OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education **J517**

Examiners' Reports

March 2011

J517/R/11M

Oxford Cambridge and RSA Examinations

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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

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

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

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) (J517)

EXAMINERS' REPORTS

Chief Examiner's Report

General Comments

As in past years, the majority of the entries for these units in this March session were from year 11, but with the new GCSEs coming there were fewer candidates from year 10 than in the past. However, units B278, B279 and B280 have continued to show an increase in the number of candidates compared with lower modules, showing that this specification continues to attract strong candidates as well as providing access for weaker candidates.

Across all modules, examiners saw some excellent performances. However, some candidates who are aggregating this summer were entered well above their comfort zone in this last session before the terminal paper and therefore did not experience the positive achievement that is intended from this course.

Centres are reminded that the last opportunity to aggregate under this specification is in January 2012. So candidates who do not obtain the required grades then will need 'start again' in June 2012 by taking papers of one of the new specifications, without being able to carry forward module marks. There is not any extra national curriculum content in the new specifications, but with the new assessment objectives and functional elements there are differences in approach, so that problem-solving skills for such candidates would need to be enhanced between January and June. The new specifications may be downloaded from www.ocr.org.uk/2010 . The new GCSE criteria mean that each paper in the new specifications must assess every grade from G to C or from D to A*, so that our present very successful graduated assessment has had to be adapted. Both of OCR's specifications are possible successors. The new Mathematics B (J567) specification already contains references to the current graduated assessment; whilst mappings to and from graduated to the new Mathematics A (J562) are also on the website, to assist teachers in preparing for the changes.

Teachers may also like to be aware of the mathematics group on the OCR social network, which is the successor to the much appreciated graduated assessment community and others. As well as discussions, there are links to teaching and examination resources for mathematics. The group may be found at http://social.ocr.org.uk/groups/maths .

B272: Module Test M2

General Comments

Candidates made a serious effort to show what they could achieve. About half gained more than 50% of the available marks, with less than 10% gaining under a quarter of the obtainable marks.

Performance was broadly similar to that of the previous March module. There was a wide spread of marks in both sections of the paper but, overall, candidates attained about the same on both sections. This was in contrast to previous years where Section A has tended to be the more accessible section.

There were instances of questions not being attempted. Q.2(a)(iv), Q.7(c)(ii), Q.7(e)(ii) and Q.7(f)(i) were the most often omitted questions, with omission rates ranging from about 20% to about 30%.

No obvious instances of candidates misinterpreting the rubric were noted. The overall standard of presentation was generally satisfactory, although there were times where digits were less than clear. Candidates appeared to have completed the paper within the time allowed. The evidence suggested that candidates had access to calculators and protractors.

In common with previous years there were candidates who failed to write down working and as a consequence failed to gain any of the available method marks. This was particularly evident in Q.2(a)(iv) – found difficult by many candidates – but it was hard not to suppose that some, albeit small, partial credit was lost through lack of written evidence.

Areas which candidates found particularly challenging were converting between metric units (Q.7(e)(ii)); multi-step problems (Q.7(c)(ii)) and problems involving interpreting the situation and applying the relevant mathematical operation (Q.2(a)(ii), Q.2(a)(iii) and Q.2(a)(iv)).

Areas where candidates performed best overall included interpreting bar charts and tables (Q.2(b)(i) and (iii) and Q.5(a)); interpreting sketch maps (Q.7(h)); simple decimal calculations (Q.2(a)(i)) and identifying nets (Q.4).

Comments on Individual Questions

Section A

1 A common, partially correct, response was BDCE. The majority of candidates indentified the candle that had 0.1 left. Almost a quarter of all candidates gained full credit, but with the same proportion failing to gain any. Lower scoring candidates found the question challenging, but it was overall a moderately well answered question.

2 (a)(i) This was a question in which over two thirds of candidates gained full credit. A common wrong response was 9.5 g – the mass of a £1 coin. Most, but not all, candidates who realised that a subtraction was called for were able to perform the operation correctly.

