GCSE

Mathematics C

General Certificate of Secondary Education **J517**

Report on the Units

March 2009

J517/MS/R/09M

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GCSE Mathematics C (J517)

REPORT ON THE UNITS

Chief Examiner's Report

General Comments

At last the changes to the GCSE have worked their way through so that for the first time for two years we had only one set of examination papers – a relief to the examiners as well as to centres, particularly to those teachers, examinations officers and invigilators who were most involved in administering the examinations. We look forward to the first terminal assessment of GCSE two-tier mathematics without coursework in the summer.

The trends noted last March have continued. In particular, the full effect on M8 of the fact that it is no longer the top of intermediate tier is apparent, with an increase in the ability of candidates entered for this module. However, with this being the last session of modules taken by many candidates, examiners do find that across most of the modules, some candidates are entered well above their comfort zone and therefore do not experience the positive achievement that is intended for this course. In contrast to this is the performance by candidates who are 'on their way', possibly to higher grades, and examiners saw some excellent performances, as usual. Although this March session continues to be mostly used for year 11, there was an increase in the numbers of year 9 and year 10 candidates who took these modules, reflecting the variety of routes/entry sessions now used by centres.

B272 Module Test M2

General Comments

The full range of scores was seen from candidates on both sections of this paper. The majority were able to complete each section in the available time; however some candidates clearly found this module very challenging.

Conversion of fractions and decimals was not well done.

It appeared that some candidates did not have access to a calculator for Section B and working out was often lacking,

Comments on Individual Questions

Section A

1 **(a)** Usually correct.

(b) Often correct. Many candidates gained the method mark for showing an attempt at multiplying 7 by 12. Several weaker candidates did not realise multiplication was required.

2 **(a)** Generally correct.

(b) Many correct answers were seen. Very few candidates showed correct working; when working was shown 184 − 50 was common.

3 **(a)(i)** Generally correct.

(ii) Generally correct with St Malo being the most common incorrect answer.

(iii) Many candidates scored all 3 marks. Of those who did not, several scored 1 mark for identifying 237 and 338 from the table. Several weaker candidates added more than 3 numbers.

(b) Many correct answers were seen.

4 The first reflection was usually correct. The second was rarely correct; most candidates just extended down to give a rectangle. Several candidates appeared not to have a ruler.

5 **(a)** Very few correct answers were seen. 1·5 was a common error.

(b) More correct answers were seen in part (b) than part (a).

(c) Often correct. Many candidates wrote down the subtraction sum, but had no idea how to proceed from there, with several giving answers larger than the original number.

6 Many correct answers were seen. A number of others scored 1 mark for attempting to multiply 40 by 3.

7 **(a)** Often correct. Many struggled with the multiplication and tried repeated addition, often unsuccessfully.

(b) The majority of candidates scored at least 1 mark.

Section B

8 **(a)** Generally correct.

(b) Less often correct. Many were confused about these answers to (a) and (b) and gave them in reverse. Few showed a list of the numbers in order.

9 **(a)** Generally correct.

(b) Many recognised the “three” but did not give a direction. Having realised it increased by 3 several candidates incorrectly wrote “It is going up in the three times table.”

10 **(a)** More correct answers were seen in (a) in (b). A small number of candidates failed to label their arrows.

(b) Rarely correct.

11 **(a)** Generally correct.

(b) Generally correct.

12 **(a)** Many correct answers seen.

(b) Fewer scored the mark here than in part (a). The majority of candidates over estimated, with the longest dog being over 2m!

13 **(a)** Generally correct.

(b) Generally correct.

(c) Generally correct; the most common incorrect error was Maths.

(d) Poorly answered. Many misread the question, thinking that he was saying English was 50% and Maths was also 50%. Of those who understood the question several stated it was more than half without explaining why.

14 **(a)** Many candidates scored 2 marks; the common error was giving the last answer as obtuse. Of those who only scored 1 it was usually for recognising the right angle.

(b) Although many candidates gave the answer within the range, there was the usual confusion with °C and angles

15 Several candidates scored full marks, while some lost 1 mark for omitting the units. Other candidates appeared not to know how many grams are in a kilogram.

16 **(a)** Often correct, although the majority failed to show correct working.

(b) Many correct answers were seen.

B273 Module Test M3

General Comments

Candidates had sufficient time to complete this paper and a full range of scores was seen. Most candidates attempted all of the questions, demonstrating that they had been well prepared for the module.

Responses in Section B suggested that some candidates did not have access to a calculator, but many appeared to have a ruler. Working was not always seen, which could have gained some method marks. Candidates struggled to understand algebraic notation and scale drawing.

Comments were not always clear, but more candidates attempted to give some sort of explanation when required.

Comments on Individual Questions

Section A

1 There were mixed responses to this question. Many candidates were aware of the correct unit for the measurement, but failed to get the correct magnitude, for example choosing 60 kg for the weight of a baby indicates that more practical measuring might be helpful. Some candidates were confused between g and ml in (c), although this part was the most often correct.

2 **(a)** 30 was seen as an answer here far more often than the correct answer of 22, indicating that candidates were unaware of the correct order of operations. Working was seldom seen.

(b) This part was very well answered, with even the weaker candidates showing that they could evaluate the brackets correctly even if they then failed to divide correctly. Working out was often seen in this part.

(c) The stronger candidates coped well with this; however common errors were answers of 15·2, 15·4 or 5·6.

(d) Candidates found the decimal division harder than the multiplication. Candidates often reached an answer of 2·[…] but did not appear to know how to deal with the decimal. 2·4 was a common error. Some candidates attempted multiplication.

3 **(a)** This was well answered by the better candidates. Few method marks were awarded, as those candidates who knew what to do generally reached the correct answer. Weaker candidates added or subtracted the 25, leading to answers of 105, 55 or 65 (from an incorrect subtraction).

(b) Fewer candidates were successful at calculating 10%, with 10 being a common answer. Some again subtracted from 80 leading to an answer of 70.

4 Parts (a) and (c) were well answered by all candidates, with fewer embedded answers seen than in previous sessions. Weaker candidates struggled with part (b), often omitting it, indicating that they did not understand that 5*d* meant 5 × *d*. Occasionally 5 × 9 was seen as the answer in (b) which did not score as it was not fully embedded: 5 × 9 = 45 was required.

5 **(a)** As expected 12 was very common as an answer for 6^2. Very few candidates seemed to recognise the square root sign, and this part was often omitted. Those that answered (ii) often gave the answer 32.

(b) Only the very good candidates scored here. There was much confusion about what was required, and a lot of candidates who had the right idea gave a confused explanation referring to an odd number being squared rather than the answer being odd. Almost all candidates could identify odd and even numbers.

6 **(a)** Very few correct answers were seen here. Some candidates scored for correctly measuring the line as 10 cm, but then did not use the scale. Of those who could use the scale correctly, a number did not convert their answer from centimetres to metres as required by the question. Some candidates seemed very unfamiliar with what the scale meant; they did no measuring and tried to do a calculation using the 1 cm and 20 cm.

(b) Even fewer candidates were correct here, and very little correct working was seen. A few candidates scored for showing that 1 m = 100 cm.

