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Examiners' Report March 2008

GCSE

GCSE Mathematics (2544)

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1.1. GENERAL COMMENTS

1.1.1. The great majority of candidates entered for this paper found it accessible.

1.1.2. The vast majority of candidates attempted nearly all the questions, as blank responses were only seen often in Section A Question 5.

1.1.3. It was great pity that a significant number of candidates did not seem to turn up to the examination with rulers and protractors as graphs were often drawn freehand and the lack of a protractor meant that few complete solutions were seen in the pie chart question.

1.1.4. Questions 1, 2, 3 in Sections A and B were tackled with the most success.

1.1.5. Question 5 in Section A was only rarely successfully completed whilst candidates struggled with the pie chart question 4 also in Section A.

1.2. INDIVIDUAL QUESTIONS

1.2.1. Question A1

This question was well understood and 99% of candidates scored full marks.

1.2.2. Question A2

This question too was well understood with 62% candidates obtaining fully correct solutions and a further 26% scoring 3 marks. Common mistakes were miscounting for tallies... though some did not do any tallies, multiplying by the frequency (possibly creating an extra column). A significant number of candidates put 13 tallies in the tally column, and another 13 in the frequency column and then did the same for 14, 15 etc. These candidates were allowed a follow through in parts (b) and (c).

Almost all candidates obtained the answer 3 in part (b) but there were many follow through marks. In part (c) the answer of 14 for the mode was almost always correct again often with a follow through but some candidates did try to calculate the mean. Only 2% of candidates failed to score any marks in this question.

1.2.3. Question A3

This question was again well understood and almost always completely correct; 82% success rate for (a) and 90% success rate for (b). A few candidates misunderstood the scaling on the horizontal axis and read the data at the end rather than from the middle of each section.

1.2.4. Question A4

44% of candidates had a reasonable attempt at this question and scored 2 or 3 marks. 50% of candidates scored no marks though very few candidates did not attempt the question, but a significant number of candidates did not have protractors and/or rulers. Quite a few candidates had no idea of how to calculate the angles and most showed no working such as 360÷40 or 45÷5 or even 9 ×... The accurate use of the protractor was not always evident and many could not draw the obtuse, 144º, and drew its supplement instead. Some candidates managed to get the mark for the angles in the table and many gained 2 marks for one angle correctly drawn and labelled. It was pleasing to see that almost all candidates labelled their attempts at the bar chart. Candidates should also be encouraged to work in a soft pencil so that incorrect work can be erased there were many instances of indecipherable pie charts where candidates had tried to correct work that couldn't be rubbed out.

1.2.5. Question A5

This question was not very well understood and there were many very poor attempts, 79% of candidates scored no marks. This type of question has been set on many Data Handling Module tests but the multistage process seemed beyond the competence of many of the candidates. The total of the frequencies, 80 was often divided by the number of the categories, 5, giving 16 as the most common response. Of those who did have some understanding of the method only about half of them used the mid-values. Working showing 1070 (the lower end of the interval × frequency) or 1870 (the upper end of the interval × the frequency) was not uncommon, as was 1470 (the correct response at this stage - the mid point of the interval × the frequency). Having got this far most candidates were unsure as to how to proceed and many divided these figures by 125 (the sum of the frequencies), or 5 (the number of class intervals). Many then went on to add the frequency and their mid range value. There were a disappointing number of good candidates who rounded to 18.3 or 18 without showing intermediate steps thus losing the final accuracy mark. Only 6% of candidates scored all the marks in this question.

1.2.6. Question B1

This question was well understood with 94% of candidates obtaining the correct answer for part (a) and 88% of candidates for part (b). In part (c) wrong answers were only seen occasionally mostly for drawing the '9' bar too inaccurately whilst only a few drew the '6' bar wrongly.

1.2.7. Question B2

This question too was well answered with 80% of candidates writing down the 8 missing combinations. A few wrote all the combinations but with the order reversed and an even smaller minority wrote only two other combinations mainly L,A and S,B and one or two wrote some combinations that weren't allowed A,B or L,S etc. Even more occasionally about half a dozen in total consisted of advise on appropriate menu combinations, suggestions about which were the healthiest meals – or even the cost of each item! Only 11% of candidates scored no marks.

1.2.8. Question B3

Again this was a well-understood question with 91% of candidates able to complete the two-way table using the information given in the question. There was less success in part (b) though 53% of candidates scored both marks and 23% gained partial credit for writing 4 over a denominator or a numerator over 11. When candidates wrote the probability as "4 out of 11" they scored no marks. Fortunately these occurrences are becoming less common though it was alarming to see many candidates writing the probability as "4"!

