Examiners' Report June 2009

GCSE

GCSE Mathematics (Linear) 1380

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1. PRINCIPAL EXAMINER'S REPORT – FOUNDATION PAPER 1

1.1. GENERAL COMMENTS

1.1.1. This paper was of a similar standard to that of last year. At the lower level it was perhaps slightly more demanding.

1.1.2. Most questions on this paper were accessible to the vast majority of the candidature. Only in question 18 was it clear that candidates, in general, did not understand what was required.

1.1.3. The use of a protractor, question 16, was very poor and should be an issue for centres. It is pleasing to note the success in long multiplication, question 17. However not having a context in this question most certainly contributed towards its success.

1.1.4. Candidates were often let down by poor use of English in explanations. Trial and Improvement methods were used to solve many questions, often leading to much more work than necessary.

1.2. REPORT ON INDIVIDUAL QUESTIONS

1.2.1. Question 1
All parts of this question was answered well with the vast majority of candidates scoring full marks.

1.2.2. Question 2
Most candidates were able to score full marks on this question, many without showing any working. Failure to achieve full marks was usually a result of arithmetic error.

16 + 9 = 24 and 30 − 25 = 15 and also 30 – 25 = 4 were common errors. Some candidates failed to subtract, giving their sum of A and B as the answer and some gave the answer 3.2 from actually measuring part C of the diagram.

1.2.3. Question 3
Candidates clearly understood that 50% is equal to one half and were able to correctly find a half of £60 in part (a). In part (b), whilst knowing that 25% is equal to one quarter, there were a significant number of arithmetic mistakes in dividing 20 by 4; an answer of 4 was a common error.

1.2.4. Question 4

All but a few candidates were able to demonstrate their ability to draw a 7 cm line accurately. However this was often not drawn from the given point. Candidates did not lose the mark for this provided their intended 7 cm line was unambiguous. Following their success in part (a), the vast majority were then able to place the point *Q*, 3 cm from *P*, again not always following the directions of the question and often merely placing a letter *Q* on their line.

Those whose measurements were incorrect were often 1 cm short, indicating they had started from 1 instead of 0 on their ruler. There was still some evidence of candidates not having a ruler.

1.2.5. Question 5

The identification of subsequent terms in this sequence was usually correctly done. Some candidates wrote the next term (116) on the dotted line of the sequence and gave an answer of 114 in part (a). This was not penalised and the mark was awarded. Whilst in part (b) the correct answer of 112 was usually given, a few candidates found the seventh subsequent term (104) in error.

In part (c), the majority of candidates were awarded the mark for responses of “because they are all even” or “because 9 is an odd number”. Many candidates felt that it was sufficient just to say something like “because the numbers go down in 2’s”. This gained no credit.

Several candidates used the word ‘uneven’ to describe odd and ‘equal’ to describe even.

1.2.6. Question 6

In parts (a) and (b), many candidates were confused in distinguishing between perimeter and area. Many gave 12 as their answer to part (a). In part (b), the omission of units was common, even when the area was correct. In part (c), many candidates successfully found the correct volume by working out 5×3 or more usually by simply counting the cubes. The most common errors seen were either calculations of 3×3×3 (=27) or mistakes in counting methods leading to answers of 13 and 14, which gained 1 mark, and sometimes 12 which gained no credit.

1.2.7. Question 7

Most candidates correctly identified the time of arrival of the 07 30 train to Alton. However the calculation of time differences required in part (b) was less than satisfactory; many candidates making simple arithmetical mistakes. In part (c), many candidates correctly identified the appropriate train but gave the time of arrival at Hexham (10 45) instead of the time from Crook (10 15).

1.2.8. Question 8

Part (a) was, in the main, answered correctly; however in part (b), 4000 and 4120 were common errors.

1.2.9. Question 9

Only one in three candidates was able to give the correct number of vertices of the cube; 6 and 12 being the most common mistakes. Part (b) was very well answered.

1.2.10. Question 10

Only a very few candidates failed to answer part (a) correctly.

In parts (b) and (c), whilst about 60% of candidates gained full marks, many errors were made. The most common incorrect pairs of answers were, (b) 3.3, (c) 3.2 (or 4.2) gaining no marks and either (b) 3.5, (c) 3.5 or (b) 3.6, (c) 4.4 which each gained 1 mark.

A number of candidates failed to write a decimal point in their answers. It was never clear if this was a simple omission or whether it was a result of confusion with the scale.

1.2.11. Question 11

Most candidates were able to correctly write down the coordinates of points *P* and *Q*, ×although a significant number reversed the coordinates to give (6, 4) and (3, 0) respectively. A significant number gave (1, 3) instead of (0, 3).

In part (c), the *x*-coordinate (2) was usually correct, but a *y*-coordinate of 4 or 5 was common. Some candidates reversed the coordinates to give (4.5, 2). This gained 1 mark only.

1.2.12. Question 12

Most candidates were able to identify the lowest temperature as –4°C in part (a). Arithmetical errors prevented about 20% of the candidature gaining credit in part (b).

In part (c), very few candidates demonstrated any method; consequently many errors were made in finding the middle number. Had more candidates drawn and used number lines, many more would have been successful.

1.2.13. Question 13

Whilst parts (b) and (c) were usually correct, in part (a) many candidates gave “unlikely” as their answer. Perhaps some candidates were unaware of the meaning of an ‘ordinary’ dice.

1.2.14. Question 14

Answers to part (a) were usually correct. In part (b), many ignored the order of operations (BODMAS) and simply worked from left to right to give an incorrect answer of 60. In part (c), many candidates were unable to correctly compute 7 × 7; answers of 42 and 56 were common.

1.2.15. Question 15

In part (a), the majority of candidates gained the mark, although answers of $12x$ and 4 were often seen. $3y$ was the most common incorrect answer seen in part (b) and only about one half of the candidature gave a correct answer of y^3.

Only 40% of candidates gained full marks in part (c) of this question; the most common error being either to add the two terms in x to give $6x$ or to write $-8y$ instead of $+8y$. Some candidates, in their working, wrote $2x + 8y$ and then gave an answer of $10xy$ or similar. Even though the correct answer has been seen, in these cases just 1 of the 2 marks is awarded.

1.2.16. Question 16

Accurate use of a protractor was seen to be poor with very many candidates unable to draw angles of 60 and 30 degrees.

A correct angle at A was often followed by candidates just joining B to the point given by the protractor, giving an incorrect value of 70^{o} for C In part (b), many gained a mark from either knowing that 90^{o} was the required angle or by accurately measuring their angle at *C*.

1.2.17. Question 17

This long multiplication question was pleasingly well done with very many candidates gaining some marks; often 2 or 3. Those candidates using 'traditional' long multiplication methods were usually successful although simple arithmetic error or place value error was not uncommon. Many candidates chose a 'multiplication table' method, often getting just one cell incorrect, for example 20 × 30 = 60 or 6000 or 500. The 'Napier bones' method was also seen and was often successful when the structure of the table was correct.