(ii) In common with part (i) the most popular wrong response was 3.15 – the thickness of a £1 coin. These two facts strongly suggest that some candidates had difficulties interpreting the problem. This part question was found challenging, possibly because it involved dealing with 'two place' decimals and also because the order presented in the table was the reverse of the actual way the calculation might well be laid out.

(iii) A poorly answered question; less than half the candidates gained full or partial credit. However, partial credit for getting 15 or 30 × 5 was not uncommon.

(iv) This was found too challenging by most; indeed well over three quarters of candidates failed to gain any credit. It had one of the highest omission rates on the paper. Popular wrong responses tended to cluster round simply adding denominations and weights, for example "80 + 50=130 and 80 + 20=100, so 50p". A number of candidates probably lost some partial credit by omitting to show any significant working.

(b)(i) A well-answered question, found within reach of all capabilities.

(ii) A significant proportion merely reproduced their answer to part (i); there appeared to be little recognition that £2 coins were being used. There appeared to be no obvious logic behind many of the wrong responses. Full follow through credit was available from candidates' response to part (b)(i), but very few availed themselves of this.

(iii) A very well answered part question; all candidates found it accessible.

3 **(a)(i)** Almost half of candidates gained full credit; it was found accessible to a degree by all. Most were able to identify the acute angle, but confusing 'obtuse' and 'reflex' was not uncommon.

(ii) A fairly well answered question. As might be expected, giving the supplementary angle as an answer was common. Notwithstanding this, many were able to measure the angle accurately.

(b) Almost all were able to gain some credit. Most errors occurred recalling which of the stars in the bottom row had reflection symmetry.

4 The most prevalent error was to match the cylinder with net F, but this was overall a well answered question.

Section B

5 **(a)** The first part was found very accessible with the great majority identifying the correct temperature in June at the South Pole. The second part was more of a challenge and responses of 0 were not uncommon.

(b) Not a particularly well answered question. "South because it was colder," was common. Repeating the question was a popular response that scored no credit.

6 **(a)** A very well answered part question.

(b) This was found challenging by most. Three quarters failed to gain any credit, although the great majority of candidates attempted the question. A very common incorrect response was 31. Most who correctly realised that 60 was the correct answer successfully stated the correct rule.

7 **(a)** Frequent errors here were 1.05 (from 80 + 25 perhaps) and 55 (possibly originating from 80 – 25).

(b)(i) Just under half of candidates were successful. There were a wide variety of answers but it was somewhat surprising to note the prevalence of 'evens' or '50/50' - betraying a basic misconception regarding probability.

(ii) A very common mistake was to label the probabilities in the wrong order. Less than a quarter were able to gain full credit.

(c)(i) There were a noticeable number of instances where candidates performed the division in the wrong order, resulting in wrong answers of 0·2. Other errors appeared to originate in candidates attempting the division mentally, giving responses of 50 or 500. Nevertheless, well over a half gained full credit.

(ii) This was one of the most challenging part questions, with a high omission rate. Many candidates gained partial credit with responses of 25. Wrong answers tended to be almost random in nature, some plainly guesses, with others apparently originating from 5000 ÷ 26.

(d) Only just under a half gained any credit for this part question. As might be expected a proportion of candidates gave the mode (12), mean (14) or omitted to order the numbers (giving 8).

(e)(i) A number of candidates simply measured the width of the balloon in the picture, giving answers of around 7. Those who did attempt a genuine estimate for the 'real' width were usually successful.

(ii) One of the least well answered questions on the paper with one of the highest omission rates. The most common wrong responses showed very poor understanding of metric units – the full range from 0.044 to 440 000 was observed.

(iii) Incorrect responses included 3, 4, ¼ and 75%. About a third of candidates were successful.

(f)(i) Not as well answered as might have been expected. A surprisingly large number of candidates omitted this part question. Just under a half gained full credit.

(ii) A well answered question. The most common wrong time was 8:29, probably the result of reading the adjacent column.

