clear what they are calculating and, in this question, candidates were expected to be explicit about which angle they were calculating. Where comparisons are required, it is essential that the candidate states clearly what they have compared with what. If a candidate is required to show a result, they are expected to show a clearly laid out method that reaches a value given to more significant figures than the value given in the question. Full credit will not be given for a method that starts with the given value and works backwards.

Comments on Individual Questions:

Question No. 1
In part (a) candidates were expected to enter the calculation into their calculator with the correct use of brackets and write down the answer and correct it to two decimal places. Many candidates reached the correct answer of 1.61. Some candidates truncated their answer to 1.60. Some candidates used a less efficient method and wrote down intermediate stages which sometimes led to the correct answer. Some candidates gained a method mark for showing an incorrect value which they then correctly rounded to two decimal places.

Part (b) was answered well and many candidates showed the correct substitution into the formula. The most common error was when candidates failed to deal correctly with $^-4 \times {}^-0.7$ which usually led to a final answer of 0.8.

Candidates who knew how to use the cube root function on their calculator reached the correct answer in part (c). The answer should be stated as 26 and not 26^3. The most common errors were to find the square root rather than the cube root or to divide by 3.

Many candidates did not know the meaning of reciprocal so could not answer part (d). Both 0.4 and $\frac{2}{5}$ were acceptable answers although $\frac{1}{2.5}$ was insufficient. The most common incorrect answer was $\frac{5}{2}$.

In general candidates showed a good understanding of recurring decimal notation in part (e). In some cases candidates gave answers such as $0.77\dot{7}$ which was condoned. Candidates who relied on their calculator value and gave an answer of 0.77777778 did not score.

Question No. 2
Almost all candidates identified the largest number from the stem and leaf diagram in part (a)(i).

In general candidates knew how to identify the median in part (a)(ii). As the number of values was even, candidates had to be able to deal with the pair of values they had identified and many reached the correct answer of 14.5. Some candidates omitted the stem and gave an answer of 4.5. It was common to see answers of either 14 or 15 where candidates did not understand how to deal with the middle pair. Candidates are not expected to round the answer to an integer in a case like this, but where 14.5 was seen in their working and a rounded answer of 15 was given, candidates were not penalised.
In part (a)(iii) the majority of candidates found the correct fraction $\frac{3}{10}$ and simplified it to $\frac{1}{10}$. As the question asked for a fraction in its simplest form, 0.1 was not an acceptable final answer.

In part (b) many candidates used the extra columns in the table to list the midpoints and the products of midpoint and frequency, then going on to reach the correct mean of 3.6. Again, candidates were not expected to round their answer to an integer but they were not penalised if 3.6 had been seen. Having found the correct sum, some candidates divided by 5 (the number of groups) or 25 (the sum of the midpoints) instead of 50 (the sum of the frequencies). Only a very small number of candidates used the class width or the endpoints of the intervals in their calculations. Some candidates attempted to calculate cumulative frequencies or frequency densities.

In part (c) many candidates carried out the correct calculation to find one number as a percentage of the other, although not all of them rounded their final answer to three significant figures as required by the question. A common error was to divide 500 by 158.66 in which case candidates could be awarded a method mark if the correct rounding of their result was seen. Some candidates used a step-by-step approach by finding 10%, 5%, 1% etc and then adding multiples of these together to try to reach 158.66: this approach is inappropriate for a calculator paper and seldom reached a sufficiently accurate result.

Question No. 3
In part (a) some very good diagrams showing all construction lines and clear shading were seen. The perpendicular bisector of AD was often drawn using measurement rather than by constructing a pair of arcs in which case a maximum of 3 marks could be awarded. If candidates had constructed the bisector and arc, they generally shaded the correct region. Common errors included bisecting angle A or drawing arcs from A and B although most candidates gained at least 1 mark.

In part (b), candidates who could recall the formula for the circumference of a circle usually reached the correct answer and stated it correct to three or four significant figures. Candidates who showed no more accuracy than two significant figures were only awarded the method mark.

The most common errors were to find the area of the circle or to multiply π by the radius rather than the diameter.

To gain full credit in part (c), candidates were expected to use the fact that the interior angle of a hexagon is 120° and to show that three of these angles make 360°. The majority of candidates did not realise that they needed to state the size of the angles. General descriptions such as ‘the shapes are identical so they fit together’ or ‘all the angles are equal’ or ‘a hexagon has 6 sides’ were common and did not score. There was some confusion between interior and exterior angles and also use of angles on a line rather than angles at a point. Some candidates said that the shapes would not fit together.