A common incorrect answer seen, gaining no marks, was 624 (20 × 30 + 6 × 4).

There were significantly fewer candidates attempting repeated addition this year.

1.2.18. Question 18

This question was very poorly answered, with many candidates realising that the lines were not parallel but unable to give acceptable explanations as to the reason. “Because the two angles are not the same” was the modal incorrect explanation given. Only a very few candidates carried out any calculation to justify their conclusion.

1.2.19. Question 19

Whilst the correct answer of 56 was the most common response in finding the size of the angle in part (a), an alarming number of candidates made errors in their calculation of 180 − 124; 46 and 66 being seen many times. Many candidates were able to give a satisfactory reason for their answer in part (ii) but still many were just repeating their working that gave them their answer in (i), or simply saying that the sum of the angles is 180^{o} without explaining why.

In part (b), about two thirds of the candidature gave the correct answer. For many, poor arithmetic in subtracting 68 from 90 was responsible for the loss of the mark.

1.2.20. Question 20

In many cases in part (a), candidates gave a fraction of $\frac{90}{600}$ and then either failed to simplify it correctly or failed to complete the simplifying process.

Part (b) was quite poorly answered, many candidates misunderstanding the demand of the question and trying to find 180% of 600. Many tried partitioning methods and often statements like “10% = 60” were seen but solutions were unable to progress and no marks could be awarded.

In part (c), the most popular misconception was to divide 330 by 2 (instead of 3) and then to divide their answer by 2 again; 82.5 or similar being a common incorrect answer seen. Some candidates failed to take account of both the yellow and red counters already having been used, omitting usually just one of them, leading to an answer of 140 or 170. One mark was awarded in these cases.

1.2.21. Question 21

The two-way table in part (a) was usually completed accurately, although a number of arithmetic errors were in evidence. In the table, the car column caused the most problems for candidates.

In part (b), the correct answer of $\frac{37}{100}$ (or 0.37 or 37%) was the most common response. Answers of 37 and 1/37 were also seen. There were also several who did not realise a numerical answer was required, responding with "unlikely"
In part (c), most candidates scored at least one mark for using either 46 or 24 in their working. Many failed to score full marks with answers of 1/46 and 24/100 being common errors. Some failed to see "not", giving an answer of 22/46. Following the correct answer in (b), many candidates gave $\frac{63}{100}$ as their answer in (c), having not fully read the question correctly.

There were less candidates giving unacceptable notation but ratio and 'out of' were still seen on several occasions.

1.2.22. Question 22

Many candidates gained at least one mark in this question for quoting either $2c$ or $4r$ or their equivalences. However $c^2 + r^4$ and $6cr$ were common mistakes.

$2c = c^2$ showing a basic misconception was also seen.

1.2.23. Question 23

Many candidates were able to gain full marks in this question; however many did not as a result, once again, of poor arithmetic. Errors were made in summing the three given angles but the majority of mistakes were for inaccurate subtraction of 318 from 360; 52, 58 and 62 being seen often.

The greater concern in this question is the vast number of candidates thinking that 380^o is the sum of the angles of a quadrilateral.

1.2.24. Question 24

Very many candidates employed trial and improvement methods in their attempt to solve these two linear equations. In part (a), this lead to many embedding the answer of 2 in their working and giving an answer of '9' on the answer line. This often gained one mark.

In part (b) such methods were less successful with the answer being a fraction. Incorrect answers of 6 or 7 or 6r1 were commonplace.

Many candidates are clearly unaware of the meaning of $2x$ and $2y$, using them as $2+x$ and $2+y$ respectively, giving answer of (a) 4 and (b) 11. (a) 8 , (b) 13 were also common wrong answers.

1.2.25. Question 25

Many candidates, in part (a), were able to gain at least one mark for correctly rotating the given shape through 90^o in a clockwise direction, although many failed to score both marks as a result of their rotation not having been made about the required centre. Some candidates attempted rotations in each of the quadrants and usually failed to score at all, having made at least one further error.

In part (b), very few candidates scored full marks. Whilst many gained a mark for comments such as “move 3 units to the right and 1 unit down” only a minority correctly mentioned ‘translation’ in their description. Sometimes incorrect use of a column vector contradicted earlier statements and marks were lost. Surprisingly many candidates miscounted how many squares to the right P had been translated; – 4 or 2 were often seen.

Another common response was “across/along 3 units and down 1”. This gained no marks.

A few gave responses such as left 3 and up 1 mapping Q to P by mistake.

1.2.26. Question 26

In part (a), candidates often failed to gain the mark when their explanation was unclear. For example, comments like “because the are the same” are ambiguous. To gain the mark, explanations needed to refer to the sides of the rectangle and not the equation.

As in question 24, algebraic methods were few and far between, many attempts leading to an answer of 6.5 ($2x = 12 + 1$) Some candidates correctly found x to be 5.5 and then tried to use this result to answer part (a). Again, in this question, trial and improvement methods were common.

Having found a value for x in part (b), many failed to use it in an attempt to find the perimeter in part (c). Often just the lengths of two sides were calculated leading to incorrect answers of 11 (5.5 + 5.5) or 46, the sum of the two longer sides.

1.2.27. Question 27

The understanding of this topic is mixed. Clearly many candidates are confused with the terminology of side/front elevation and plan in part (a), very many simply copying one of the two elevations shown.

In part (b), attempts at a 3-D sketch were generally good and many candidates scored at least one mark in this part.

1.2.28. Question 28

Most candidates were able to gain some marks in this question. Often the loss of marks reflected the lack of comprehension or carelessness in reading the question. Some gave answers to part (a) in part (b) and to a lesser degree vice versa. In part (a), many candidates asked a suitable question but failed to give response boxes for the alternative replies.

In part (b), failure to quote a time period or giving over-lapping response boxes were the main reasons why marks were not awarded. Candidates should ask themselves the question “Could I put my tick in more than one box?” If the answer is ‘yes’ then the response boxes are over-lapping and therefore need correcting.

Many candidates mixed up their responses to 28(a) and (b) or tried to combine them into a longer series of questions.

1.2.29. Question 29

In part (a), 57% gave the correct answer. Parts (b) and (c) were less well done, with incorrect positioning of the decimal point accounting for the majority of the errors made.

1.2.30. Question 30

It is true to say that performance in part (a) was better than that in part (b), however this question was, in general, not well answered. In part (a), one .mark could be gained by correctly finding a half of 72; many failed to get any further than this, usually dividing 36 by 2 to give 18 as their final answer. Some tried to find the square root of 72 and then divide the result by 2

Many candidates simply did not know where to start in part (b), often simply quoting factors of 72. Any attempts at drawing a factor tree often resulted in the award of one mark, but few completed the process to a correct conclusion. Answers of $2 \times 2 \times 2 \times 9$ and 2, 2, 2, 3, 3 and 2+2+2+3+3 were seen on a number of occasions.

2. PRINCIPAL EXAMINER REPORT – FOUNDATION PAPER 2

2.1. GENERAL COMMENTS

2.1.1. A significant weakness running through several questions relates to technical terms or key words. This includes naming angles (Q2), circle parts (Q3), statistical terms (Q6), solids (Q7) and types of number (Q13).