7 Few candidates gained full marks here; however most attempted the question. Those that had a reasonable grasp of probability usually identified blue as 5, but then were unsure about how to get the other two, often giving 5 for red and then 10 green. Many candidates realised that the total of the counters should be 20, but did not understand the significance of the probability line, and gave three numbers with the correct total, often from a division leading to 7, 7, 6.

Section B

8 Most candidates attempted this question, but very few were completely correct. Most gave ticks and crosses as required. Perhaps more practical handling of 3-D objects would give candidates more success with this type of question.

9 **(a)** Almost all answers were correct.

(b) Again mainly correct, but some candidates had problems reading the scale correctly here, with answers of 73 or 78 rather than 76 seen. Most candidates appeared to have attempted to read the correct bar.

(c) Some good attempts at explanations were seen, with candidates describing the heights of the bars and scoring the mark for using terms such as ‘highest’ or ‘tallest’. Poor English was sometimes a problem, although generally candidates who didn’t score were comparing males and females or rewording the given sentence rather than referring to the bar chart.

(d) This part was well answered with some very clear answers. Most candidates could identify that the life expectancy was longer for females in all continents. Those who gave a comparison for a single continent, if correct, also scored.

10 **(a)** More candidates shaded just 5 squares in the shape rather than correctly shading 10.

(b) Candidates also struggled with this part. The better candidates got the correct answer or scored 1 for correctly calculating one quarter. Other candidates knew that they had to do something with the 3 and 4, but often attempted division by 3 or multiplication by 4.

11 **(a)** Candidates had maybe not read the question carefully as there were many answers of 7:10, from subtracting one hour rather than one quarter hour. There was little evidence of any working seen. In general, candidates could use the correct form for time.

(b)(i) The better candidates scored well here, but as usual there was much confusion between mean, mode and median. Some candidates found the total but then failed to divide by 8, or gave the answer as 104 here then divided by 8 to give 13 as the answer in part (ii).

(ii) Very few candidates were correct here, with 104 a very common incorrect answer. Some candidates who had attempted to work it out correctly had an error in their subtraction, so did not score.

12 **(a)** Well answered by most candidates. Working was often seen, usually leading to the correct answer.

(b) In common with (b), candidates struggled with this part, again indicating their unfamiliarity with algebraic notation. Answers of 10 and 20 were very common.

(c)(i) There was very little evidence of working seen in this question, but the better candidates were correct. Some candidates misread the question and gave an answer of 4, for a one litre carton, which was given 1 mark. Answers of 125 (250/2) were common.

(ii) Some candidates correctly followed through their answer from part (i) and scored here, particularly from an answer of 4 in (i). Some who were correct in (i) gave an answer of 5 rather than 3 because they did not use 2 litre cartons. Those candidates who gave an answer greater than 20 in (i) generally did not follow through correctly with an answer of 1 here.

13 **(a)** Almost all candidates plotted the point correctly.

(b) Many candidates drew a good ruled line. It was common to join (100, 8) to the origin, but if the rest of the line was correct to (500, 16) this was not penalised. Some candidates drew very thick lines or did not use a ruler.

(c) Many candidates answered part (ii) correctly but struggled to interpret (i), not realising that no mass meant they had to read the graph at 0 grams.

B274 Module Test M4

General Comments

Taken as a whole, attainment on this paper suggests that is was marginally harder than on the corresponding series last year. A reasonable range of scores was seen from candidates for this paper, ranging from zero to almost full marks. About a quarter of all candidates gained more than half the available credit with approximately one eighth achieving more than three quarters of the maximum marks. Overall, performance on Section A was about half a mark lower than on Section B.

There was no evidence that candidates experienced any undue time problems. Many candidates deprived themselves of possible credit by neglecting to show any working. Question 7 was a particular example of this; many candidates' responses consisted of a single number, thus providing no evidence on which to award partial credit.

Writing and numbers were usually, but not always, easy to understand and clear. Some candidates left what constituted their final answer in some doubt by indistinct and ambiguous crossings out – over writing should be discouraged.

Areas of mathematics which candidates found particularly accessible were: coordinates in four quadrants (Questions 1(a)(ii) and (iii)), recognising multiples and factors of numbers (Question 3), continuing a spatial pattern (Question 5(a)), interpreting simple probability (Question 8(c)(i)), ordering decimals (Question 11(b)) and reading charts (Question 11(c)).

Content which was found difficult included: setting up simple algebraic relationships and using formulae (Question 1 (c) and (d)), identifying misleading aspects of graphs (Question 2(b)), pencil and paper calculations involving the multiplication of decimals (Question 4(b)), calculating probabilities (Question 8(b)), and converting Imperial measurements to metric (Question 9(b)).

Comments on Individual Questions

Section A

1 **(a)(i)** Over a quarter of candidates failed to attempt this part question. A common error was to label the line of reflection rather than the fourth vertex. There were also attempts to complete a parallelogram resulting with C being placed at (-3, 3).

(ii) Very well answered; over eighty percent of all candidates were successful. There were comparatively few instances of candidates transposing coordinates but partial credit was available for consistently transposing coordinates.

(iii) A well answered part question found accessible by the great majority of candidates.

(b) Most candidates successfully indentified at least two of the orders of rotation symmetry. However it was evident that some confused rotational symmetry with reflective symmetry. There were a number of attempts to describe the order of rotation using words such as clockwise, across, right, up or down and combinations of 90°, 180° and 270°; partial credit was not available in such cases.

(c) Almost one in five candidates failed to attempt this question. Partial credit was available and a significant number of candidates gained this. Less than one in ten gained full credit. Popular errors appeared to involve candidates multiplying rather than adding lengths in order to find the perimeter. Another frequent wrong answer was 4*a*. The relatively small number who failed to simplify their results once they had found an expression for the perimeter was noticeable.

(d) This was a challenge for most candidates. The majority of credit was gained for 25 and very few gave the correct units with 'cm' quite common. A prevalent wrong response was 7·5; a result of adding 10 and 5 and dividing the result by 2 perhaps.

(e) Found difficult by some candidates but most were able to give a valid reason for angle *a*. However obtaining angle *b* was less successful. Although 360° was stated in many cases as the reason, candidates were sometimes confused as to which angles to add together, and tended to include 50° and 30° with the two 100° angles.

2 **(a)** Only about a third of candidates were successful. Many focused on the difficulty of reading the heights of the bars.

(b) Fewer candidates were successful compared with part (a). Overall, a very poorly answered question found too challenging by a great number of candidates. A significant proportion of candidates did not attempt this question. Most common wrong responses involved reference to the curved nature of the line, "not a line of best fit" or stating that the points did not line up with the years.

(c) Somewhat surprisingly only just under half of all candidates were successful. A common wrong response, perhaps not unexpectedly, was 55 – a result of adding the 5 to 50. Other common wrong answers were 40 and 60. The question was found particularly challenging by the least capable.

3 The great majority of candidates, including the least capable, achieved at least partial credit, but less than one third gained maximum credit. Most candidates recognised the numbers which were multiples of 3 and divisible by 5. Generally speaking it was the prime numbers and square numbers that caused most problems.

4 **(a)** Only about half were successful with this fairly straightforward question. Poor understanding of place value was shown by answers such as 1·04, 1·4 and even 2·22, which were by no means uncommon.