1.2.9. Question B4

Candidates understanding of stem and leaf diagrams is improving over time and there were fewer pictures of plants with leaves and numbers put on the leaves. Some included the stem digit on the right e.g. 2|23, 24 etc., some did not even bother to order the numbers. 66% of candidates scored at least 2 marks with the Key being a problem some simply put a number like 2|3 in the key but did not show 2|3 **=** 23 whilst others left the box empty. Some of the weaker candidates arranged the amounts correctly in order whilst others failed to order the leaves.

2. PRINCIPAL EXAMINER'S REPORT – PAPER 9 (HIGHER)

2.1. GENERAL COMMENTS

2.1.1. The great majority of candidates entered for this paper found it accessible.

2.1.2. The vast majority of candidates attempted nearly all the questions, as blank responses were only seen in Section B Question 5.

2.1.3. It was great pity that a significant number of candidates did not seem to turn up to the examination with rulers as graphs were often drawn freehand.

2.1.4. Questions 1, 2, 3 in Sections A and B were tackled with the most success.

2.1.5. Question 5 in Section B was only rarely successfully completed whilst candidates struggled with the descriptive nature of question 2 and Question 4b in Section B.

2.2. INDIVIDUAL QUESTIONS

2.2.1. Question A1

This question was well understood with 97% of candidates correctly answering the question. A very small minority forgot to take the total probability away from 1 and an even smaller minority forgot to write their working.

2.2.2. Question A2

The responses to this type of question are improving year on year. 63% of candidates gained both marks as they remembered to include a time frame in their question and most were careful to cover both ends of the range of options. There was however still a sizeable group who give overlapping ranges. e.g. 5-10 and then 10-15 etc. A very small and fortunately decreasing minority produced tally charts. The inclusion of at least one end point like 'none' or 'more' was sometimes missing from some candidate's responses thus also losing the mark for the response boxes.

2.2.3. Question A3

The idea of a line of best fit appeared to be well understood in the majority or cases with most candidates being able to draw one to the required degree of accuracy. 94% of candidates were able to describe the relationship with only a few contradicting themselves. Occasionally negative on its own seen, and negative relationship, and sometimes positive. Taking an estimate from the line of best fit was also well handled apart from the fact that there was a tendency to 'round' the result so that the value for age in years would be an integer value.

2.2.4. Question A4

In part (a) there were some very well presented box plots, which had been accurately drawn to indicate clearly the important features. Full marks were obtained by 56% of candidates. In some instances confusion arose over the median value as this was sometimes given incorrectly as the upper quartile. The fact that a box plot had been drawn for the boys' heights on the question paper was obviously a help in guiding the weaker candidates into drawing the correct structure for a box plot.

For part (b) a comparison was required and again there were 23% of fully correct answers and 44% gained 1 mark. However, there were some who simply wrote down a series of values that offered no comparison but merely gave numerical values. The most successful responses were those that made a straightforward statement highlighting the differences in the median value and referring to the spread of heights by reference to the range being greater for boys or the fact that the inter-quartile ranges were the same. Specific mathematical terms were required rather than generalisations such as "girls are/were taller overall than the boys" and offering no justification for this. A few mentioned the skewness of the distributions.

2.2.5. Question A5

The stratified sampling either proved to be a well rehearsed routine or one that was challenging. Many accurate solutions in 47% of cases were seen which lead to the correct rounded answer of '13'. Some found it necessary to work out the sample sizes for each of the four groups, which, although it acted as a check, was also time consuming. They did, however, select the correct result as the final answer. For those less certain a trial and error approach was used in a minority of cases which they attempted to balance out the numbers from each group taking into account the number of boys in each group and aiming for a total of '40'. In many cases, weaker candidates offered 40 / 4 = 10 as their answer. Unfortunately, in about 6% of cases, premature rounding (i.e. 40/132 = 0.3 then 0.3 x 43 =12.9) cost candidates 1 of the 2 marks available.

2.2.6. Question B1

The stem and leaf diagram was fully correct in 81% of cases and a further 14% gained 2 marks, often for leaving the diagram as unordered or omitting the key. Only a small minority of candidates scored zero – they usually wrote down the values without any separation between the stem and the leaves. There were a surprising number of answers with a correct diagram but an incorrect key – often with just the stem value being identified with the tens digit only.