(g) The great majority were able to access this question. However, despite its almost standard nature, answers of 50 (38 + 12) and 26 (38 – 12) were seen - a result of candidates not being able correctly to represent the situation mathematically.

(h)(i) A well answered part question with the most common error involving candidates taking grid references as points rather than regions.

(ii) Those that failed to gain any credit tended not to have attempted the question, rather than attempt it incorrectly. Nevertheless, the question was found accessible to almost all candidates.

B273: Module Test M3

General Comments

The paper produced the full range of marks, but it was more common for higher marks to be awarded for Section B than for Section A. There was no evidence on either section that insufficient time prevented candidates from finishing. Some candidates may not have been provided with calculators, as working shown in Section B sometimes indicated calculations were completed with pen and paper only.

Diagrams were well presented on the whole, with appropriate use of rulers in most cases. However, working was not usually shown and many candidates wrote down just their answers.

The questions set on number were usually answered well but the questions on algebra and statistics were answered poorly. There was evident confusion between the operations necessary to solve equations and also between the meanings of mean, mode, median and range.

Comments on Individual Questions

Section A

1 Usually only 1 mark was awarded, for the square root of 36. Most appeared not to know what a square number was and gave 2 or 48 as their answer.

2 Candidates found this question very difficult. The most common error was to calculate with '100 minutes per hour'. Examiners allowed marks for any correct step or for a second answer which followed from an incorrect first, but despite this, candidates often earned 0 marks. The method used was usually unclear.

3 **(a)** Most candidates knew that they had to divide 64 by 4 but few could actually do so, many of these achieving it by repeatedly halving.

(b) Few candidates got this multiplication correct. Most errors involved the carry digit.

(c) Most knew that they had to move the decimal point but they moved it in the wrong direction, giving 275·6 as the answer.

(d) The main problem here was finding a quarter of 24 which was then multiplied by 3. It was a surprise that most did not use the halving technique. Those who did use this technique usually halved three times to get 3.

(e) Candidates did not find 10% correctly; some attempted to find 1% and the decimal point was usually moved incorrectly.

4 In these equations, the incorrect inverse operation was often selected. In most cases, subtraction was used irrespective of the operation in the equation.

(a) The most common incorrect answer to this equation was 7.

(b) Many subtracted 3 from 21 to get 18.

(c) Despite more frequently selecting the correct inverse, it was a surprise that many incorrectly subtracted 6 from 18, giving 13 or 11 as the answer.

5 Many candidates were not aware that non-numerical answers were not acceptable at this level, and appeared to have been prepared to give probability 'words'. Those who did respond in fractional form generally gained both marks.

(a) As well as words, 173/200 was sometimes seen.

(b) This was answered better than part (a) and 0 or 0/200 were the common answers.

6 The common answers were 5 and 14 or 14.5, indicating that they had measured the lengths with a ruler and the 'real-life' scale, using the door, had not been taken into account.

7 (a) Although this gauge was often read correctly, 29, 28.4 and 20.4 were all frequently seen.

(b) Poor answers included the adding or subtracting of 0.5 and 400 without converting to the same units. Many scripts had 'Yes' or 'No' alone as a response.

8 (a) The most common error was to measure the whole base of the rectangular plan and then use the scale to give 6 × 4 = 24. No marks were available for this as it was essential that the candidates interpreted the question correctly. Other candidates measured the perimeter of the entire diagram. Higher scoring candidates did well and some showed their measurement of 3 cm correctly on the diagram.

(b) Some candidates were unsure what to do but many did score full marks for this part.

Section B

9 Many diagrams earned at least one mark for either the vertical or horizontal line and more earned both marks.

10 (a)(i) Almost every candidate completed the bar chart correctly.

(ii) Many gave 8 as the mode, rather than blue.

(iii) Many candidates answered this well, giving a clear justification. Weaker answers showed some understanding but failed to demonstrate a correct use of mathematical language in order to provide justification. As might have been expected there were a considerable number of responses where the student decided that the question was wrong and that most of the doors were in fact blue.