2.1.2. Presentation of answers was a concern on this paper. Candidates need to write their figures clearly enough to be read. For example, it is sometimes unclear as whether a digit is a 4 or a 9; 0 and 6 are also sometimes not clear, as are 5s and 6s in some respects. Correct money notation needs to be used, and candidates sometimes confuse the use of commas and decimal points. Candidates who work in pencil frequently rub out valuable working, and their work is far less legible than a candidate who works in black ink. Work presented in red or coloured ink is frequently illegible. The proportion of candidates who present only answers without working run the risk of no marks awarded (if the answer is incorrect).

2.1.3. Rounding is a problem for many, particularly when the calculator display shows many digits and candidates choose not to write down all the numbers. Essential advice for candidates in this context is to always write down the full version of the number and then round.

2.1.4. Most centres correctly advise candidates to have the correct equipment for an examination. Many candidates did not have a compass (evidenced in Q3, 19) or a calculator (evidenced throughout). Candidates should be taught how to use calculators sensibly: always write down the numbers and operations they put on the calculator, and copy the full display; write the final answer with correct notation, ensuring it is a sensible answer.

2.1.5. The use of algebra continues to be a weakness. This was highlighted when candidates were substituting numbers incorrectly into algebra (Q18) or manipulating basic algebra (Q23).

2.2. REPORT ON INDIVIDUAL QUESTIONS

2.2.1. Question 1

This was a well answered question with most candidates scoring full marks. Occasionally candidates lost marks in part (b) by giving the incorrect answer of £3.5, or in part (c) by confusing the use of commas and decimal points (eg 3.510)

2.2.2. Question 2

Most parts of this question were well attempted, errors coming from not understanding the technical terms. For example in part (b) a minority of candidates marked obtuse angles. In part (c) it was important to draw a shape in which examiners could identify two pairs of sides that were approximately the same length, but those candidates who failed to use the grid as a guide, or whose diagrams were so roughly drawn failed to make this clear.

2.2.3. Question 3

In part (a) it was obvious that many candidates did not have a compass, and therefore wasted this mark. Those who did have a compass usually presented an accurate circle. In part (b) it was surprising the number of candidates who failed to draw a diameter. A common error was predictably the drawing of a radius, but many drew the diameter as a chord, perhaps through the letter C rather than the centre X, or left the question blank.

2.2.4. Question 4

Most candidates gained full marks on this question. Where they did not it was usually due to misunderstanding or misreading of the question or simple mathematical errors. In (b) it was not uncommon to see the answers embedded in working, or shown as seven £8.65s added up in working without the answers “7” on the answer line. Examples of errors in (c) include calculations for 1 adult and 1 child, or incorrect/missing subtraction of £18.45 from £20 in part (c).

2.2.5. Question 5

A well answered question in which the only mark lost was usually in part (d). In this part it was the quality of the explanations on which the mark was awarded. Failure to mention the significance of the “3” usually rendered the explanation incomplete.

2.2.6. Question 6

Parts (a), (b) and (d) were usually completed well. It was unfortunate that a significant number of candidates failed to attempt part (a), which is inexplicable. In part (c) many candidates did not understand the term “mode” , and some put “10” rather than the colour as requested.

2.2.7. Question 7

Poor spelling was not penalised as long as the word could be unambiguously associated with the solid. Nevertheless it was disappointing that 20% of candidates were unable to name these common solids correctly.

2.2.8. Question 8

Most candidates gave $\frac{9}{12}$ as their initial response, but not all cancelled their fractions correctly. Part (b) was also well answered. Only 50% of candidates were able to give this common fraction as a decimal, with many giving incorrect answers such as 3.0, 0.03, or failing to attempt the question. Part (d) was answered far better.

2.2.9. Question 9

This was a well answered question. The only common errors was not placing the ruler correctly on A, measuring the distance between the letters A & B rather than the line AB, and placing the midpoint inaccurately "by eye" rather than by measuring.

2.2.10. Question 10

Parts (a) & (b) were well answered. There were a few minor slips in tallying, and the frequency column was sometimes misplaced, but rarely inaccurate. Part (c) was poorly answered. Many misunderstood the term "range", whilst a significant minority calculated this from the frequency (7-1).

2.2.11. Question 11

Those candidates who showed their method in part (a) usually wrote 6×3+4; too many incorrectly calculated 6×3. In part (b) the most common error was to divide 52 by 6 and then subtract 4, but many failed to show any working.

2.2.12. Question 12

This was a well-answered question in which the only errors concerned using scales.

2.2.13. Question 13

Part (i) was well answered. However, in parts (ii) and (iii) there was much miss-understanding of the terms "factor" and "prime". In the former candidates chose numbers that were not factors, or 42, and in the latter chose numbers that were not prime numbers.

2.2.14. Question 14

Part (a) was answered correctly by the majority of candidates. Part (b) was less well done, with some candidates trying to identify a further case of reflective symmetry. A significant minority of students answered (a) and (b) the wrong way around.

2.2.15. Question 15

Candidates were generally successful in calculating the unit fraction of the amount, but there were many errors in calculating 2/9 of 36. Those candidates who attempted to add the two fractions usually made errors, with many giving the sum incorrectly as $\frac{3}{15}$ after adding both numerators and denominators. Once fractions had been added candidates became unstuck as to where to go next with the solution, generally giving the complimentary fraction as the final answer, thus failing to interpret the context of the answer.

2.2.16. Question 16

Performance on this question was poor, with only ¼ of candidates scoring significant marks. Angles or calculations leading to angles were rarely shown; many pie charts appeared to have been drawn only roughly in proportion to the figures, but scored no marks as the angles, when measured, were rarely accurate. Some inaccuracies arose due to sectors being drawn freehand. Labelling showed some improvement, but without some accurate angles did not attract marks on their own.

2.2.17. Question 17

It was surprising how many candidates gave an incorrect answer for this question. It was clear that many did not have calculators, and struggled to multiply the three figures together; many answers suggested that a significant number resorted to guessing the answer. Some attempted to add the numbers, suggesting they did not know how to calculate volume, or were trying to find the edge length.

2.2.18. Question 18

Many candidates struggled with the algebra in this question. Many attempts at substitution were spoilt by incorrect use of operations (eg 1.8+-8 in part (a)) or incorrect transcribing of negative values. In part (b) few gained a mark for substitution by not writing the full equation; though some got as far as stating the 36. Many answers showed no working in either part.

2.2.19. Question 19

Many candidates did not attempt this part, and few earned marks. It was clear that many did not understand the term "bisect". Some drew a line through the angle, but it was hardly a bisector. Some who had a compass started by drawing a pair of arcs, but then could not progress the solution.

2.2.20. Question 20

The majority of candidates gained full marks for this question. The main misconception was in the operations required, and it was not uncommon to find candidates applying the operations the wrong way around in (a) and (b). Again the absence of a calculator was an inhibitor, leading to complex multiple addition and subtraction methods which rarely gained any marks.