(b) This part question had the lowest facility of the whole paper. This was quite surprising as the question involved no context and tested a self-contained piece of content. Many candidates gave an answer of 4·5, which is perhaps understandable, but not so responses of 1·8 (by addition) and 1·15. Even the most capable failed to gain full credit in nine cases out of ten.

5 **(a)** Found accessible by the overwhelming proportion of candidates. Most problems seemed to crop up when candidates used triangles as the underlying structure to the pattern or by adding extra dots.

(b)(i) Over a third of the candidates were successful. However in some cases it seemed that they did not associate part (a) with the question. Common errors included 1500, 150 and 3000.

(ii) Less than a third gained credit for this part question. Nevertheless a variety of correct answers were seen.

6 **(a)** Found difficult by all including the most capable. Just over one in ten gained full credit. A popular incorrect answer was 100. This may have been the result of an unsuccessful attempt to add 70 and 35; a lack of working made it difficult to be sure. Overall the success rate was surprising given the standard nature of the problem.

(b) This part question was found more accessible than the previous part, with almost half of candidates gaining full credit. The response 4 was a common wrong answer; probably the result of an incomplete method.

Section B

7 Almost two thirds of candidates failed to gain any credit. Of these about a third failed to make any attempt. A proportion of candidates must have failed to gain any credit by not showing any working, merely writing down an incorrect answer. Common wrong answers were 8·7, 10·4, 4·4 and 4·2 – most the result of adding incorrect combinations of 2s and 2·2s. However just over a tenth gained full credit.

8 **(a)** A very well answered part question. Nevertheless it appeared that there were instances where the question was misread and on a noticeable number of occasions only one letter was given.

(b)(i) Found difficult, with almost a quarter of all candidates failing to make an attempt. It appeared that candidates were confused by the actual numbers and did not comprehend that the appropriate addition had already been done. A significant number of candidates divided 158909 by 2.

The rounded answer of 5 was occasionally seen and was awarded full credit.

(ii) About a third of candidates did not attempt this question. Only the most capable were successful in interpreting the question; many misunderstood what was required and gave comparisons between the numbers of words in English and German and a significant number pointed out that 'both start with 27.'

(c)(i) Almost three quarters of candidates gained full credit and most were able to give a moderately clear reason for their choice of 't'. Well over half the least capable succeeded in gaining full credit. It was encouraging to note the appearance of the word 'frequency' in some explanations.

(ii) Found too great a challenge by the least capable; only about one in ten of all candidates gained full credit. A number of candidates gave the probability in words, such as unlikely; no credit was available for this.

9 **(a)** Found too much of a challenge by over half the candidates. There were many instances of the perimeter or half-perimeter being calculated. Partial credit was available for the realisation that a multiplication was required. Less than a quarter were completely successful.

(b) As in previous series, conversion between Imperial to metric units was poor, with only one in ten candidates gaining any credit. In fact there was only marginal difference in performance between the least and most capable. Incomplete recall or knowledge of conversion factors led to answers of 11, 22, 110, 0·11, etc.

10 Half the candidates managed to score on this question. Many stopped once they had found two numbers that summed to 30 or gave a product of 144, regarding the two conditions as independent. Approximately a quarter of candidates gained full credit.

11 **(a)** Although many candidates gave answers within a reasonable, if not acceptable, range there was a large number of excessively high or low estimates made. Candidates tend not to consider the reasonableness of their answers as evidenced by answers such as 1000 m, 350 m and 100 m. There were also instances where the length of the drawing had been simply measured.

(b)(i) Well answered. Candidates had no difficulty finding the largest decimal.

(ii) Over three quarters of candidates failed to gain credit. Many had obviously calculated 4·469 – 0·081 giving an answer of 4·338.

(c)(i) A very accessible part question; almost three quarters of candidates gained full credit.

(ii) The great majority of candidates gained credit. The most common error was 2·5 seconds.

(iii) Not quite as well answered as the previous two parts but overall over half the candidates were successful.

B275 Module Test M5

General Comments

A wide range of scores was seen for this paper although relatively few scored the highest marks. Candidates appeared to have sufficient time to complete the paper.

Candidates frequently showed some of their working although, for question 11(a), this tended to reveal either lack of understanding or equipment.

Comments on Individual Questions

Section A

1 **(a)** Candidates found this quite a daunting start, clearly finding the signs difficult and often giving wrong answers of -6 or 10.

(b) This was better answered although common errors were 4 or -16.

(c) This was definitely the most difficult part with common errors being -10 and 16.

(d) Candidates found this quite accessible with many correct answers or 4 × 4 × 4 being shown. Candidates who wrote 4 × 4 × 4 were not always able to evaluate this calculation, with 12 or 32 common miscalculations.

(e) This was found reasonably straightforward by around 50% of candidates although some showed lengthy, unnecessary and frequently incorrect working to attempt to evaluate 3^5.

2 Candidates found this accessible and many scored full marks. A common error was to think that $5e - e$ was 5.

3 **(a)** The table was often correct.

(b) Despite having correct tables many candidates plotted the points and failed to draw a line joining them, thus losing 1 mark. Most candidates had rulers so that they could gain full marks. Most, but not all, used their rulers accurately. Some candidates seem to feel that all lines must pass through (0, 0) and spoiled their line.

4 **(a)** A very small proportion scored this mark. Answers revealed misunderstandings, with the decimal point being moved, numbers truncated and superfluous zeroes being left in the answer.

(b) A few more candidates scored marks here than in part (a) but many attempted to divide the numbers as given and did not round them. Many had some idea of what to do but, possibly through a lack of “feel” for the magnitude of the numbers, used inappropriate approximations such as 480 and 52 and then attempted, with limited success, a version of division.

(c) This part was well done. Common errors were to place a digit in the single box after the decimal point and to place the same digit in the **final** box above the 100, either leaving the first box blank or placing a 0 there, or to state $0{\cdot}5 = \frac{10}{100}$.

5 **(a)** A well answered question with very few wrong forms such as ratio, words or "out of" seen.

(b)(i) Candidates responded well to this with clear lists. Few gave repeated entries or incomplete lists.

(ii) After a good part (i) many candidates responded incorrectly here with the common wrong answer(s) 2/4, 1/2 or 'evens'. Presumably they had ignored the list and gone back to the numbers to see two odds from four numbers.

6 This question challenged the geometric understanding and reasoning of many candidates. Some ignored the given statement and wrote new ones of their own. For example, with a rectangle, writing a statement about its sides. Some rewrote the given statement putting 'always' into it. Loose comments such as "the diagonals are the same" did not score marks.

Many candidates thought that in a shape all the sides could be parallel. It was not clear how many candidates could recall the properties of a rhombus or trapezium. However, some very good answers were seen with concise statements made.

7 In a poorly answered question quite a significant number of candidates scored 1 mark for guessing the answer with no apparent working. 'Working' often consisted of the list, reordered using the apparent size of the fractions. Candidates picked up odd marks for converting an improper fraction to a mixed number (or vice versa) or for a cancellation.
Frequent wrong answers were $\frac{11}{16} \times 3 = \frac{33}{48}$ and, less often, $2\frac{1}{4} = 2{\cdot}14$
Working generally revealed misunderstanding about the nature of fractions and the processes that may be used to compare them.