In part (b) 39, the correct answer was seen in 60% of cases, even without working. Of the wrong answers, 38 was the most common and 40 almost as frequent. These answers appeared without working in many cases, though some – in attempting to find the middle number in an even list – seemed unsure how to cope with finding the 6.5^{th} number and opted for the 6^{th} one (38) anyway. Others just halved 12 and looked for the 6^{th} number because of this.

2.2.7. Question B2

This question allowed candidates to be creative in their answers and 47% of them seized the opportunity and gained two marks. There were, of course, many candidates who had good ideas and were able to write them intelligibly. They were able to point out that having only women in a sample would make it biased (Many wrote that men and women may well have different cinema going habits). They were also able to remark on the fact that the people interviewed leaving the cinema must already have been to the cinema at least once. 90% of all candidates were able to score at least 1 mark, usually for identifying that only women were asked, they found it harder to identify that the location was important as well.

2.2.8. Question B3

This question was well understood but it was surprising to see so many candidates making errors in labelling the probabilities for snooker. The Darts "Not win" was almost correctly labelled by 96% of candidates but they often switched the probabilities for "win" and "not win" for snooker.

2.2.9. Question B4

Even though this question is regularly tested on these modular tests many candidates failed to recognise the true nature of a histogram and treated it as though the different bar widths were irrelevant. Hence they thought the frequencies related to the height of the bars. As a result answers of : 70 50, 35, 10 were the most commonly seen response in about 50% of cases. 9% of candidates were able relate frequency, class width and frequency density or managed to show the correct frequency density scale and gained 1 mark. Fully correct solutions were seen in 41% of cases

2.2.10. Question B5

This was a fairly standard, but non-trivial, probability question. Many successful candidates drew correct probability tree diagrams and used them properly. 24% of candidates knew that they had to multiply the probabilities together as they worked along a set of branches starting with the root and were then able to add the resulting 3 fractions correctly to get the right answer. However, there were a large number of errors due to inability to tackle the arithmetic of fractions correctly. These were of the following general types:

- carelessness, exemplified by one of $\frac{3}{9}\times\frac{2}{8}=\frac{5}{72}$ or $\frac{2}{9}\times\frac{1}{8}=\frac{3}{72}$
- confusion over multiplication, exemplified by all of $\frac{3}{9}\times\frac{2}{8}=\frac{5}{72}$, $\frac{2}{9}\times\frac{1}{8}=\frac{3}{72}$ and $\frac{4}{9}\times\frac{3}{8}=\frac{7}{72}$
- confusion over multiplication as exemplified by $\frac{3}{9}\times\frac{2}{8}=\frac{42}{72}$ or $\frac{3}{9}\times\frac{2}{8}=\frac{432}{72}$
- confusion over addition as exemplified by $\frac{6}{72}+\frac{2}{72}+\frac{12}{72}=\frac{20}{216}$

Many candidates made life harder for themselves by calculating the correct fractions for the cases SS, PP and CC, cancelling them and then making an error on the addition of the three fractions with different denominators.

Some candidates treated the problem as one of replacement and were rewarded as they had essentially the correct method.

Some candidates thought the total of yoghurts was 8 rather than 9 and ended up with a fraction over 56 and there were also some candidates who tried to eat 3 yoghurts.

Other candidates gave fractions such as prob.(2nd is S) = $\frac{2}{9}$ rather than $\frac{2}{8}$.

Some candidates drew out the whole equally likely sample space for the case with replacement and obtained the answer $\frac{29}{81}$

There were, of course many candidates who tried to draw a probability tree but could not get its structure correct (generally they did not have 3 branches from every node) and many others who could not get as far as that. 45% of candidates scored no marks.

3. PRINCIPAL EXAMINER'S REPORT – PAPER 10 (FOUNDATION)

3.1. GENERAL COMMENTS

3.1.1. The paper proved to be accessible to most candidates with the majority of the candidates attempting all questions.

3.1.2. Candidates appeared to be able to complete the paper in the allotted time.

3.1.3. It was pleasing to note that more candidates attempted to show the stages in their working.

3.1.4. Some of the basic algebraic manipulation needs to be reinforced especially when dealing with the methods of simplification and factorisation.

3.1.5. Many candidates did not know what was required when asked to estimate the answer to a complex calculation with many trying to find the exact answer by using long multiplication and division.