2.2.21. Question 21

Most candidates gained marks in this question. Plotting was done in part (a) with relative ease, but the descriptions in part (b) sometimes lost marks because they were not general enough: commenting on a single point will not earn the mark. In part (c) candidates were expected to make a reasonable estimate which in many cases gained marks, with or without a line of best fit. In some cases it was cleat the candidate was filing to see their answer within the context of the problem, for example giving an answer less than 70.

2.2.22. Question 22

In part (a) there were many correct diagrams drawn and the vast majority of candidates scored at least one mark for drawing a diagram which shows at least two of the sides enlarged correctly. Some gave an enlargement that was scale factor 3. In part (b) performance was much worse. Some recognised this as a reflection, but few stated the line of symmetry. Many appeared to think this was a rotation. Others use common language such as “flipped” or “mirrored” rather than the correct description of “reflection”.

2.2.23. Question 23

Even basic algebra was a weakness on this paper. Only about half the candidates were able to simply the expression in parts (a) and (b), with the performance far worse in parts (c) and (d). In part (a) candidates were just guessing, giving answers such as m^4 and 4^m, and in (b) pq^4 and incomplete expressions such as $pq\times4$ or similar.

In (c) many did not know what to do with the 5. Many added it, others doing a partial expansion leading to $15x$, $15x$-2 or $15x$+5-2

In part (d) few gave any reasonable answer, with a plethora of terms associated with 3, y and 4, but with little recognition of what was needed when multiplying. In some cases correct answers were spoilt by incorrect and unnecessary further simplification, such as $15y^2$.

2.2.24. Question 24

In part (a) the vast majority of candidates scored a mark for a ratio of 18:12 or equivalent, despite some failing to correctly cancel the ratio, or gave the ratio the wrong way around. There were many correct answers. In part (b) some candidates successfully calculated the ratio of oranges to apples as 9:45 but chose 9 as their final answer. The weaker candidates divided 54 by 5 and rounded the answer to 11.

2.2.25. Question 25

Very few candidates earned any marks for this question, which was designed only for the more able at the Foundation level. 80÷5=16 was the most common error, but few considered using midpoints. Many failed to attempt the question.

2.2.26. Question 26

A surprising number of candidates correctly answered both parts of this question. Though t^{12} was common, more gave the correct answer. The success rate was even higher in part (b), showing that work on indices is certainly accessible to Foundation students.

2.2.27. Question 27

The advice given to many candidates is to calculate the numerator and denominator separately before dividing to get the final answer. This advice was ignored by many candidate who just put the numbers into their calculator in the order given in the question and hoped for the best, which was usually no marks as a result. A significant number doubled 3.2 rather than squaring. In part (b) most students did not understand what 1 significant figure meant, and gave their answer to 1dp instead. Many who gave a negative answer in (a) rounded their answer to a positive answer in (b).

2.2.28. Question 28

Very few correct answers were seen. The errors made by candidates were many and common, including incorrect choice of formula to use (πr^2 quoted and used incorrectly) use of 8 as a radius, incorrect values of π used (though given on the front of the paper), failure to divide by 2, and leaving the answer as the arc, without adding on the straight edge to give the total perimeter.

3. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 3

3.1. GENERAL COMMENTS

3.1.1. This was an accessible paper that gave candidates ample opportunity to demonstrate their understanding. Candidates seemed to have had enough time to attempt all the questions and many made very good attempts at the paper.

3.1.2. There were many candidates who did not appear to have studied some of the more difficult topics. In some cases the paper proved far too challenging for candidates and entry at the Foundation tier might have been more appropriate. It is difficult to believe that candidates who substitute 2 and 5 into $4n - 3d$ and write down 42 – 35 are best suited to the Higher tier.

3.1.3. There were several questions in which basic arithmetic let many candidates down. In question 10, for example, dividing 40 000 by 125 proved to be beyond many and some struggled with 1000 ÷ 125. Simple arithmetic errors were common in questions 4, 8(b) and 21.

3.1.4. It was pleasing to see that most candidates had written in ink and in the appropriate spaces in the paper. Candidates should, however, be reminded to take care when setting out their answers. In questions 10, 24 and 25, in particular, working out was frequently poorly presented and difficult for examiners to follow.

3.2. REPORT ON INDIVIDUAL QUESTIONS

3.2.1. Question 1

This question was answered well by the vast majority of candidates. The most common errors in part (a) were due to the failure to carry out simple additions and subtractions accurately with incorrect entries seen most often in the 'Car' column. Some candidates failed to notice the empty space in the 'Total' column and left this blank. In these cases it was apparent that candidates had not carried out a horizontal check as well as a vertical one. The probability in part (b) was usually correct.

3.2.2. Question 2

Part (a) was answered very well by most candidates. For some, the signs caused a problem with $2x - 8y$ being the most common incorrect answer. Most candidates were also successful in part (b). Some, though, wrote down $2c + 4r$ in their working and then made this equal to $6cr$, or even $8cr$, and lost a mark. A few candidates gave the answer as $c^2 + r^4$. Many candidates did not know the difference between an expression and an equation but they were not penalised for this.

3.2.3. Question 3

This question was answered well with the majority of candidates completing the table accurately and drawing the correct straight line. In part (a) the most common error was an incorrect *y*-value for $x = -1$. Candidates with an error in the table frequently went on to draw the correct line but unfortunately did not return to (a) to correct the table. A significant number of candidates found it difficult to plot negative coordinates, often plotting negative values of *y* as positive values. A few plotted the points correctly but failed to join them up.

3.2.4. Question 4

Although part (a) was well attempted the correct answer of 15 was perhaps not as common as might have been expected. Many of those who did not work out the correct answer gained one mark for substituting the value of *P* to get $50 = 4k - 10$ but then incorrectly manipulated the terms to get $4k = 50 - 10$. Thus 10 was the most common incorrect answer. Many candidates who gave an answer of 10 were unable to gain the first mark because they did not show the substitution. Some of those with a correct method failed to divide 60 by 4 correctly. In part (b) most candidates correctly substituted the given values. The majority went on to give the correct answer but some who wrote 8 – 15 gave the answer as 7 rather than –7.

3.2.5. Question 5

Part (a) was answered extremely well with most candidates rotating the shape 90^o clockwise, usually using *O* as the centre of rotation. Most errors resulted from rotating the shape 90^o clockwise about the wrong centre although some candidates rotated it 90^o anticlockwise about *O*. Full marks were surprisingly rare in part (b). Many failed to identify the transformation as a translation. Some candidates used words such as 'transformed' or 'moved' but many did not attempt to name the transformation and simply described the movement by using words or a vector. Vectors were often correct although sometimes the signs were incorrect. Other common errors included writing coordinates instead of a vector and describing the movement as 'across 3 and down 1'.