Section B

8 **(a)** This was generally well done with a few reversed coordinates.

(b) This was equally well done. Candidates who reversed coordinates in (a) were allowed to 'follow through' here.

(c) This part was much less well answered. Common errors were 90° and 270° but there were plenty of unexpected errors, such as 25° and 40°.

9 **(a)** Candidates scored quite well on this but many failed to show working. 24, with nothing else, was a common response. Candidates who did not score well frequently added the given dimensions. Much less frequent were attempts at surface area or incorrect multiplications of 4, 2 and 3.

(b) The 3-D nature of the question confused most candidates. Many picked out A but did not, presumably, recognise the horizontal plane for B.

10 **(a)** There were some reasonable responses but many candidates found it difficult to formulate coherent responses. Many used words such as ‘add up’ for ’calculate’. The most successful gave examples such as ‘6 × 2 = 12 not 3’ and did not attempt lengthy written responses.

(b) This question also caused candidates many problems. It is clear that many candidates solve this type of equation by a form of trial and improvement. These were often seen alongside the given working. Using this method, candidates could detect the wrong answer but rarely where the error had occurred. Candidates frequently ringed all of $4c = 6$ or parts of the initial equation.

(c) Part (c) was more often correct, usually using some form of trial and improvement. Embedded answers were relatively uncommon and many candidates seemed to find the idea that an answer could not be whole unlikely. Thus $2h = 5$ often lead to $h = 3$. A common initial error was to write $2h = 17$.

(d) This part was the second worst-answered in the question with the success rate little above that expected from guessing.

11 This entire question presented candidates with very real problems.

(a) Many attempted some rudimentary division of the pie charts without the obvious aid of any measuring equipment. Correct answers were rare. Where working was attempted, units were often left out from the measurement (° or %) and so part marks were lost.

(b) Many candidates scored part marks for ordering the figures given. Common errors were 4, 8, 4 and 8 or 35 (without ordering). There was the expected confusion with mean and mode. Very few candidates were able to recognise the anomalous results of 35 and 32 and concentrated on the fact that the median was not one of the numbers in the list or the small size of the sample.

(c) This was quite well answered with common wrong answers of 70% or 3.

12 **(a)** This was poorly attempted with a significant number not attempting the question. Candidates often gave distances for the bearing.

(b)(i) Candidates responded quite well to this question and many scored part marks for measuring and **writing down** the distance from the map.

(ii) A surprising number of candidates did not attempt this question. However, those that did often scored both marks, as long as they showed their working from part (i) to allow follow through. 16·5 was a common wrong answer.

B276 Module Test M6

General Comments

Candidates scored across the mark range on this paper but higher scores were very infrequent with the majority finding this paper very challenging. A large number of candidates were inappropriately entered at this level. The stronger answers from candidates were on the topics of scatter graphs, use of a calculator and rounding, solving simple equations, ratio and probability. The more challenging topics on this paper appeared to be operations with decimals, subtracting fractions, drawing linear graphs, problem solving with averages, problem solving with cuboids and volume and transformations.

All candidates had time to complete the two sections of the paper and where questions were left unanswered it was owing to difficulty with the content.

Comments on Individual Questions

Section A

1 **(a)** There were mixed responses to this part. In the first grid, many were able to obtain 9·19 by adding 6·8 and 2·39, although a common error was to give the answer 8·47. Fewer obtained 0·96 although subtraction was recognised by many as the correct method to use. A common error was to give 0·94 or 1·04 as the answer.

(b) The second grid was very poorly answered. Many gave the product of 0·5 and 0·03 as 0·15 instead of 0·015 and the answers 1·6 and 0·8 were rare, although many candidates were able to obtain the correct digits without being able to place the decimal point correctly. Many candidates left blank spaces on the grid for these values.

2 Candidates did find this question challenging but many were able to gain 1 mark for recognising that two of the values should be 78. A smaller number gave 3 values that added to 240 thus recognising the significance of the mean being 80. Very few gave the 3 correct values. Common misconceptions were to divide 80 by 3 and give values such as 26, 26 and 28.

3 **(a)** Many were successful in multiplying the two fractions given to show 3/24 but cancelling this fraction to its lowest terms caused difficulty. No candidates appeared to use a cancelling method with the two fractions before multiplying. Common errors included $3 \times 1 = 4$ for the numerator and a surprising number of candidates that tried to convert the fractions to a common denominator before multiplying. Some had difficulty in processing 4×6 in the denominator and this was very surprising, and disappointing, at this level.

(b) There were some very good answers where clear working was shown in converting $\frac{1}{4}$ to $\frac{3}{12}$ before subtracting to obtain $\frac{4}{12}$. Many were unable to reduce the answer to its lowest terms however and $\frac{2}{6}$ was a fairly common answer. A few converted to a common denominator of 24 or 48 and arithmetic errors were more frequent in those cases. Many candidates gave answers of $\frac{6}{8} = \frac{3}{4}$ by mistakenly subtracting the numerators and the denominators and this was very common.

4 **(a)** Many candidates were very well prepared for this question but found using the scale to plot the two points very challenging. Interpreting that two squares vertically equalled one unit did cause unexpected problems for most.

(b) This was well answered generally with many using the correct term 'negative' but candidates should note when asked to describe the **correlation**, terms such as negative, positive and no correlation should be used. Word descriptions of the connection between the two sets of data do not answer the question.

(c) The line of best fit was well drawn with a ruler in most cases. A few drew freehand lines for which no credit was given. Only a few candidates did a 'dot to dot' line this time. Reading from the line of best fit did require candidates to interpret the vertical scale accurately and there were problems for many again here.

5 **(a)** Although many were successful in part (i) it did cause unexpected difficulty for some. A correct substitution was often seen with the value 4 but then arithmetic errors were made, some unable to square 4 correctly, or not adding 16 and 12 to complete the problem.

In part (ii), many made the error in squaring -5 to give -25 or -10 for example. A few did not understand that the value of -5 should be substituted in both places where x appeared in the expression. Fewer were successful in obtaining the answer 10 than in part (i).

(b) Many correct expressions of $5x - 35$ were seen. Common errors included answers of $5x - 7$ or giving a correct answer and then going on incorrectly to try to simplify it further or find a solution for x.

(c) Factorising the expression proved more challenging than expanding the brackets and for some this was left blank. Those that recognised that the use of brackets was required made errors such as $b(b - 4b)$.

6 There were a few excellent ruled lines, sometimes following a table or list of coordinates that the candidates had constructed. Some plotted the correct values but then did not join them together.

The lack of a table of values to complete in this question did cause problems for most however, and answers often lacked any clear structure or working with random crosses often appearing on the grid without justification. Candidates should be prepared to tackle unstructured graphing questions such as this by imposing a structure of their own.

Section B

7 (a) This was generally answered well. Some candidates using 'natural display' calculators left their answers as improper fractions for which they did not score.

(b) There were a number of correct answers shown. The most common error was to round the answer incorrectly and answers of 4·0, 4·06, 4·07 were often given. There were also errors in the division line where candidates had not used brackets in the denominator on their calculator and then arrived at the answer 3·6.