3.1.6. Candidates should be encouraged to look at the reality of their answers. In question A6 many candidates found that Sarah travelled 4800 miles in 2 hours and in question A8 they found that James paid £228.60 for each cinema ticket.

3.2. INDIVIDUAL QUESTIONS

3.2.1. Question A1

95% of the candidates were successful in showing the required numbers on the number line. The most common error was to put the answers in reverse order on the left. A few merely put minus signs in front of the existing numbers on the number line demonstrating little understanding of what was required.

3.2.2. Question A2

Again, 95% of the candidates were able to write the number in figures in part (a) although some did write 2350. In part (b) the success rate was a little lower.

3.2.3. Question A3

Most candidates felt that the mathematical name for the five-sided shape was a hexagon although there were many polygons and octagons Around 44% were able to name the shape correctly.

3.2.4. Question A4

Many candidates recognised that 5 was a factor of each of the numbers in the fraction but then did not know how to utilise this fact correctly with $\frac{1}{5}$ being a popular incorrect answer. It was also not uncommon to see the given fraction of $\frac{15}{25}$ in the answer space! Around 60 % of the candidates were able to simplify the fraction correctly.

3.2.5. Question A5

Virtually all candidates demonstrated that they had to use the given line to arrive at the answer. The problem arose with using the scales correctly. Many wanted to round their answer to the nearest whole number with 3 and 7 being common incorrect answers. Others realised that the answer to part (a) was one block above 3 but then wrote their answer as 3.01 which was out of the tolerance for the answer. 74% got part (a) correct with 10% fewer getting part (b) correct.

3.2.6. Question A6

It was pleasing to see that nearly 80% of the candidates were successful in working out how far Sarah travelled. The most common error was where candidates converted the 2 hours to minutes, writing an answer of $120 \times 40 = 4800$ miles … quite an achievement for a 2 hour journey. There were many candidates who gave an answer of 20, found by dividing 40 by 2.

3.2.7. Question A7

Even though calculators were allowed in this section, many candidates felt they did not need to use them for this question as the incorrect answers of 7 in part (a) seemed obvious to them. Around 60% of the candidates were successful in part (a) with 72% successful in part (b).

3.2.8. Question A8

Most candidates realised that they needed to divide £38.10 by 6 to work out the cost of each cinema ticket. This was successfully calculated by most candidates. However a few candidates then went on to round their answer of £6.35 to £6.50. As working was not shown they then lost the available method mark. The most common error was to multiply £38.10 by 6 which led to an answer of £228.60 for each cinema ticket. Over 84% of the candidates got this fully correct.

3.2.9. Question A9

In part (a) around half the candidates multiplied the 3 values to reach a volume of 80 cm^3. However, many candidates added the three values or multiplied 10 by 4, 4 by 2 and 10 by 2 reaching an answer of 68. Some cubed each of the three values, then added their three answers together. Part (b) had the same success rate as part (a) with many able to score both available marks by multiplying their volume by 0.7 correctly. The most common error was to divide by 0.7 Others thought they had to cube the 0.7, getting an answer of 0.343, and some simply took their part (a) answer and added or subtracted 0.7 to it.

3.2.10. Question A10

It was pleasing to note that most candidates showed some working on this question. As a result over 60% of the candidates were able to score at least one mark, generally for multiplying either one of the readings or the difference (or sum) of the readings by 45 or 0.45 The most common error was for candidates to add the two readings. Others thought that they only had to deal with the new reading, not understanding that the old reading was needed in order to determine how many units of gas were used. Some made computational errors in the subtraction of the two readings. Some realised they had to convert from pence, but became confused and carried out two sorts of conversion effectively dividing by or multiplying by 1000 or 10000. It was clear that some candidates did not have their calculator with them, and resorted to manual calculations, which resulted in errors from their lack of ability to subtract and multiply. Around 22% of the candidates scored 3 or 4 marks.

3.2.11. Question A11

Many candidates attempted to draw diagrams to represent each fraction and this generally proved to be a successful method of getting at least 3 of the 4 fractions in the correct order. 25% scored one mark for getting 3 of the 4 fractions in the correct order with a further 30% scoring both available marks.

3.2.12. Question A12

It was disappointing to see how many candidates had absolutely no idea how to write down the coordinates of *P* and *Q* correctly with many writing *P* or *Q* as one of the numbers. Many candidates who attempted this question used the numbers 0, 2, 3 and 4 but generally not in the correct order. It was not uncommon to see only two numbers written in the brackets with many not attempting the question at all. Some wrote answers using only the letters *x*, *y*, and *z* in different orders, or sometimes prefixing these letters with numerical values. Only 11% of the candidates scored 1 mark with a further 5 % scoring both available marks.