3.2.6. Question 6

In part (a) the majority of candidates were able to give a correct explanation although some gave parallel sides rather than equal sides as the reason. Another common error was for candidates to substitute $x = 5.5$ into both expressions instead of using the properties of a rectangle. Only the weakest candidates failed to gain any marks in part (b). The most common errors resulted from incorrect manipulation and often led to $2x = 13$ (instead of $2x = 11$). Some candidates failed to divide 11 by 2 correctly. Those who resorted to trial and improvement were rarely successful. Although there were many fully correct answers in part (c) some candidates struggled to substitute correctly into each of the four expressions. Many made calculation errors. Only a small number of candidates stated that the total perimeter was $8x + 13$ and then made just the one substitution.

3.2.7. Question 7

Part (a) was answered correctly by about 90% of the candidates and almost 70% were successful in part (b). Many of those who answered (b) incorrectly did not appreciate that the answer had to be less than 1. Part (c) proved to be the most difficult with about half of the candidates giving the correct answer. The most common incorrect answer in this part was 32.20.

3.2.8. Question 8

In part (a) the majority of candidates divided 72 by 2 and then found the square root, usually just giving the positive solution which was sufficient for full marks. The common error was for candidates to try to find the square root of 72 and then divide by 2. A few divided by 2 twice and gave an answer of 18. Part (b) was generally answered well with the most common method being the use of a factor tree. Many fully correct answers were seen and most candidates were comfortable with index notation. Some made errors in their factor tree (often $6 = 3 \times 3$) and some who found the correct prime factors listed them on the answer line or wrote $2^3 + 3^2$.

3.2.9. Question 9

The correct answer of a 2 by 2 square was drawn by about half of the candidates. A very common error was to draw a rectangle with either the correct width or the correct height. Some candidates reproduced the given plan whilst others reproduced the given front elevation. Part (b) was answered quite successfully. Most candidates seemed to have a good understanding of what was required and appreciated that the shape should look like a prism. Some of the sketches were not too well drawn but the majority at least showed a trapezoidal face.

3.2.10. Question 10

There were two main methods used for answering this question. The first, converting 40 litres to millitres and then dividing by 125 posed problems for candidates in the evaluation. Often, the number of millitres was incorrect with 40×1000 frequently being evaluated as 4000. The subsequent division by 125 was very poorly attempted or, in some cases, not attempted. Too often the answer found by using this method was incorrect. The second method, finding the number of seconds for one litre, i.e. dividing 1000 by 125, and then multiplying by 40, usually led to the correct answer. There were frequent attempts at repeated addition rather than division and these often resulted in incorrect answers. Sometimes a mixture of the two methods was seen in this question.

3.2.11. Question 11

Part (a) was answered correctly by about 80% of the candidates. About half of the candidates were successful in part (b), giving an answer of 63.5 or 63.49 recurring. The most common incorrect answer was 63.4. Often candidates did not give enough decimal places for a recurring decimal and wrote 63.49.

3.2.12. Question 12

Candidates were very successful at using compasses to draw an arc with centre *B* and radius 4 cm and shading the correct side of the arc. About a quarter of the candidates were able to draw the angle bisector from *A* to *BC* and those who did usually went on to get full marks. Many candidates drew the perpendicular bisector of *BC* and some drew a vertical line from *A* to *BC.* Some bisected the wrong angle (usually *B*) and some drew more than one arc but no straight lines. One third of the candidates, though, gained no marks at all in this question.

3.2.13. Question 13

Part (a) caused little difficulty, with most candidates gaining full marks for a suitable question with response boxes. When marks were lost it was usually because candidates omitted response boxes or produced a tally chart instead. In part (b) many candidates failed to realise that there were two ways in which the question could be improved. Firstly, many did not give a time period in their question, although some did include this in their responses. Secondly, the response boxes were sometimes too vague or, more commonly, the options were not mutually exclusive.

3.2.14. Question 14

The majority of candidates gained one mark for rounding at least two of the numbers correctly to one significant figure and a further mark for the correct processing of two of the numbers, most usually $7 \times 200 = 1400$. Most candidates, though, were unable to divide correctly by 0.05 with only a few realising that dividing by 0.05 is the same as multiplying by 20. Far too many candidates lacked the understanding that dividing by a number less than 1 makes the final answer larger than the original number. Another common error was for the denominator, 0.051, to be rounded to 0.1 or, less commonly, to 0.5, 1 or 0.

3.2.15. Question 15

In part (a) almost 70% of the candidates were able to write 64 000 in standard form. The success rate in part (b) was much lower with just over 30% able to write 156×10^{-7} in standard form. Here, 1.56×10^{-9} was a common incorrect answer. Many candidates, though, wrote the answer as an ordinary number.

3.2.16. Question 16

It is encouraging that many candidates were able to recognise different types of factorisation and distinguish between the type involving common factors and the type which needs two brackets. The majority of candidates demonstrated knowledge of factorisation in part (a) although a number did not fully factorise the expression. Partial factorisations such as $2(2x^2 - 3xy)$ and $x(4x - 6y)$ were quite common. Some candidates identified $2x$ as the common factor but made a mistake inside the brackets, e.g. writing $2x(x - 3y)$. In part (b) many candidates attempted to factorise into two brackets, although a large proportion did not find two numbers which both multiplied to give –6 and added to give +5. Many found numbers which satisfied one condition or the other, but not both, e.g. 2 and 3.

3.2.17. Question 17

In part (a) most candidates were able to plot the points correctly and produce an accurate cumulative frequency graph. Some candidates plotted the points correctly but drew a line of best fit and some plotted at the midpoints of the amounts spent. Part (b) was also answered well with most candidates able to find the median. Few, though, drew a horizontal line from cf = 60 so were unable to be awarded a method mark if their answer was incorrect. Some candidates believed the median to be 64 (the frequency in the middle of the table) and some wrote 0-250. Good comparisons were made in part (c) between the spending of men and women although there were some confused statements made by candidates who did not appreciate that the different numbers of men and women was not relevant when comparing the medians.

3.2.18. Question 18

Many candidates answered part (a) correctly, recognising the right angle between radius and tangent and using the angle sum of a triangle to work out the size of angle *AOD*. There was, though, some evidence of poor arithmetic with some candidates unable to subtract 126 from 180 correctly. Correct answers to (b)(i) were much rarer. Many candidates had remembered that angles in the same segment are equal but had forgotten that the two angles both need to be on the circumference of the circle. Hence a very common error was for angle *ABC* to be given as 54^o (the same as angle *AOD*). The majority of the candidates who answered (b)(i) correctly were able to give the correct reason in (b)(ii).

3.2.19. Question 19

Part (a) was answered correctly by almost 60% of the candidates. Many candidates attempted to solve the simultaneous equations using an algebraic method instead of using the graphs. Most of these attempts were unsuccessful. Part (b) was answered correctly by less than half of the candidates. Many who did not give a fully correct equation were awarded one mark for an equation with either a correct gradient or a correct intercept.