8 Many were able to obtain the correct answer of 131°, but often without giving reasons referring to the angle properties used in the calculations.

There is still uncertainty about the difference between giving reasons and showing calculations. 'Angles of a quadrilateral sum to 360°' and 'angles on a line sum to 180º' were the expected reasons, but many candidates were vague or imprecise in their use of language and some simply showed number calculations rather than reasons for the steps.

Common errors in the calculation included giving answers of 49° or for some mistakenly thinking that angles on a line included the angle 83° and answers of 97° were fairly frequent.

9 (a) Many candidates were well prepared for both parts (a) and (b) and showed clear vertical working using the balance method for the equations. Others appeared to use trial and improvement and only scored marks if the correct answer was obtained. Errors in this part included adding 9 rather than subtracting as the first step. Some candidates left solutions embedded in the equation and should ensure that solutions are shown clearly.

(b) There were mixed answers to this part. Many manipulated the terms to $8x = 1$ and then made errors in finding x. The most common error however was in reversing the operations to collect the terms in x and the number terms. It was common to see $4x = 1$ or $4x = 9$ in working. Weaker candidates often showed jottings with no particular written method.

10 (a) Some did use the correct terminology of reflection to describe the transformation; many however used terms such as 'flip', 'mirror', 'symmetry' which were not acceptable. Some thought that it was a rotation.
Only a handful of candidates earned the second mark for giving the equation of the mirror line.

(b) Many were able to draw a translation of triangle A on the grid, but only a few managed to interpret the translation vector as a movement of 2 to the left and 4 up. Some translated the incorrect triangle.

11 The ratio question was generally very well answered. The main common error was to give answers of 150 ml and 600 ml from dividing by 5 rather than 6.

12 (a) Those that could recall the correct formula for the circumference of a circle were successful and just under half of the candidates managed this. Others used an incorrect formula of πr^2 or πr. A few candidates lost marks by not showing working and then giving an answer slightly out of range such as 37·6 cm.

(b) Many left the first part out. Some used a volume approach and tried to find the volume of the cupboard and then divide this by the volume of the CD case. The best approach was to divide comparable lengths 87 cm by 14·5 cm, 108 cm by 9 mm and show that these were exact values with no remainder. Some did try this approach but stumbled on the unit conversion of 9 mm into cm.

In part (ii), some used their answers to part (i) and an answer of 72 was frequently seen. Some restarted and usually tried a volume divided by volume approach and the unit conversion did cause errors again here.

13 This was very well answered. A few were unable to add up the probabilities in the table correctly and gave answers such as 0·72, and this was surprising given that is was on the calculator section.

B277 Module Test M7

General Comments

There were many candidates who were well prepared for this paper and were able to attempt all the questions. However there were also candidates who appeared to be incorrectly entered and had little knowledge of most topics. The answers to the algebra questions were better than expected; the weakness appeared to be in shape and space. Some candidates appeared not to have the correct equipment, especially compasses and a ruler. The knowledge on how to work out the area of simple shapes seemed to be weak. In Section B some candidates were attempting calculations intended to be done with a calculator without one. Few were able to structure or set out clearly their answers to multi-step questions.

Comments on Individual Questions

Section A

1 **(a)** The best answers came from a factor tree. Many thought that 9 was a prime number so that a common answer was 5 × 5 × 9. Problems came when division into 225 was attempted. Some attempted to divide by 2, whilst division by 5 led to many errors.

(b)(i) Many gave the answer as 15^2 or 25. Very few used the answer to (a).

(ii) Common responses were 4^3 or the square root, 8.

2 Division by 3 proved difficult for many candidates with answers such as 1·7, 1·8 and 2·6. Many others found a quarter by halving twice and then multiplied by 3 to give 3·6 as the final answer.

3 **(a)** Most gave the correct answer. A few wrote negative or scattered.

(b)(i) Most of the lines of best fit were correct; a few were inclined at too steep an angle and did not follow the line of the points. Some candidates did not use a ruler or they attempted to draw a curve.

(ii) Most read correctly from their line of best fit; some read 120 from the width and gave the corresponding answer from the length axis.

(c) This was answered well, especially as most used their lines of best fit to justify their answer. Some failed to make the point clearly and usually stated that it was a big leaf, or stated 'the longer the length the longer the width.'

4 Many candidates tried to get 62 any way they could using the numbers 5, 2 and 3. Some did (5 × 2 × 3) × 2 + 2 whilst others thought that 4 sides were 5 × 3 making 60 and then they added 2 to get 62. Some tried this approach: (5 × 3) × 4 + (2 × 3) × 2 = 72, and stated that the given answer of 62 was wrong! Some worked out the perimeter of all the edges of the cuboid.

5 It was surprising that few appeared to have the appropriate equipment. It was common to see attempts to construct a quadrilateral, usually a parallelogram, and then draw the diagonal, or alternatively they would use the ends of the two lines to construct the arcs in the centre. Those who used compasses often placed the point at the wrong place. Some marked the first arcs then did not know what to do next; there were no further arcs.

6 Almost all candidates wrote + 3 in the sequence but many wrote $n + 3$ as the answer. Clearly the major advance is realising that + 3 in the sequence leads to $3n$ in the expression and only a few achieved this. A few gave the next term, 17, as the answer.

7 (a) Many failed to fully explain why $n = 5$ did not satisfy the inequality, usually saying that $3n$ is not between the two limits. This is insufficient justification, as we need to see the value of $3n$, which in this case is 15. Some stated that 5 did not divide into 12 and many others felt that $3n$ should equal 12.

(b) Answers often left out the value 0. There were others who worked out 4, 3 and 2 but misunderstood the lower limit as 1 rather than -1. Most lacked a strategy to answer this question even when presented with one in part (a).

8 (a) This was answered very well, but there were some miscalculations leading to 0·5 and others forgot to subtract 0·6 from 1.

(b) The majority of answers discussed whether the probabilities given were correct rather than about the number of counters.

Section B

9 The best solutions worked out the cost of one litre (£1·07) and multiplied it by 8·6. The most common error was to work out 5 ÷ 5·35 (= 0·93) and then to multiply by 8·6 rather than divide. Some attempted to add the equivalent of 3·6 litres on, for example they would add 3 × 1·07 (or 0·93) and then some attempt at 0·6 of a litre and many of these clearly did not have the use of a calculator. There were some who added the 3·6 to 5·35 to get 8·95.

10 Correct solutions were either based on multiplying by 0·92 or multiplying by 0·08 and then subtracting from 850. The main error was to calculate 8% by dividing by 8, hence 850 ÷ 8 = 106·25 and then subtracting from 850. There were others who thought 8% was equivalent to 0·8.

11 The structure of the table did help many get this question correct. However there was a large number who did not multiply the midpoint by the frequency. They would either divide total frequency by 6 or the total of the midpoints by 6 or 80. A few divided the correct total (13 050) by the total of the midpoints or by 6.

12 (a) Many tried to find the solution in this part rather than answer the question. So they would substitute values like 2·4 and 2·42, thinking it sufficient to find a single close value.