Question No. 4
In part (a), the majority of candidates realised that relative frequency was a fraction and some went on to convert this to a decimal or percentage, any of which were acceptable. Common errors were to find 160 ÷ 43, rather than 43 ÷ 160, or to simply give the answer 43.

In part (b) most candidates understood how to use the relative frequency to estimate the required number from the population and reached an answer of 285. Some candidates calculated the multiplier 7.5 from 1200 ÷ 160 but went on to multiply by the wrong frequency. There was a misunderstanding of the term ‘estimate’ in this context by some candidates who thought that they needed to round the numbers used.

Question No. 5
Some very good correct ruled lines that covered the full width of the grid were seen in this question. Unlike previous years, very few candidates plotted points without joining them and few candidates did not use a ruler to draw their line. As the equation was given in its implicit form, rather than the more straightforward explicit $y = mx + c$ form, some candidates made errors in finding pairs of values of x and y. The question did not provide a table of values for candidates to complete and few candidates drew their own table of values. Many candidates who drew incorrect lines gained 1 mark for one correct point plotted, usually (5, 5), (0, 2.5) or ($^{-}5$, 0). Some candidates used the values in the equation and drew graphs crossing the x-axis at $^{-}5$ or 5 and the y-axis at 5 or 2. Only a very small number of candidates drew curves.

Question No. 6
A reasonable number of candidates reached the correct answer to this problem, either following prime factorisation of 180 or a trial and improvement approach. The most elegant method of solution was to say that $2^k \times 3^k \times 5 = 180$ so $6^k = 36$ so $k = 2$. Some candidates used factor trees or Venn diagrams which also led to correct answers in some cases. There was confusion seen between lowest common multiple and highest common factor in some cases when candidates gave values of P and Q greater than 180. When using a trial and improvement approach, it was common to see a large amount of disordered working out, which often included the correct solution, but candidates did not always identify this in their working and gave different values on the answer lines.

Question No. 7
In part (a) most candidates changed the subject of the formula correctly. The correct algebraic steps required were clearly shown in many cases and the use of a flow diagram method was rarely seen. Where errors occurred they usually involved failure to change signs as the terms were changed from one side of the formula to the other, division of the e, but not the 5, by 7 and transposing of the e and f.

Part (b) was also well answered with most candidates giving the correct inequality, $x > 4$, as the answer. Some candidates who treated the question as an equation in order to solve it, failed to revert to an inequality for their final answer and $x = 4$ or simply 4 were common errors that were awarded 1 mark.

Question No. 8
In part (a)(i) most candidates translated the triangle correctly. Some candidates showed a correct displacement in one direction only and a small number reversed the *x*- and *y*-displacements.

In part (a)(ii) many candidates gave the correct centre and scale factor for the enlargement. Some candidates quoted the centre of enlargement as a vector rather than as coordinates and some candidates just gave the scale factor. Candidates who drew rays from B to A were generally more successful in identifying the centre correctly.

In part (b) most candidates correctly found the perimeter of the enlarged shape. Candidates did not always understand the concept of the effect of enlargement on perimeter and did not simply multiply the original perimeter by the scale factor. It was common to see a rectangle with perimeter of 10, usually 2 by 3, which was scaled up in order to find the perimeter of the enlarged rectangle.
In part (b)(ii) correct answers were less common. Again the effect of enlargement on area was not understood and few candidates multiplied the area by the scale factor squared. Candidates who drew a rectangle and scaled it up were often successful. The most common incorrect answer in this part was 24 from multiplication of the area by the scale factor.

Question No. 9
Most candidates gave the correct expression for the *n*th term of the sequence in part (a). Partially correct expressions such as $5n + 6$ or $5n – 1$ were sometimes seen and only a very small number of candidates gave incorrect answers such as $n + 5$.

Candidates who reached the correct answer in part (b) had used a variety of methods including algebraic solution, trial and improvement and continuation of the two sequences. The most common method was continuation of the sequences and where this was done methodically it often resulted in the correct answer. Many candidates using this method set out their work in a disorganised manner, made arithmetic slips or showed insufficient terms of each sequence leading to incorrect results. The algebraic method was often clearly laid out and correct, although some errors in signs were seen when collecting terms. Candidates using trial and improvement often used insufficient trials to reach a solution or did not use the same value of n in both sequences. Some candidates were confused between the term number and the term value and, having reached the correct values, gave v as 17 and n as 86.