(b) There was confusion throughout part (b) between mode, median, mean and range.

(i) Those who recognised the mean often failed to go beyond the addition of the data. There was evidence that even though there were two 8's only one was included in the addition. Also, because one frequency was 0 some candidates thought there were only eight values to be taken into account for the division.

(ii) The most common incorrect answer from those who recognised the range was either giving 8 (or 9 – 1). The incomplete response 9 – 0 was rarely seen. The answer 6, the median, appeared in this part or in part (i) on many scripts.

11 **(a)** Many candidates gave 48, not understanding the index notation.

(b) Strange convoluted calculations showed either that some candidates did not know they were looking for the square root or perhaps did not have, or could not use properly, their calculator.

(c) This was generally correct, with the odd incorrect order of operations giving 46.

(d) This part had far more responses of 66 than of 46, which may have been due to the incorrect use of a calculator.

12 **(a)** Many scripts indicated that the candidates did not know what a conversion graph was. Responses shown as bar charts, grids showing only the points marked and grids left untouched were common. Where lines were produced they were generally correct, though some fell into the trap of veering off to the end at (40, 50) even when they had begun at the origin and passed within tolerance at (20, 24).

(b)(i) Reading the conversions required for part (b) was erratic, with many incorrect answers. Strangely, those who had no line drawn sometimes managed to estimate, presumably from the table, with some success.

(ii) This part was correct more often than part (b)(i), but being given as 40 in a noticeable number of instances.

13 **(a)** This was well answered, though far too many simply wrote their answer, resulting in no marks if a slip in calculation had been made.

(b) This appeared to be either too difficult to attempt or hard enough to be left until the end. Of those who made an attempt but failed to provide 255, many scored the method mark for the substitution within the formula being set out in full, or for writing 200 in what little working was seen.

14 This question on views differentiated well.

(a) View 1 was the most common wrong answer.

(b) The answer 2 was usually seen here.

(c) Some thought that it was 3 or 1.

B274: Module Test M4

General Comments

Examiners saw a wide range of marks, although there appeared to be few candidates scoring above 40 marks in total, with many more scoring fewer than 10 marks.

Responses to questions that required some form of judgement, such as Q.6, Q.8 and Q.11, were often poorly expressed and rarely used mathematical terms accurately.

Some candidates showed working in their responses to Section B. Rulers and pencils appeared to be in short supply.

Comments on Individual Questions

Section A

1 **(a)** Most candidates gave the coordinates correctly.

(b) Few candidates correctly recorded the point as (3, -3). Many appeared to miscount the distance from B (in squares) and (2, -3) was a common error. Some candidates recorded a point vertically above B and some gave a point on the *x*-axis. Most candidates wrote the coordinates of their point correctly, although some reversed coordinates were seen.

(c) Many candidates drew a rectangle using the three points A, B and C and scored 1 mark. Some gave the area of their rectangle, although the number doing this was quite small. A very small number created a triangle and found its area correctly.

2 **(a)** Candidates found it very hard to express the rule coherently. "Add one each time" was a common error. "Add one **more** each time," scored the mark as did those candidates who wrote +1, +2, +3, +4, +5, +6, +7. Candidates needed to complete the sequence or indicate that it continued in this way to score the mark.

(b) 39 was often correctly given.

(c) 11 or 17 were often correctly given but 12, 14 and 21 were all popular wrong answers showing that 'prime' was not well understood.

(d) All the difficulties observed in part (a) were seen in this part. However, listing – 7, – 6, – 5 . . . was a safe alternative to describing the pattern.

3 **(a)** A large number of candidates scored well in this calculation. Many showed working and gave (£)5.25 as the correct answer. (£)4.25 was commonly seen, from carrying 1 instead of 2 in the addition.

(b) This part also showed a good response although 7.25 was not often seen as an answer. Many candidates showed their intention of adding the three amounts but were confused as to where to align the numbers. These candidates scored the method mark. In attempting this addition many treated 2.5 as 2.05 and 3 as 0.3 or 0.03. 6.80 was a very common answer from using 2.05 but, if no working was shown, scored no marks.