(b) The main problem was that the values substituted for x in x^3 were different in x^2, for example calculating $2{\cdot}3^3 + 3{\cdot}3^2$ or $2{\cdot}3^3 + 3^2$. There were some who tried to solve the equation analytically and working such as $x^5 = 20$ was seen. Many gave the answer correct to two decimal places rather than the required one.

13 **(a)** A common error was to see just two terms, which would be either x^2 and 10 or $2x$ and $5x$. There were many who multiplied 2 and 5 to get 7.

(b) In multiplying out the brackets $5x + 2$ was a common error whilst others subtracted the 2 before removing the brackets. Many could not resolve the equation $4x = 2$ to get the value of x correctly and $x = 2$ was a common answer.

14 Most could not get 2 hours 30 minutes into hours, using 2·3 usually. Many divided 270 by 150(minutes) but then either left their answer in km/mins without writing the new units, or they multiplied/divided by 100 to convert to hours.

15 The main problem was that most candidates could not calculate the area of the compound shape. Some multiplied each length by 5·5 and then they added the results together. There were other attempts where they calculated the area of the rectangle correctly but then failed to work out the area of the circle, using many 'formulae' such as 32π, 64π and $32\pi^2$. There were some who attempted to work out the perimeter. Some candidates divided their 'area' by 5·5 to find the value of the land. The working was poorly structured in this question.

B278 Module Test M8

General Comments

This paper differentiated well between the candidates, with some excellent scripts from good candidates who were able to cope well with the more challenging questions. The majority of candidates were able to attempt all questions. However, there were a few of the weakest candidates who were entered at an inappropriate level and appeared unfamiliar with some of the content of the module, such as quadratic equations, box plots and moving averages, so there were some questions not attempted in such scripts.

Section B marks were generally lower than Section A marks, due to the equation with a fractional coefficient as well as to the questions in this part which required explanation.

Comments on Individual Questions

Section A

1 **(a)** Most knew that they needed to use a common denominator, but many could not cope correctly with the whole numbers. Often 8/20 – 15/20 became +7/20 and many of those who correctly gave −7/20 could not combine it with the 1 to obtain the correct answer of 13/20.

(b) Many good answers were seen, although having reached 84/20 some then made errors in writing this as a mixed number or in simplifying their answer. Some produced a common denominator and then tried to add/subtract. Some inverted the second fraction after making it top heavy. Some changed their fractions to a common denominator and then multiplied the numerators but not the denominators. Another frequent error was to calculate 2/5 × 3/4 and 2 × 1.

2 **(a)** There were a few completely correct answers to solving the inequality, some gaining a method mark for either 2 shown or reaching $5x > 10$ (some then gave $x > 5$). Common errors were a first step of $7x > 10$ or $6x > 10$. There were also some trial and improvement attempts seen from weaker candidates who appeared unfamiliar with inequalities.

(b) A good number obtained at least two of the three marks for this, although some, having factorised, failed to find the values of x. Many gained at least one method mark for the factors, although some who realised the form of factors required gave $(x - 7)(x + 1)$ or similar. Many obtained the final mark for solutions following through from their factors. Weaker candidates often had no idea here and tried linear equation techniques.

3 **(a)** Some rotated using the wrong centre, but nearly all the candidates used a rotation of 180°.

(b) Many candidates had this correct, although some translated by $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$ instead of $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$. Some candidates miscounted; if they did so in one coordinate only they gained part marks, but some translated both wrongly, in effect by $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$. Perhaps they counted starting/finishing points.

(c) Many gave the correct rotation through 180° about a correct follow-through centre for their translation, although some omitted the angle or centre. Quite common, however, was the response just giving both transformations from parts (a) and (b), instead of the single transformation requested – such candidates did not gain any marks. A few candidates gave the correct alternative of an enlargement with scale factor −1 and correct centre of enlargement.

4 **(a)** Very few candidates gained all three marks here. Most knew that the *y*-intercept was 5 and correctly gave (0, 5) but few obtained (−2·5, 0) although some got as far as (2·5, 0); the common error here was to think they needed to use the gradient and to give the answer (2, 0). There was sadly very little working evident, such as $2x + 5 = 0$.

(b) There were many correct equations for a parallel line, but also some perpendicular ones as well as answers such as $y = 4x + 10$ by simply doubling the right-hand side.

5 There were many correct answers for the probability; most realised they needed to use the bottom branches. Some added 0·9 and 0·8 instead of multiplying them, whilst some then halved their answer, realising that they could not have a probability of 1·7, although many candidates appeared unperturbed by a probability of 1·7. A few candidates could not multiply the decimals correctly and gave answers such as 7·2 or 0·72.

6 Many stated that the angles were the same or that both triangles had a 70° angle or equivalent, for which a mark was allowed, although few candidates mentioned the included angle. However, many candidates just stated that one triangle was an enlargement of another without mentioning the scale factor or common ratio or giving other justification, and did not gain the second mark. Better candidates spotted that the scale factor was 1·5 or wrote about the sides in the larger triangle being ‘half as much again’ or 2/3 (from DEF to ABC). Others gave ratios correctly. ‘1/3 as much again’ was a common error and weaker candidates who got this far sometimes wrote about the amounts added on.

Section B

7 **(a)** Few candidates were able to cope successfully with the fraction in this equation. Many realised that they needed to multiply by 2 but did not multiply by it throughout the equation. A great number gained a follow-through mark from one error but few gained full marks. A surprisingly common answer following $5x = 4$ was $x = 1·25$. When correct work was done to reach the $6x = 8 + x$ stage, then full marks were almost invariably gained. Very few used the $2·5x = 4$ route.

(b)(i) Many could not cope with x terms on both sides of the equation and gave a solution with x equal to an expression that contained x. A common incorrect answer was $x = y/8$, candidates having added $5x$ and $3x$ rather than subtracting. Some reached $y = 5x – 3x$ but then factorised to give a final answer of $x = y/(5 − 3)$. Others got into difficulty by taking values to the 'wrong' side and creating negatives which they could not deal with e.g. $3x – 5x = −y$. Many who correctly reached $2x = y$ failed to find the final answer.

(ii) More success was achieved with this part. However, a large number of candidates found $9y = x^2$ and then went astray, not recognising the need to simply take the square root of both sides.

8 **(a)** The big problem for candidates was in not spotting that this was a reverse percentage problem. The most common mistakes involved finding 6%, 106% or 94% of 12667. Those who divided by 1·06 almost always produced the correct answer.

(b)(i) Answers were often poorly expressed so that candidates, who may have known why the formula worked, did not identify clearly the required features. Most got one mark for explaining the link between 2 years and squaring, but fewer explained the multiplier 1·06. Some thought it was an increase of 106%.

(ii) This calculation of the expected population was done correctly by the vast majority of candidates.

9 Weaker candidates were not comfortable with trigonometry but many of the others were successful. 75 was often marked on the diagram and then used, often correctly by the better candidates. Some evaluated successfully using sin 105° or cos 15°. There were a few examples of candidates having their calculators in the wrong angle mode. The degree of accuracy of the answer was very good. Some attempted to use Pythagoras' theorem.

10 **(a)** Constructing the box-plot was mostly done well. Those who made errors usually did so in reading off the quartiles from the cumulative frequency graph. A few candidates plotted their minimum and/or maximum points at the ends of the grid.