Question No. 10
In part (a) candidates who understood that a reverse percentage calculation was required and correctly identified that the total bill was 112.5% of the cost of the meal usually reached the correct answer. Many candidates found 87.5% of the total bill or found 12.5% and added or subtracted it from the total. This was another question where inappropriate non-calculator methods were common. Candidates did not always recognise that the answer should be given to two decimal places in a money question, so £30.8 was common when £30.80 was expected, although, in this instance, this was not penalised.

Candidates were more successful in carrying out the compound interest calculation in part (b). Those who used the formula generally reached the correct answer. Candidates who approached the solution using less efficient year-on-year calculations sometimes used incorrect or inappropriate rounding of intermediate values or had transcription errors in their working which led to an inaccurate final answer. This method often included breaking down the percentage into 10%, 2% and 0.4% which led to errors. Some candidates used an incorrect multiplier of 0.24, 1.24 or 2.4 and others used simple interest rather than compound interest. A small number of candidates carried out a percentage reduction calculation. In this question if candidates had checked whether their answer was reasonable it would have led many to realise that they must have made an error as an answer of £5355.15 is clearly wrong as it is less than the starting amount and an answer of £79 626.24 is clearly wrong as it is far too large.

Question No. 11

In part (a) many candidates started by drawing the triangle correctly on the grid. Following this, few identified that they needed to use Pythagoras's theorem to calculate the length and many measured the length of AC in their triangle. The wording of the question indicated that a calculation, rather than a measurement, was required.

When candidates found the horizontal and vertical distances for the sides they often used these to find gradients, rather than lengths, of the lines. Where Pythagoras was used, it was often on triangle ABC with lengths assigned to AB and BC either by measurement or by counting squares. Candidates who had identified the correct horizontal and vertical distances for AC and used Pythagoras usually reached the correct final answer.

In part (b) most candidates gave the correct coordinates for vertex G although some had not read the question carefully and used a side length of 1 cm, leading to the answer (1, 1, 1). Most candidates identified the correct vertex in part (ii) with the most common error being vertex F where the *y*- and *z*-axes were confused.

Question No. 12

Many candidates plotted a correct, accurate box plot in part (a). The most common error was for candidates to plot all of the given values leading to the median being plotted as the lower quartile and the interquartile range being plotted as the median in their box plot. Candidates should be made aware that they may need to do a calculation in this type of question, in this case calculating the lower quartile using the upper quartile and median. A small number of candidates appeared not to know what a box plot was.

Candidates who understood how to interpret a histogram gave the correct answer of 15 in part (b)(i). It was common to see answers of 0.5 which was simply a reading of the frequency density.

Some candidates gave correct answers with clear comparisons of the two surveys in part (b)(ii). Having reached the correct percentage of 60% in Sonia's survey some candidates failed to compare this with the 75% in the national survey, either just stating Sonia's result or saying that it was different to the national survey. Some candidates misread the scales on the axes leading to incorrect frequencies or incorrect bar widths. Candidates who showed their method clearly often gained some credit in this question, as even if the frequencies had been found incorrectly or frequency densities used, method marks were available for calculating the percentage and for making a clear comparison between the two surveys using their results.

Question No. 13

Many candidates were able to use trigonometry correctly to calculate the angle of the roof and then use the given information to identify the correct types of tiles. As this was a quality of written communication question, in order to gain full credit, working had to be mathematically correct and clearly laid out with the calculations clearly identifying the angle being found, together with a clear conclusion identifying the appropriate tiles.

There were a number of reasons for one mark being lost after reaching the correct angle: failing to identify the angle calculated as the pitch angle, selecting just pantiles, misunderstanding the inequalities and hence selecting slate and plain or not setting out the calculations in a mathematically correct way. Candidates were expected to show sufficient accuracy in their calculations and indicate clearly what values they were using, so expressions such as $\sin^{-1}$(ans) were not acceptable for full credit.

Candidates generally coped with being given more information than was required although some did use all three trigonometric ratios rather than just one. The majority of candidate used right-angled trigonometry although sine and cosine rule were also seen. Some candidates who used the cosine rule were unable to rearrange it correctly to find cos *A*. A small number of candidates used a reverse method and found the height of the roof or the length of the slope using the angle given for each type of tile, though they were then often confused about what to do with the values they had calculated.

Question No. 14
Some clear and correct algebra was seen in part (a). Candidates who began by eliminating the fraction often reached the correct result, although some errors in signs were seen when collecting like terms. Candidates are expected to give the exact solution to the equation, so in this case a fraction was more appropriate although answers given using recurring decimal notation or correct to three significant figures were accepted. Some candidates attempted to eliminate the fraction but only multiplied one of the terms on the left-hand side by 5. Method marks were awarded for correct algebra seen, so a correct solution of the resulting equation could gain partial credit. Weaker candidates attempted solution using trial and improvement which was generally unsuccessful.