4 **(a)** The reflection was often seen in the correct quadrant of the grid although the drawing was frequently poor. Poor accuracy often meant that candidates did not score full marks.

(b) The mirror line was often correctly indicated though, again, accuracy was often poor.

5 The responses to this question suggested that candidates for the new specifications will need preparation to deal effectively with QWC questions. Candidates rarely tackled the task systematically either by listing factors of 50 and searching for differences of 6 or by multiplying whole numbers with a difference of 6 and attempting to produce a result of 50. Some working was seen from most candidates and many scored a method mark but few annotated their solutions or explained why they wrote 'yes' or 'no'. As part of examination technique, candidates should be aware that a mark allocation of 3 indicates that more than 'yes' or 'no' is required as an answer.

6 **(a)(i)** This part question was not answered well and few gave a response in the range 70 – 90 (thousand).

(ii) Few candidates clearly recognised the problem with the vertical scale on the graph. Many gave variations on "Because it's inaccurate," or "Because they said 'roughly'". Some tried to state that the divisions on the vertical scale were too widely spread to read accurately and said "Because points are not on a line." Examiners had sympathy with this response but found great difficulty in interpreting inaccurate language.

(b) The same problems with inaccurate language were seen in responses to this question. Few recognised that there was very little data on which to draw a conclusion and a few said that house prices could go up or down, to score a mark.

7 100 and 2 were sometimes seen in the table, often with little working.
299 and 0.2 were common wrong answers.

Section B

8 **(a)(i)** Many candidates correctly calculated the mean as 1.25 and showed working leading to this. Many, but by no means all, gave the total as 10 and were unsure how to continue. 1 was a common wrong answer and 10 – 8 was also often seen.

(ii) Many candidates gave the correct answer of 1. Some wrote 1 to 2 and some wrote 2 – 1 = 3. A common error was to answer 1 for part (i) and 1.25 for part (ii), confusing range and mean.

(b) A significant number of candidates did not distinguish between the range and an average. Few correct answers were seen. Many thought that Sally was correct and very few recognised that the range cannot be used for this purpose.

9 **(a)** Candidates often wrote that that $\frac{4}{5}$ is 0.45 as a decimal (or occasionally 4.5).
Few candidates linked the percentage to the answer to give the correct response of 0.8.

(b)(i) Neither of parts (i) or (ii) was well answered, showing a lack of understanding of equivalent fractions and percentages. 7 was a common wrong answer to this part, although almost any number, including 100, could appear in the box.

(ii) In this part, 5 and 10 were common wrong answers.

10 **(a)** Candidates responded very well to this angle question and 127 was often seen.

(b) This too was well answered. Candidates who did not answer 47 often scored a method mark for using 90^{o} in their calculations. Some candidates guessed or appeared to measure the angles.

11 **(a)** Quite a number of candidates correctly gave the distance as 6km. However, many, inexplicably, gave 6.2 or 6.3, presumably from some measurement rather than reading the graph.

(b) A significant minority repeated the information and stated that the boys were travelling 'steadily' and did not score. Many answers equivalent to "Garry was faster" were seen, sometimes justified by the fact that he had to go further. Other responses talked about distances or about times, but few stated that they were travelling at the same speed and this sometimes had to be inferred from the inaccurate language candidates used.

12 **(a)** Many good responses were seen, completing the patterns.

(b) Many candidates scored one mark for recognising that the constant was + 2. However, few wrote *w* in the first space. Most candidates attempted to write a calculation rather than a formula, often with figures that seemed unrelated to the problem.

13 Very few candidates knew a rough equivalence between kilograms and pounds. For many the answer given was 18.5 or 1.85, even £185 and so on.

14 A significant number of candidates scored 1 mark and many scored 2. Some answered order 4 and 2, when the correct answer was order 2 and 4. Weaker responses often gave 'clockwise' or 'anticlockwise' rather than an order of rotation symmetry.