3.2.20. Question 20

In part (a) many candidates did not show a good understanding of working with inequalities, often replacing the < sign with an = sign at the first opportunity. Algebraic manipulation within the inequality was often poorly handled and it was not uncommon for candidates to add 1 to both sides or add t to both sides. Some who showed $t < 5.5$ or $t < 11/2$ in their working then wrote $t = 5.5$, or $t = 5$ or just 5.5 on the answer line and could not be awarded the accuracy mark. Candidates were more successful in part (b). Those who were correct in part (a) generally achieved the mark in part (b) as well. Some candidates solved part (b) independently from part (a) by substituting integer values into the inequality.

3.2.21. Question 21

There were an encouraging number of fully correct answers. A large number of candidates, however, took M to be proportional to L instead of L^3 which resulted in 240 being the most common incorrect answer. Those who managed to get as far as $k = 20$ usually managed to complete the question successfully but it was not uncommon to see $20 \times 3^3 = 20 \times 9 = 180$. Some candidates incorrectly evaluated 2^3 as 8.

3.2.22. Question 22

This question was very poorly attempted with many candidates displaying a lack of understanding of histograms. The majority used the given frequencies to draw bars of different widths and some drew frequency polygons. Very few candidates gained full marks. Candidates who showed understanding of frequency density often made mistakes carrying out the divisions involved. Some wrote down no calculations at all and went straight to drawing the histogram, often with errors. The final bar was frequently drawn with an incorrect width. Even when correct histograms were seen the candidates often failed to gain full marks because they did not label the vertical axis or provide a key. Some candidates used frequency × class width as frequency density.

3.2.23. Question 23

Very few candidates failed to score any marks at all in this question. Part (a) was answered very well with most candidates completing the probability tree diagram correctly. Errors usually occurred on the right hand branches where some candidates put the values 0.5, 0.3 and 0.2 in the wrong order and some inserted the results of multiplying two probabilities together. A significant number of candidates were not aware that they needed to multiply the probabilities on the relevant branches in part (b) and many added 0.5 to 0.5 instead. Even when candidates did write down 0.5 × 0.5 this was sometimes evaluated incorrectly with answers of 0.5, 1 and even 2.5 seen quite frequently. Some candidates with incorrect answers lost the opportunity of gaining a method mark here because they did not show any working.

3.2.24. Question 24

Part (a) was very poorly answered. It was good to see some responses in which statements and justifications were laid out correctly but the majority of candidates had little idea of how to set out a formal proof of congruency. Statements were often vague and general, e.g. 'all sides are the same'. Even when candidates were able to give three correct statements it was not uncommon for the incorrect reason for congruency to be given – most frequently SAS when it should have been RHS. Full justification was rare. *BD* = *DC* was stated in numerous responses with candidates failing to realise that this was a consequence of congruency. The most common errors were not justifying the statements made and not providing the reason for congruency. Some candidates thought that AAA and ASS were sufficient for congruency. Very often the working was difficult to follow. More candidates were able to gain one mark in part (b) but very few realised they needed to use congruency to justify *BD* = *DC.*

3.2.25. Question 25

Many candidates gained one mark in part (a) for a correct substitution but very few were able to progress any further. Most went on to add $2\frac{1}{2}$ to $3\frac{1}{3}$ and then gave either $5\frac{5}{6}$ or the reciprocal of it as the final answer. Some candidates attempted to use a common denominator of $2\frac{1}{2} \times 3\frac{1}{3}$ but frequently made errors in their calculations. A small number of candidates converted the fractions to $\frac{4}{10}$ and $\frac{3}{10}$ respectively and obtained $\frac{7}{10}$ easily but some then forgot to invert. Many candidates showed considerable working which was often poorly set out and difficult to follow. Only the very best candidates were successful in part (b). Most were unable to manipulate the terms correctly. Some simply inverted everything and $u + v = f$ became $u = f - v$. Others attempted to clear the fractions but forgot to multiply all the terms by f (or v or u). Those who managed to get to $1/u = 1/f - 1/v$ sometimes went on to gain one mark for $u = 1/(1/f - 1/v)$.

3.2.26. Question 26

Part (a) was answered quite well with a good proportion of candidates recognising the transformation and remembering how to write the equation down. Many candidates used a combination of f, x and 4 but opted for the wrong one so that $y = f(x + 4)$ and $y = 4f(x)$ were common incorrect answers. Relatively few fully correct answers were seen in part (b). Where one of the two marks was awarded, this was usually for drawing a graph with the correct amplitude. Graphs with the correct period but incorrect amplitude were much rarer. Some candidates doubled the period rather than halving it. Marks were sometimes lost because the curve was not drawn accurately enough or only drawn for part of the given range. Not all candidates attempted this question but most of those who did tried to draw some sort of wave.

4. PRINCIPAL EXAMINER'S REPORT – HIGHER PAPER 4

4.1. GENERAL COMMENTS

4.1.1. Candidates should be reminded not to work in red pen or pencil. Blue or black ink should be used with pencil reserved for graph work and diagrams. This year there were problems with some candidates writing in what appeared to be thick black felt pen which was visible through the paper; please encourage candidates to use biro or ink pen rather than felt pen.

4.1.2. This paper was accessible to the majority of candidates. There was no evidence to suggest that candidates had difficulty completing the paper in the given time.

4.1.3. As expected, some of the weaker candidates made little progress with the more demanding questions, but most candidates were able to gain marks here and there throughout the paper.

4.1.4. The vast majority of candidates did all their calculations and checks within the space provided for each question, but written responses often went beyond the answer region.

4.1.5. Whilst most work was easy to read and follow through, a significant number of candidates produce work that is not well organized.

4.1.6. Candidates should be encouraged to learn the formulae for the circumference and area of a circle. These were not known by a significant number of candidates this summer.

4.2. REPORT ON INDIVIDUAL QUESTIONS

4.2.1. Question 1

The majority of students gained full marks on this question. Many however multiplied when they should have divided and vice versa. Candidates need to be encouraged to write out their working as too many merely gave answer only solutions, some of which you suspect, but without any evidence, were copying errors e.g. £564 in(a) or £87 in (b). Some candidates used repeated addition in (a) rather than multiplication.

4.2.2. Question 2

Part (a) was extremely well answered by candidates, with most scoring full marks. The few mistakes included using a scale factor of 3 instead of 2, or doubling the number of steps rather than increasing their length. Most candidates clearly knew what the transformation was in part (b) and gained the first mark for reflection, but many lacked the skill to describe adequately, using words such as flipped and mirrored. However the second mark was not so readily achieved. Although the correct answer was probably the most common, some confused the y-axis with the line y = 0 or merely called it the y line and a few quoted y = x as their mirror line.

4.2.3. Question 3

On the whole this question was well answered, with most candidates stating the answer only. There were a few common wrong responses which included omitting the plus 1 to obtain “1, 4, 9”; using n=0 for the first term to obtain “1, 2, 5”; incorrectly evaluating 3^2 as 6 to obtain “2, 5, 7”. Perhaps the most common incorrect response came from those who treated it as an iterative process to gain “2, 5, 26”. Some candidates did not evaluate the expression but used “n^2+2, n^2+3” as the next terms.