3.2.13. Question B1

This proved to be a very successful starter question with around 70% of the candidates scoring all three available marks. Candidates found part (c) the most difficult even though any number ending in 4, no matter how many digits in the number, was awarded the mark. Well over 90% of the candidates scored the first two marks.

3.2.14. Question B2

Over 90% of the candidates were able to score both marks in part (a). Some candidates added extra sticks in their diagram with the most common error being to add two extra triangles to the previous diagram rather than one. A number of candidates got 12 as they drew 4 full triangles. In part (b) 22 or 20 were common incorrect responses although 63% of the candidates were successful in working out that 21 sticks were needed for Pattern Number 10.

3.2.15. Question B3

A wide variety of methods were used to multiply 324 by 25. The most popular method was to make a grid using 300, 20, 4 with 20 and 5. Often errors were made in the number of zeros in 300×20 but method marks could still be scored. However some candidates made a grid using 3, 2 and 4 with 2 and 5, completely not understanding the method. Those who used the traditional method of long multiplication the most common error was adding 648 to 1620 rather than 6480 which resulted in no marks because this was clearly a conceptual error. Napier's method was often used successfully. Just under half the candidates obtained the correct answer of 8100 with a further 11% scoring 2 marks for making one an arithmetic error in their multiplication and possibly another in their final addition. There were also a significant numbers of misreads to this question such as 325×25 and to a lesser extent 324×24.

3.2.16. Question B4

Although nearly all candidates attempted part (a), there were many errors with only 44% scoring all 3 available marks. Most candidates were able to score at least one mark with two thirds scoring 2 or 3 marks. Many candidates only labelled one side with arrows and many put arrows on adjacent sides. Some candidates were not specific about where they put their labels for *A* and *B* which meant that it was not possible to identify which angle was their answer.

3.2.17. Question B5

There were quite a few correct methods to find the size of the angle *y* but a lack of competency in handling the arithmetic resulted in the loss of the accuracy mark. The sum of the angles 55 + 75 + 90 was indicated in the many cases followed by the subsequent subtraction from 360 thus earning the method mark. However, many did not take the 90° into account or subtracted from 380°. Others added 55 and 75 and then reached an answer of 50° obtained by subtracting this from 180° or subtracting this from 360° getting an answer of 230°. 60% of the candidates scored both available marks on this question. An angle of 145 was seen on a number of scripts with no working. This was probably from measuring the angle and gained no marks.

3.2.18. Question B6

Those that knew to multiply the two numbers nearly always went on to work out the correct answer with only 64% of the candidates getting this fully correct. The most common error was to work out the perimeter with 16 being a frequent incorrect answer. Others tried to use Pythagoras, writing $3^2 + 5^2$.

3.2.19. Question B7

In (a) The subtraction signs within the expression appeared to cause a problem in a significant number of attempts. The combining together of like terms was understood such that $3a - a$ and $5b - 2b$ were seen as part of the more confident approach to the simplification process. Where attempts were made to proceed without writing down this first stage in the simplification it was not unusual to see $4a$ and $7b$ or, even more common to see $-3b$ given as the incorrect result of combining the terms. 38% obtained the correct answer with a further 23% scoring one mark for sight of $2a$ or $3b$ somewhere.

Nearly 90% of the candidates could not cope with multiplying out the two brackets in part (b) with only 8% scoring one mark for getting 3 out of the 4 terms of the multiplication correct before simplifying their answer. Candidates at this level do tend to find the manipulation of algebra difficult.

Those that got part (c) correct (11%) tended to go on to get part (d) correct (9%). However it was clear that many of these Foundation candidates did not know where to start when asked to factorise an expression.

3.2.20. Question B8

Most candidates did not understand what was required when asked to estimate with many candidates attempting to work out the sum using long multiplication of 3.92 by 89.9 Not surprisingly they were unsuccessful. Unless estimation was used, candidates could not score any marks. Nearly 60% of the candidates scored no marks on this question. The range of estimates varied with 30% of the candidates writing 4 or 90, scoring at least one of the available marks. Dealing with the 0.209 in the denominator, however, proved to be somewhat more challenging with many rounding this to 0.3 or 0.5 or just leaving this as 2. Arriving at $\frac{4\times 90}{0.2}$ or $\frac{360}{0.2}$ indicated an understanding of the process involved in establishing the estimate and earned the two method marks. Beyond this there was less confidence in being able to work out the division. Dealing with the 0.2 led to a variety of attempts many of which did not achieve the correct estimate. The most common incorrect response was $\frac{4\times 90}{0}$ or $\frac{4\times 90}{1}$ both of which tended to be followed by a final answer of 360. Candidates should be encouraged to show their estimation of each value in the calculation before doing the calculation in order to score as many marks as possible.