(b) Most candidates gained some credit, but relatively few gained full marks. The medians/averages were often successfully compared and values correctly read, but the range or IQR were misinterpreted and more calculation errors were seen here. Many thought that a greater range meant that the boys were taller or based their comment on the shortest/tallest instead of the spread as requested.

11 **(a)** Those who knew what to do usually did it correctly, but some found the first moving average instead of the second and others failed to divide by 4. Some others used only two or three values in their calculation. Some made errors due to not using brackets or an equals key in their calculation, but awarding the method mark on its own was rare as many showed no method. Many candidates who did not know what to do simply attempted to read off the scale and gave an answer of 1400 or omitted the question.

(b) This was well understood and answered correctly by most candidates. Some comments described changes throughout the year instead of the trend over the years.

B279 Module Test M9

General Comments

Although examiners felt that the paper was set at an appropriate level the standard of performance varied considerably. On the whole Section A proved more accessible to the majority of candidates. Some candidates coped well and were for the most part able to attempt a good proportion of the paper and achieve marks well above the target grade.

In general, good scripts were characterised by the presence of some working and formal use of algebra, allowing examiners to award method marks even when the final answer was incorrect. Regrettably, many candidates failed to achieve the target grade, seemingly unprepared for some of the topics. These candidates fared very badly, often with scores less than 10. Overall there was a balanced range of scores for the paper with roughly equal numbers scoring under 10 or over forty. The standard of basic skills in arithmetic left much to be desired on many scripts. For example, the ability to work with simple fractions in question 3 was noticeably lacking.

All candidates had time to complete the two sections of the paper.

Comments on Individual Questions

Section A

1 Most candidates scored at least one mark for appropriate rounding. Many went on to earn all three marks but some struggled with the arithmetic, showing $4 \times 3 = 7$ or $12 \div 6 = 6$, while others struggled to combine the powers, e.g. $^{-}2 \times 9$ or $^{-}2 + 9 = 11$. There are still a good number of candidates who do not appreciate the need to round to one significant figure in this sort of question.

2 (a) This was well answered by most candidates. Wrong answers typically included 0 and 7.

(b) Candidates found this more difficult with slightly more than half earning the mark. Errors were split between an inability to cope with the cube and the negative power. Common incorrect answers included $^{-}8$, $^{-}6$, 0·002, $\frac{2}{3}$, $-\frac{2}{3}$ and $\frac{1}{2^3}$.

(c) About three quarters of candidates earned this mark. Common errors included 40·5, $\sqrt{81}$ (not evaluated), and $\frac{1}{9}$.

3 (a) Many good responses were seen. For others, some simply repeated the probabilities for the males, and for others $\frac{1}{7}$ and $\frac{6}{7}$, or $\frac{2}{9}$ and $\frac{7}{9}$ were common errors. Some used the data from the table and produced probabilities with denominators that were neither 40 nor 8.

(b) It was most disappointing, at this level, to see so many candidates who could not perform the multiplication of two simple fractions. The majority realised that it was the correct operation to use, but then went on to add the fractions or combine addition and multiplication, e.g. $\frac{3}{10} \times \frac{1}{8} = \frac{4}{80}$, or $\frac{12}{40} \times \frac{5}{40} = \frac{17}{40}$. Those with errors in (a) often followed through correctly and earned the marks.

4 **(a)** It was encouraging to see many correct responses. Where errors were seen candidates often earned partial credit. The most common error usually occurred with the x terms. Common errors included $3 \times 3x = 6x$ and $9x - 2x = {}^{-}7x$ or ${}^{-}11x$.

(b)(i) Again, many correct responses were seen with the factorisation. The most common error was wrong signs in otherwise correct factors.

(ii) A majority of candidates were able to factorise the denominator and cancel correctly, even when following through an error in (i). Weaker candidates did not see the connection with part (i) so started again, often cancelling individual x terms or x^2 terms. Some otherwise correct answers were spoiled by attempts at further cancelling of x terms leading to $\frac{-6}{-4}$. Wrong factors for the denominator included $(x + 8)(x - 8)$.

5 **(a)** Apart from the many correct responses seen there were frequent numerical slips in the correct approach. Two common errors involved adding the frequency densities arriving at 35 (often summed incorrectly) or counting the grid squares to get 70.

(b) Many failed to appreciate the distributions of the heights of the trees and merely compared a corresponding interval. Others often commented that Oaks started at 6 m whilst Ash started at 14 m. Candidates should be encouraged to make comments on average and spread.

6 **(a)** There were many poor responses to this question with very few mentioning the angle in a semicircle. It was common to see 'it is 90° because it is a right-angled triangle'. Many were preoccupied by the presence of the tangent and the tangent/radius property was often given as the reason. A small number quoted that the angle at the centre was 180° and that the angle at the centre is twice the angle at the circumference, which was awarded full credit.

(b) Candidates performed slightly better on this part of the question. It was clear that some candidates knew the correct method and reason but struggled to express themselves clearly. 'Alternate angles' was often quoted as the reason. However, many did achieve the answer of 72° although a large number based their reason on angles in a triangle and angles on a line.

Section B

7 **(a)** Only the most able achieved much success with this question. Few candidates realised that the application of Pythagoras' theorem was required. Even when Pythagoras' theorem was applied candidates often used incorrect values such as 8 and 7, 8 and 3, etc. Many simply gave coordinates as their answer whilst others gave the gradient.

(b)(i) Candidates achieved less success than in the previous part. Quite often an equation was given as the answer. Others gave 2 as the answer, in some cases even after previously writing $\frac{4}{8}$. Many gave the answer as coordinates but far too often many candidates appeared to have little idea of what to do.

(ii) Many candidates appeared to have little idea of what to do. Some inverted their gradient but then forgot to change the sign; others changed the sign without inverting. In a significant number of scripts the use of $y = mx + c$ was seen but the x was omitted, leading to answers such $y = –2 + 3$. Some left their answer incomplete as $y = -\frac{1}{0{\cdot}5}x + 3$. The use of 3 as the intercept was better understood and some picked up a mark for using this in their equation.

8 **(a)(i)** Apart from the most able many candidates failed to appreciate that the mass was proportional to the square of the radius. This led to the very common error of $M = 450r$. Some of those using the correct method found the constant of 75 but then failed to finish off with an equation.

(ii) About a third of candidates earned the mark for identifying the correct graph. Many simply gave A as their answer.

(b) This was answered well by many candidates. Not all candidates showed all stages in the rearrangement but many did. When answers were incorrect candidates usually picked up a mark for correctly multiplying by 3. The transposition of the terms in π and h caused most difficulty and it was common to see $3V – \pi – h = r^2$. Other common errors included taking the square root early, e.g. $\pi rh = \sqrt{(3V)}$.

9 **(a)** Candidates struggled to express themselves clearly and many failed to give a full reason. Many stopped short by saying 'there would be a fair number' or 'there would be an equal number chosen from each year' but did not mention proportion.

(b) Significantly, candidates achieved greater success with this part of the question. As expected, 20 was a common wrong answer followed by 1200 ÷ 312 and 312 ÷ 7.