Many candidates correctly subtracted the algebraic fractions in part (b) and reached the correct answer. As the question did not require an answer in its simplest form the common answers of $\frac{7}{10y}$ and $\frac{7y}{10y^2}$ were both accepted. Some candidates attempted to use a common denominator but failed to deal with the *y* terms correctly and reached an answer of $\frac{7y}{10y}$ or $\frac{7}{10}$ which were both given 1 mark. Some candidates simply subtracted the numerators and subtracted the denominators and did not score.

Question No. 15
In part (a) some candidates identified the upper bound correctly as 505. Common incorrect answers included 510, 550, 504, 504.9 and 500.5.

In part (b) most candidates gained some credit, often for showing a division of a value appropriate for the mass of the sack by a value appropriate for the mass of a small bag using consistent units. Some candidates then went on to gain a second method mark for rounding down the result of their division. Only a minority of candidates identified that the minimum number would be found by dividing the lower bound of the mass of the sack by the upper bound of the mass of the bag. A number of candidates failed to convert correctly from kilograms to grams with 2000 g being a common incorrect conversion of 20 kg. Some candidates did not appreciate the need for bounds in this question and simply calculated 20 000 ÷ 500 = 40.

Question No. 16
In part (a) many candidates clearly understood what was required in factorising an expression. Many candidates realised that $15x^2$ was the product of $5x$ and $3x$ or $15x$ and x and went on to give an expression that expanded to give $15x^2$ and $^-2$. Very few candidates went on to check that

the expansion of their brackets would also give + x as the third term. Some candidates simplified the problem by factorising $x^2 + x - 2$, then multiplying their result by 15 and others tried to take out a common factor, often of only the first two terms.

In part (b) many candidates attempted to use the quadratic formula to solve the equation and many substituted the values correctly. The more effective working quoted the quadratic formula, identified the values of a, b and c in the given equation before substituting them into the formula. Common errors were to omit the negative sign for the value of c, not to write the ± symbol in front of the square root or to use a short division line. The quadratic formula is given on the formula sheet on the paper, so candidates should be able to quote it correctly. Most candidates gave their answers to two decimal places as required by the question. Some candidates attempted to factorise the equation or used trial and improvement to find a solution. Candidates who attempted to complete the square were generally unsuccessful.

Question No. 17
Candidates who answered the question correctly usually worked in two stages, first using the relationship $m = kd^3$ to find the value of k using the values for the 3.5 mm diameter ball then using this value of k with 5.5^3 to find the mass of the second ball. Having found a correct value of k, some candidates then went on to use 5.5 rather than 5.5^3 in their second calculation. Inappropriate rounding of k to 4 rather than 3.97 led to an inaccurate final answer. Although a proportionality relationship was often identified, many candidates misinterpreted the information given in the question and a common answer of 267 was seen from using $m = kd$ or 420 from $m = kd^2$.

Question No. 18
In part (a) some candidates identified the correct translation of the given parabola. Some sketches were careless and if the parabola drawn crossed the given parabola credit was not given. It was common to see translations of the given parabola down, to the left or to the right.

In part (b) many candidates identified the correct shape of curve required but the curve drawn seldom passed though the correct points at 0°, 90°, 180°, 270° and 360° as required. Many candidates drew graphs of sin x, cos $2x$ or other incorrect trigonometric functions. In some cases the correct key points were shown but joined with straight lines rather than a curve.

Question No. 19
In part (a), candidates were required to show a correct trigonometric calculation and give the answer to at least four significant figures to gain full credit. Many candidates simply showed 3 tan 62 = 5.64, so lost the accuracy mark. Many candidates also used the sine rule correctly to solve the problem. Candidates who started a trigonometric calculation using the 5.64 given in the question could gain partial credit if a correct statement were seen. It was common for candidates to use Pythagoras's theorem with 3 and 5.64 to calculate the hypotenuse EM, and then to use this value in another Pythagoras calculation with 3 to reach 5.64 again: this type of circular argument was not given any credit.

In part (b) candidates who knew the formula for the volume of a pyramid reached the correct answer. Few candidates knew this formula, and it was common to see either base area × height or ½ × base area × height used. Other candidates referred to the formula sheet, which does not include this formula, and used the formula for the volume of a cone with the length of the base in place of the radius.

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