4. PRINCIPAL EXAMINER'S REPORT – PAPER 11 (HIGHER)

4.1. GENERAL COMMENTS

4.1.1. The paper proved to be accessible to most candidates with the majority of the candidates attempting all questions.

4.1.2. Candidates appeared to be able to complete the paper in the allotted time.

4.1.3. It was pleasing to note that more candidates attempted to show the stages in their working.

4.1.4. Some of the basic algebraic manipulation needs to be reinforced especially when dealing with the methods of simplification and factorisation.

4.1.5. Recollection of geometric theorems and facts related to a circle were not widely appreciated in their application to problem solving.

4.2. INDIVIDUAL QUESTIONS

4.2.1. Question A1

Most candidates were able to make a good start to the opening question on this paper. Many did this by first finding 10% and then halving this to find 5%. They then added these together to get 9. The most common error was to state that 10% was 6 and then say that 5% was 12 reaching an incorrect answer of 18. Candidates who did know the correct process, attempted 60/15 and arrived at 4. A few candidates misread the question and gave 51 as the final answer.

4.2.2. Question A2

Although nearly ¾ of the candidates got this question fully correct, there were a substantial number of candidates who stopped at 60. A few candidates attempted Pythagoras, clearly not reading that the area was required. It was clear that some students were entered for the Higher Tier when the Foundation Tier would have been more appropriate … one of the common incorrect answers, apart from 60, was 16!

4.2.3. Question A3

Many candidates just wrote 65° as their answer, scoring no marks. Students should be encouraged to fill in the angles they know on the diagram as had 65° been seen on the diagram at angle *QRC* or at angle *DRS* then the candidate would have scored one of the two available marks. The most common incorrect method shown was when candidates took 130 from 180 (instead 0f 360) and divided by 2 to reach 25. It was pleasing to find that over 80% of the candidates scored both marks on this question.

4.2.4. Question A4

It was pleasing to note that most candidates showed some working on this question but, at the same time, it was disappointing to find that not even half the higher candidates were able to score more than 2 marks. As a result many were able to score method marks, generally for multiplying either one of the readings or the difference (or sum) of the readings by 45 or 0.45 The most common error was for candidates to add the two readings and to divide by 45. Others thought that they only had to deal with the new reading, not understanding that the old reading was needed in order to determine how many units of gas were used. Quite a few candidates failed to convert their answer to pence, or they did not show they were dividing by 100 so attempts to place the decimal point could not be rewarded. Candidates should be reminded to convert their answer to the units required.

4.2.5. Question A5

In part (a) over 80% of the candidates multiplied the 3 values to reach a volume of 80 cm^3. However, many candidates added the three values or multiplied 10 by 4, 4 by 2 and 10 by 2 reaching an answer of 68. The most common error was to find the surface area of the net or half the net (only 1 of each rectangle). Part (b) was not as well done although nearly ¾ of the candidates were able to score both available marks by multiplying their volume by 0.7 correctly. The most common error was to divide by 0.7. Others thought they had to cube the 0.7, getting an answer of 0.343

4.2.6. Question A6

It was disappointing to see how nearly ½ the candidates had no idea how to write down the coordinates of *P* and *Q* correctly with many writing *P* or *Q* as one of the numbers. It was also common to see the *z* coordinate of *P* left blank instead of '0'. Most candidates who attempted this question used the numbers 0, 2, 3 and 4 but generally not in the correct order. There was confusion about the order of the numbers although the incorrect answers did not generally show a consistency between the order of the numbers for the coordinates.

4.2.7. Question A7

Many candidates were able to provide a correct expression for the *n*th term of the sequence. The most common incorrect answer was $n + 4$. Others wrote $4n + 2$ or even $2n + 4$. However many got confused in part (b) saying that the 101 was not in the 4 times table, not recognising that none of the terms in the sequence were in the 4 times table. It was not uncommon to see the word 'equal' used instead of the word 'even' when describing the terms. Others said that 101 could not be in the sequence because the terms in the sequence went up by 4. This explanation would have been acceptable if they had then gone on to say that the sequence started with 2 or an even number. Nearly all candidates attempted an explanation … the most effective being that 101 is odd and/or the terms in the sequence are even. Nearly ½ the candidates scored all 3 available marks.