4.2.4. Question 4

Points were usually plotted correctly although a few candidates clearly missed this part of the question. A number initially misread the table horizontally and so plotted (65,80) but then realised and rectified their mistake when unable to plot (100,110) on the axes provided. In part (b) the majority of candidates chose to describe a dynamic relationship along the lines of “the taller the sheep, the longer it is” rather than just stating positive correlation. Incorrect answers most commonly seen involved “direct proportion” or an expression of the difference between the variables. A number referred to weight of sheep rather than height. In part (c) neither a line of best fit nor vertical line at 76cm was usually seen. Instead candidates judged the value by eye and in most cases gained full marks by being within the acceptable range of answers. Errors that did occur were due to the 2 axes being confused or misreading of the vertical scale.

4.2.5. Question 5

This was generally answered correctly, with most candidates using two steps, first dividing by 19 and then multiplying by 31. Sometimes candidates resorted to an unnecessarily complicated method no doubt taught for situations when calculators are prohibited, e.g. find the cost of one, then 20, then thirty, and then add 1 more. Finding the cost of 1, then 12, then adding on was also quite popular. Unfortunately the more steps that were involved the more mistakes and rounding errors that appeared. However by far the greatest source of mark loss in this question, was in misreads and transcription errors, 13 used instead of 31 being the most common.

4.2.6. Question 6

Substitution of values into the formula was generally correct. Subsequent errors with evaluation usually involved the -8 term where candidates often added 1.8 and -8 rather that multiplying them to give -6.2 and a final answer of 25.8 or ignored the negative sign to evaluate -8 x 1.8 as +14.4 and get 46.4 Often the operations were incorrectly ordered to give 1.8 x (-8 +32) = 43.2 and the decimal point in 1.8 was sometimes omitted. In part (b) as in part (a) correct substitutions were often seen although some candidates missed the mark available for this by going straight to an incorrect attempt to solve. Where errors occurred in subsequent algebraic manipulation, some went on to add 32 to 68 getting 100, which they then divided by 1.8 to get 55.5555…. Others divided 68 by 1.8 before subtracting 32. The decimal point in 1.8 was again sometimes omitted giving 2 as a final answer after 36 = 18C . Another common error was to substitute 68 for C rather than F giving F = 1.8 ×68+32.

4.2.7. Question 7

Weaker candidates could draw the 60° bearing but not 310°. A number used their protractor with the straight edge horizontal, effectively measuring bearings from an East-West line. Some candidates marked points correctly but then joined the two points up, thus losing the third mark. In some cases, the mid-point of this line was identified and labelled R.

4.2.8. Question 8

In part (a) those who did not score full marks either did not simplify fully or had the ratio around the wrong way. The colon on the answer line seemed to be a very good prompt for candidates. In part (b) the majority of candidates scored 2 marks for “45”; this was generally accompanied by workings which showed division by 6 and multiplication by 5 in that order. Some candidates built up the ratio from “1:5” to “2:10” to “3:15” etc summing the parts until the correct one of “9:45” was obtained. One mark was commonly obtained for “9”, sometimes for the ratio “9:45” and rarely for “270”. Zero marks were awarded a number of times for the incorrect response of “10.8”, obtained from “54/5”.

4.2.9. Question 9

While it was pleasing to see that most candidates now have a good grasp of this part of the syllabus and consequently scored well on this question there is still a lack of understanding for the need to calculate a value for $x = 2.65$ (or between 2.6 and 2.65). Candidates need to be taught that evaluating at 2.6 and 2.7 and finding out which is nearer to 71 is incorrect mathematically. Failure to round their answer to 2.6 was also common, many trying to 'do better' than 1dp.

4.2.10. Question 10

Of the candidates scoring 2 marks, most did this with very neat and precise responses, showing clear construction lines, although a few candidates did use very faint or minimal arcs which were difficult to see. In general it appeared that most candidates knew that bisect meant split the angle in half, although some candidates were seen to construct perpendicular bisectors through the 2 lines and others created a triangle and produced a perpendicular bisector of the new line.

The candidates gaining 1 mark were equally split between those splitting the angle without construction lines and those who drew arcs on the original lines. Many candidates were thrown by the fact that the two arms of the given angle were of different lengths and they drew arcs from the ends of the lines.

4.2.11. Question 11

Many candidates thought that 1 was a prime number. Others had trouble with the word "sum", misinterpreting it as product. Successful candidates usually offered a correct counter example, frequently $2 + 3 = 5$, and often backed this up by a written explanation. On occasions, a correct counter-example worthy of full marks was spoiled by further embellishment including incorrect statements or other examples involving non-primes.

4.2.12. Question 12

Most candidates made full use of the extra columns in the table. A significant number of candidates correctly found fx using the appropriate midpoints but then divided the sum by "5" (the number of groups) or "75" the sum of the midpoints (this was particularly disappointing with 80 having been given in the question).

The most common response from those only gaining 1 or 2 marks was to use the end points when calculating fx. Weaker candidates divided the sum of the frequencies or the sum of the midpoints by 5. Most candidates seemed to realise that the extra columns in the table had a purpose and wrong responses included finding the frequency density and producing cumulative frequency.

4.2.13. Question 13

A significant number of candidates were unable to gain any marks in this question, this was frequently due to the formula for the area of a circle being used. Common errors were forgetting to halve the circumference, confusing the radius with the diameter or most commonly forgetting to add on the diameter. Many candidates just found the length of the arc rather than the perimeter of the shape.

4.2.14. Question 14

Parts (a) and (b) were generally well answered. The most common incorrect answer in (a) was 3a. In part (c) Most candidates managed to expand 3y x y correctly and simplify to $3y^2$ but a few did not multiply 3y by 4 and just wrote 12 rather than 12y. Hence $3y^2$ + 12 was the most common error seen. Expansion of both brackets in part (d) did not usually cause problems although a few multiplied the brackets together. Simplification caused more difficulties with the -8 term added leading to 5x + 14 or a common arithmetic slip giving 2x + 3x = 6x Again, in part (e) the expansion of brackets was often successfully tackled but simplification led to more errors, caused usually by difficulties dealing with the negative terms. In the expansion, 4 and -3 were added rather than multiplied to give 1 leading to x^2 + x + 1 or just x^2 +1. -3x and 4x were sometimes combined to give –x and a common mistake was to ignore the – sign and add these 2 terms to give x^2 + 7x -12.

4.2.15. Question 15

The majority of candidates gained full marks here. A common error was to type the whole problem into their calculator without the use of brackets, reaching an answer of -1.534023. The most successful solutions were when the candidates worked in stages calculating the numerator and denominator separately, not only does this approach avoid the former error but it also gives the opportunity to gain method marks. Another area of concern was the rounding/truncating of values, either in the answer or at various stages.