10 A large number of fully correct answers were seen. In cases where full marks were not earned it was common for candidates to earn 2 or 3 method marks. Common errors included forgetting to halve the volume of a sphere and using the wrong formula for the volume of the cylinder (the formula for a cone was often seen). Several arithmetic slips were seen such as 3^3 given as 9.

11 **(a)** Less than half of all candidates earned this mark. Many simply gave 27 : 125 as their answer or other variations such as 1 : 4·6 or 9 : 42.

(b) Even less success was achieved on this part. For those with the correct ratio of 3 : 5 a common error was a volume of 150, failing to appreciate the need to square the linear scale factor. Others reverted to using the volume factor and obtained an answer of 416. Some of those using the correct method failed to pick up all three marks because of premature rounding or truncating the scale factor to 1·6.

B280 Module Test M10

General Comments

Candidates appeared well prepared for this paper and many demonstrated good algebraic skills. The weakest topics were vectors and probability.

Candidates had sufficient time to complete both sections. Working was evident for most questions but sometimes it was poorly organised and difficult to follow

Comments on Individual Questions

Section A

1 This was very well answered. The only common error was 41/100.

2 Few completely correct answers were seen. About half of candidates scored one or two part marks. Interpretation of the power of ½ proved problematic, with some thinking it meant reciprocal, halve or square. Some reached $36x^4y^2$ but then simply halved to give $18x^2y$. Some appreciated that they needed to find the square root but floundered as they tried to find the square root of each term before finding the product.

3 (a) Many candidates drew the correct histogram but some simply drew the final two bars at heights of 3 and 6 cm. Some ignored the key and calculated frequency densities and then drew a correct histogram.

(b) Over half the candidates scored both marks and the majority of the remainder scored 1 mark. The marks were generally scored for comparing the lower, upper or middle priced houses. A common answer which failed to score was 'houses in B are cheaper than those in A'. Some statements did not give a comparison, merely related to one of the regions.

4 (a) Just over a half of candidates were able to show that **RS** = 2**b** – 2**a.** Many did not appreciate that a vector involved direction as well as magnitude.

(b)(i) Only the most able candidates made an acceptable attempt at this part. Some identified a correct vector 'route' but used an incorrect vector, such as **RG** = **a**. Many used incorrect assumptions such as **EH** = **FG**, **FG** = ½**QS** or **EG** = 3**b**.

(ii) Many identified the quadrilateral as a parallelogram or rhombus but sadly square, rectangle, kite and diamond were also offered. Few explanations involved vectors and some of those made errors, such as all 'sides' were 2**b** – **a**.

5 Many candidates demonstrated confidence in eliminating y but then made errors when rearranging or failed to spot the factors. Those who found the correct factors often made errors when finding the solution from $(5x – 4)$, offering 5/4, 4 and 1. Some attempted to solve by using the formula but few knew the square root of 196, despite this being a requirement of the programme of study. Some attempted to complete the square but errors were made at an early stage so marks were rarely earned.

6 **(a)** Stronger candidates recognised that they needed to multiply the numerator and denominator by √3 but some, having reached $\frac{12\sqrt{3}}{3}$, failed to simplify this expression. A common error was to square, giving 144 / 3.

(b) The majority of candidates were able to start this part and a significant number scored full marks. Errors included 3 – 25 = -22 or 22, 5√3 + 5√3 = 10√6. Weaker candidates simply wrote 3 ± 25.

Section B

7 About half the candidates gained full marks for this question and others gained a method mark for substituting in the formula. Errors included substituting 3 instead of -3 (for -*b*), or 8 instead of -8, and an incomplete vinculum in the fraction. A significant number of candidates tried to complete the square but they generally either forgot or failed to convert the quadratic into one with coefficient 1 or 4.

8 The majority of candidates found the correct cylinder volume but some found the surface area. Candidates usually introduced the correct formula for the sphere's volume but often failed to write a statement equating the two volumes. They frequently had problems with the order of operations and a wide range of answers appeared. A common error was to record $\sqrt[3]{225}$ = 15. In general only the stronger candidates scored full marks.

9 **(a)** A high proportion of candidates gave the correct percentage. Errors included 88, 22, 0·88 and 0·22.

(b) Most candidates found and plotted the correct points. However many candidates lost the final mark as they joined the points with line segments or a line of best fit, rather than a curve. A small number of candidates drew bars and only scored if there was evidence of the correct calculation.

10 **(a)** Most candidates recognised the need to use the sine rule and most reached 5·8 through 8·2 × sin 40 / sin 115 or similar. A few found 5·8 / sin 40 = 9·02 and 8·2 / sin 115 = 9·04, and scored 1 mark rather than 2.

(b) About half the candidates substituted correctly into the cosine rule. However, this was often incorrectly evaluated. A few found AC and then used the cosine rule on triangle ACD.

11 **(a)** Responses to this part were disappointing. Many used replacement and so 4/16 × 4/16 = 1/16 was a common incorrect answer. 4/16 × 3/16 = 3/64 was also evident.

(b) Only the most able candidates tended to use part (a) to solve part (b). Candidates more frequently used a tree diagram and identified the correct routes, but frequently assigned incorrect probabilities. Overall this part was not well answered.

12 Most candidates were able to tackle this question. They generally reached a numerator of $(a + 3)(a - 2) - (a - 3)(a + 2)$ and a denominator of $(a - 3)(a + 3)$. The subtraction caused problems, with a lack of brackets leading to algebraically incorrect expressions even if the candidates understood what they were trying to achieve. As a result, candidates often resorted to 'fixing' their working to reach the required answer.

Grade Thresholds

General Certificate of Secondary Education
Mathematics C – Graduated Assessment (Specification Code J517)
March 2009 Examination Series

Unit Threshold Marks (Module Tests)

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
B272	Raw	50							39	24	14	0
	UMS	70							60	40	30	0
B273	Raw	50							28	13		0
	UMS	79							60	40		0
B274	Raw	50						35	20	12		0
	UMS	90						80	60	50		0
B275	Raw	50						28	15			0
	UMS	99						80	60			0
B276	Raw	50					24	11				0
	UMS	119					100	80				0
B277	Raw	50				27	14					0
	UMS	139				120	100					0
B278	Raw	50			32	16						0
	UMS	159			140	120						0
B279	Raw	50		31	15							0
	UMS	179		160	140							0
B280	Raw	50	29	13								0
	UMS	200	180	160								0

Notes
The table above shows the raw mark thresholds and the corresponding key uniform scores for each unit entered in the March 2009 session. Raw marks in between grade boundaries are converted to uniform marks by a linear map. For example, 28 raw marks on unit B278 would score 135 UMS in this series.

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

For a spreadsheet designed to calculate UMS scores for this specification, please visit the Graduated Assessment e-community at:
http://community.ocr.org.uk/community/maths-gcse-ga/home

The grade shown in the table as ‘p’ indicates that the candidate has achieved at least the minimum raw mark necessary to access the uniform score scale for that unit but gained insufficient uniform marks to merit a grade ‘g’. This avoids having to award such candidates a ‘u’ grade. Grade ‘p’ can only be awarded to candidates for B271 (M1) and B272 (M2). It is not a valid grade within GCSE Mathematics and will not be awarded to candidates when they aggregate for the full GCSE (J517).

Statistics are correct at the time of publication.

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