4.2.8. Question A8

Although many candidates recognised that two brackets were required, many wrote

$(x + 6)(x - 1)$ or $(x - 3)(x - 2)$ with varying signs, all of which showed recognition of reaching 6 and 5 but clearly not understanding that the product of the two numbers needed to be 5. Weaker candidates often thought that a common factor could be extracted giving $x(x - 6) + 5$ as the final answer. Only ¼ of the cndidates got this fully correct with a further 6% scoring 1 mark.

4.2.9. Question A9

20% of the candidates were able to score 1 mark in (a) for multiplying and getting 3 of the 4 terms correct. By far the most common error here was to multiply $2x$ by $3x$ to get $6x$ rather than $6x^2$ with $6x + 4x - 9x - 6 = x - 6$ being a common incorrect response. Many candidates failed to recognise that multiplying was required and simply added the x and numbers terms, getting $5x - 1$. Others struggled to deal with the signs, when multiplying or adding. 27% got this part fully correct.

It was unusual to see any correct answers in (b) with over 85% scoring no marks on this part, although a few did score one of the marks by correctly writing the fractions with the correct common denominator. Many of these then could not cope with the minus before the second term, simplifying the numerator to $2x^2$.

4.2.10. Question B1

There were many correct methods to find the size of the angle y but a lack of competency in handling the arithmetic resulted in the loss of the accuracy mark. The sum of the angles 55 + 75 + 90 was indicated in the majority of cases followed by the subsequent subtraction from 360 thus earning the method mark. However, many did not take the 90° into account. At this point it would have been advisable to check that the four angles did indeed sum to 360° as there were many cases in which an arithmetical error crept into the calculation. 83% scored both marks with a further 9% scoring 1 mark.

4.2.11. Question B2

The subtraction sign within the expression appeared to cause a problem in a significant number of attempts. The combining together of like terms was understood such that $4x - 2x$ and $5y + 3y$ were seen as part of the more confident approach to the simplification process. Where attempts were made to proceed without writing down this first stage in the simplification it was not unusual to see $6x$ and $2y$ given as the incorrect result of combining the terms. Only 63% got this fully correct with a further 20% getting one of the terms correct.

4.2.12. Question B3

The range of estimates varied but 4×9 was much in evidence. Dealing with the 0.209 in the denominator, however, proved to be somewhat more challenging with many rounding this to 0.3 or 0.5

Arriving at $\frac{4\times 90}{0.2}$ or $\frac{360}{0.2}$ indicated an understanding of the process involved in establishing the estimate and earned the two method marks (1/4 of the candidates). Beyond this there was less confidence in being able to work out the division. Dealing with the 0.2 led to a variety of attempts many of which did not achieve the correct estimate. The most common incorrect response was $\frac{4\times 90}{0}$ or $\frac{4\times 90}{1}$ both of which tended to be followed by a final answer of 360. Candidates should be encouraged to show their estimation of each value in the calculation before doing the calculation in order to score as many marks as possible. A common misconception was that dividing by 0.2 equated to dividing by 5 so 72 was a familiar incorrect answer. Candidates struggled with dividing by 0.2 with only 14% getting this question fully correct.

4.2.13. Question B4

There were many fully correct tables of values (over 90%). A realisation that the *y*-values were going up in twos helped in the calculation of the *y*-values or as a check that the table was correct.

Using the table of values to draw the graph of $y = 2x + 2$ was again well tackled resulting in the accurate plotting of the points to produce a straight line by over 80% of the candidates. In some instances the points were correctly plotted but not joined up thereby losing the final accuracy mark. A few students failed to read the scale on the axes correctly and assumed that the *x*- and *y*-axes were both 1 square = 1 cm.

4.2.14. Question B5

Simplifying $x^3 \times x^4$ resulted in a range of answers with x^{12} and, the correct answer of x^7 being the most popular. 78% got this part fully correct. In some cases x^3 was read as $3x$ and x^4 as $4x$ giving $12x$ as the final answer.