4.2.16. Question 16

Candidates were equally successful in part (a) and (b) with the vast majority giving the correct answer in each part. In part (c) the most common error was to cube only one part of the product leading to either 8x or $2x^3$ Some candidates wrote out 2x x 2x x 2x and thus gained a mark but went on to simplify incorrectly. Confusion adding rather multiplying to cube 2 led to $6x^3$ In part (d) many candidates confused the operation of the numbers and indices, leading to answers including $7a^7h^5$ from 3 x 4 = 12 and $12a^{10}h^4$ from 2 x 5 =10 and 4 x 1 = 4. Some candidates included + signs between their terms, for example $12a^7 + h^4$.

4.2.17. Question 17

Many candidates realized the need to use Pythagoras' theorem and then applied it correctly. There were some though that took the required length to be the hypotenuse (finding root 117) and therefore lost marks. This question showed that some of the pupils did not have a clear understanding of what to do if the hypotenuse was given in a question. Some tried to treat it as a trigonometry question with some quite involved work. Many pupils did not round correctly (6.70 or 6.7); candidates should be reminded to give a full figure answer before rounding.

4.2.18. Question 18

Most answered this part (a) correctly. There were some who stated that 30kg was the heaviest bag. The majority of candidates were able to score marks in (b) and (c). However, part (d) was very poorly answered on the whole. Good candidates realised that that those less than 10 represented the lower quartile as seen at the start of the question. They used the diagram given at the start of the question and either said 240/4=60 or said 240/2=120 which gives the median and then said 120/2=60. Errors included 240/5 =48 the 5 being taken from 10-5. Range = (29-5) =24 then 240/24 is 10 and 10 X 5 = 50 the 5 being taken from 10-5 and 240/6 = 40.

4.2.19. Question 19

In part (a) there was the expected mix of results between those calculating compound and simple interest. Most people were able to pick up at least one mark for 180, 4860 or 4680. Many opted for correct methods other than the efficient multiplying by 1.04 or 1.04^2, eg by finding 4% and then adding to find the principal amount for the calculation for the next year. There was a significant number of students who seemed to rely on non-calculator techniques, breaking the problem down to 5% and 1% and then 4%. Many of these attempts ended in numerical errors.

In part (b) the best answers used a "trial & improvement" approach using (1.075)^n showing repeated multiplications of 2400 by 1.075 to find the answer and slightly fewer repeatedly divided 3445.51 by 1.075. There were a surprising number of lengthy methods involving multiplication and addition each year - often correct but for premature rounding. Candidates using this method sometimes miscounted the number of repetitions they had done and gave 4 or 6 as the answer. The two main errors were dividing (3445.51-2400) by £180 or subtracting 7.5% of 3445.51 and working backwards. This question was surprisingly well done even to the extent that a few candidates were able to use logs to solve $1.075^n = 1.4356$.

4.2.20. Question 20

In part (a) many candidates struggled with this question or adopted a long-winded approach involving Pythagoras and the sine rule. Common errors included failing to identify cos as the appropriate ratio or using an incorrect order of operations when finding invcos. The sine rule candidates often failed to rearrange correctly, some of them failed to put sine at all and others calculated the third side using Pythagoras incorrectly.

In part (b) most candidates recognised the need to use the tan ratio but faltered when it became necessary to manipulate the formula to make y the subject. A common error was to write tan40=y/12.5 and then rearrange incorrectly confusing the angle and side length given to calculate 40 x tan12.5. Others attempted tan40 ÷ 12.5 or 12.5 ÷ tan 40. Some candidates identified the third angle as 50 and then successfully used the sine rule.

4.2.21. Question 21

The most common pair of incorrect answers seen were 26 and 135 where candidates did not appreciate that the question involved a sample rather than the whole population shown in the two-way table. Rather than carry out a single calculation, some candidates wrote down decimal or percentage values for fractions such as 26/258. Premature rounding of these values occasionally led to inaccuracies but the necessity to have a whole number final answer usually rescued a potential loss of accuracy marks. A number of candidates assumed that part (b) also referred to the students studying Spanish and calculated 62/258 x 50 rather than use the 135 total of female students.

4.2.22. Question 22

Many candidates struggled with the requirement for an algebraic proof and instead opted to substitute various values for n. Those attempting to simplify the expression often made errors with $(3n)^2$, expressing it as 9n, $6n^2$ or $3n^2$. Sign errors and omission of brackets around the second half of the expansions accounted for many of the other errors with 1 x 1 = 2 causing a severe loss of marks for a few. A difference of two squares method was seen on a small number of occasions. Some candidates correctly simplified to 12n but failed to justify the final mark often stating that 12 rather than 12n was a multiple of 4.

4.2.23. Question 23

Part (a) was correctly answered by about half the candidates, but incorrect responses included (ab)/2, a+b, a-b, and p. It appeared that candidates were confused by part b, and it was noticeable that a lot of those who correctly responded to part (a) did not even attempt part (b). There were some very neat logical arguments but on the whole the responses were messy with lots of crossing out and arrows directing you to the next line of their answer. Of those who gained some credit the most common mistake was using PB instead of BP, (there was little appreciation that the opposite direction results in a negative vector), followed by those who missed out brackets and hence only multiplied part of the vector. Some candidates tried to draw a scale drawing as the proof. A few candidates tried to give a justification in words.

4.2.24. Question 24

This question was reported by many as being a good discriminator. The most efficient way to tackle the question was to realise that the angle of the sector was 60.This enabled the candidates to use the ½ absinC formula for the triangle. However many candidates resorted to the cosine rule to find it or decided because it was a sixth of the circle they needed to use sin 6. A number of candidates were able to calculate one of the areas correctly; more frequently the sector, and then the subtraction carried out The most common error was to use half base x height for the triangle area, using 6 as the height. Some did use Pythagoras to find the height but often made errors. Quite a few found one or other of the two areas and offered this as their answer.

4.2.25. Question 25

A challenging question for all but the most able candiates. Many did not appreciate the need to factorize the numerator and denominator and tried to cancel individual terms. More students gained marks from factorizing the numerator than the denominator, here a non - unitary x^2 coefficient was beyond the reach of all but the best. Pleasingly, the vast majority of those who reached the final answer did not try to cancel again. There were a surprising number of attempts to use the quadratic equation formula here.

4.2.26. Question 26

A large number of candidates drew tree diagrams, which in most cases were helpful: however some candidates drew them so big that their calculations were then squashed around the edges with very little logical flow. Most candidates seemed to have assumed that there was replacement and so limited themselves to 2 out of the four marks. It was common to consider only three scenarios instead of 6, for example red then orange but not orange then red. It was more common to see 6 fractions added rather than 1 – the complement.

5. STATISTICS

5.1. MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
1380/1F	100	60.2	17.1	50
1380/2F	100	61.0	16.4	50
1380/3H	100	58.4	17.7	50
1380/4H	100	62.9	19.7	50

5.2. GRADE BOUNDARIES

The table below gives the lowest raw marks.

	A*	A	B	C	D	E	F	G
1380_1F				74	59	45	31	17
1380_2F				75	62	49	36	23
1380_3H	85	68	51	34	20	13		
1380_4H	91	73	54	36	20	12		

	A*	A	B	C	D	E	F	G
1380F				149	121	94	67	40
1380H	173	141	105	70	40	25		

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