Part (b) required the expansion of the brackets $(x + 3)(x - 5)$ and many understood the implied multiplication of the terms. The problem was in dealing with the minus sign in the second bracket. The method mark was awarded for three correct terms out of four from $x^2 + 3x - 5x - 15$ with the correct sign. A significant number disregarded the negative sign and gave their answer as $x^2 + 8x + 15$. Over 80% got this fully correct with a further 9% getting 3 of the 4 terms correct.

In part (c) factorising $5x + 10$ to produce $5(x + 2)$ was seen in just over half of the cases. However others regarded it as being a quadratic type and attempted to do the factorisation using two brackets. Others wrote $2.5(2x + 4)$.

A second factorisation appeared in part (d) for $x^2 - 8x$ and for those familiar with the process, it seemed to be a fairly routine question. Just under half the candidates got this part correct.

The final part of the question asked for a simplification that required the recognition that the expression $(x + 3)$ was common to both the numerator and denominator in the algebraic fraction. Around 40% were successful with this part. For those who did not spot this, trying to make any sense of it proved to be a tortuous route.

4.2.15. Question B6

Converting a number from standard form to an ordinary number produced a variety of answers. The correct answer being 3 600 000 but variations on the theme included 3.600000 as the most common incorrect answer. It seemed to be a case of 'what to do with the decimal point' or 'how many noughts to add on' rather than not recognising the standard form notation. Over 60% got this correct.

4.2.16. Question B7

There were many varied attempts at dealing with the interpretation of the recurring decimal and writing it as a fraction. Guesses tended to centre around the fact that 0.25 could be written as ¼ followed by 0.025 written as 1/40 with further variations on this theme. The more thoughtful attempts began with $x = 0.02525\ldots$ and then moved on to statements involving $10x$, $100x$ or $1000x$. However, there were then difficulties in deciding which statements should be paired together in order to develop the process. Many had difficulty knowing which numbers recurred with 0.250250… seen in many cases. A method mark was given for this correct pairing. Many candidates recognised that they needed to pair $100x$ with x but then had difficulty writing these correctly. It was not uncommon to see $100x = 25.2525\ldots$ or $10x$ written as 2.5252…

It was encouraging to note some very well explained methods leading to the correct fraction being obtained. For the majority though it did not appear to be a well-rehearsed method of solution with 78% scoring no marks at all.

4.2.17. Question B8

For part (a) the calculation of the angle *APB* was required although there was much evidence of either angle *APO* or angle *BPO* being given as the final answer. Candidates need to ensure they know how to identify the angle required. Candidates are also encouraged to fill in as many angles that they can on the diagram as this might lead to a method mark being scored. A necessary step in the calculation was the realisation that the angle between the tangent and the radius was 90° which scored the method mark.

Part (b) proved to be more demanding in so far that it was asking for geometric reasons rather than a calculation. The more successful candidates recognised that an isosceles triangle was evident for triangle *ABP* or that the sum of the angles in a triangle is 180 degrees and this was rewarded with a mark. The second mark came from using

a tangent theorem but this proved to be rather elusive in all but a few cases. A common incorrect response was to state that the tangent makes a 90° angle with the circle which was not sufficient for the mark as the candidate needed to state that the angle between the tangent and the radius is 90°.
Around half the candidates scored 2 or more marks with less than 2% scoring all 4 marks.

5. STATISTICS

5.1. MARK RANGES AND AWARD OF GRADES

Unit/Component	Maximum Mark (Raw)	Mean Mark	Standard Deviation	% Contribution to Award
5542F	30	21.1	4.5	100
5542H	30	18.9	5.6	100
5543F	50	27.8	8.7	100
5543H	50	29.1	9.6	100

5.2. GRADE BOUNDARIES

The table below gives the lowest raw marks for the award of the stated uniform marks (UMS).

	A*	A	B	C	D	E	F	G
UMS (max: 41)				**36**	**30**	**24**	**18**	**12**
Paper 5542F				25	21	18	15	12
UMS (max: 60)	**54**	**48**	**42**	**36**	**30**	**27**		
Paper 5542H	29	25	19	13	9	7		

	A*	A	B	C	D	E	F	G
UMS (max: 83)				**72**	**60**	**48**	**36**	**24**
Paper 5543F				39	31	23	16	9
UMS (max: 120)	**108**	**96**	**84**	**72**	**60**	**54**		
Paper 5543H	46	38	30	23	17	14		

5.3. UMS BOUNDARIES

	Max	A*	A	B	C	D	E	F	G
UMS	600	540	480	420	360	300	240	180	120