15 This question was quite well answered with many candidates scoring 2 marks for working out the cost of the day and night units under the new tariff. A common error, despite the reminder, was to forget to add the whole day charge. Significant numbers of candidates failed to sort out the units they were using and pence became pounds in the final stages. Only the best responses concluded the calculation, showing that £2.08 represented a saving on the £2.13 currently being charged.

16 Many candidates scored 1 mark for working out that the number of 'points up' was 716 and some of these gave the answer as a fraction. However, for many, the answer given was just 716 rather than $\frac{716}{1000}$.

B275: Module Test M5

General Comments

Candidates scored across the full range of marks and had time to attempt all questions. Few candidates scored more than 30 marks on the paper, although those who did often showed clear steps in their working. A significant number of candidates appeared wholly unprepared for this module with many questions left blank or answered with scant, or no, working.

Many candidates had difficulty in giving a clearly worded explanation where required and failed to use correct mathematical language. Only a very small proportion of candidates scored the available mark for giving the unit of their volume, and almost half failed to give a unit at all, even though this was expressly requested in the question. Many candidates appeared not to have covered work on maps and bearings.

Comments on Individual Questions

Section A

1 **(a)** This was generally well answered, although some candidates did not understand the index and worked out 6 × 2.

(b) Very few candidates worked out the cube correctly. Some realised that it was a power of 4, but did not know which one. Those who recognised it as 3 often multiplied 3 by 4. Some candidates had clearly found the square root of 4.

(c) This was generally well answered, but some candidates omitted the negative sign.

(d) Far fewer candidates answered this correctly, generally giving an incorrect answer of −8, presumably inferring that as the calculation involved negatives, there must be a negative sign in the answer. Some candidates divided incorrectly.

2 Many candidates gained at least one mark here, for some comparison of the two discounts or for conversion of ¼ to 25%. Having done the conversion to a percentage, some candidates did not then go on to compare the two percentages so were not awarded the second mark. Some candidates were side-tracked by the different wording of the two offers and compared 'off all purchases' with 'off everything' so failed to score. Only very few incorrect conversions to a percentage were seen, but some candidates did not attempt to convert.

3 **(a)** Many candidates were unfamiliar with the notation required for grid references although, because the mark scheme condoned use of six-figure references and the inclusion of punctuation such as (58, 35), candidates benefitted in this case. Some candidates confused the order of the numbers or referenced all corners of the square, answering e.g. 3558 or 5859, 3536.

(b) Candidates clearly did not understand what was meant by bearing, and many gave a distance as an answer. A few answered using compass directions and only a very small proportion gave an angle, which was usually incorrect.

(c) This part was reasonably well answered, with many candidates giving an answer in one of the acceptable ranges. Some gave the measurement of the line without then converting using the scale. Some answers of 12 were seen, where the scale had been misinterpreted; this did not score without working seen.

4 **(a)** Despite the fact that an estimate was required, many candidates attempted to work out the exact answer, so did not score. Some candidates could not multiply the numbers correctly having shown acceptably rounded values.

(b) Many candidates correctly identified that the estimate was bigger but were not awarded the mark as their explanation did not state that they had rounded values up. Explanations stating that the numbers had been rounded or rounded to the nearest 10 were judged to be incomplete and did not score. Some candidates appeared to be comparing their answer with the number of hours, 28, given in the question.

5 **(a)** Higher scoring candidates had no problem with this equation but others struggled, often omitting it or giving answers such as 10/5 or 3.

(b) This part was correct more often than part (a), showing that candidates could cope better with a two stage equation than with one involving division. Very few candidates showed any algebraic working here, so part marks were seldom awarded. Answers of 8 (from 8 + 5 = 13) and 6 (from 2 + 6 + 5 = 13) were common.

6 **(a)** Many candidates filled in the table incorrectly, with only the higher scoring candidates realising that they needed to substitute into the given equation to find the required values of y. Many other candidates appeared to guess a pattern of values to complete, often 0 and 2 or -1 and 3.

(b) Those candidates who had completed the table correctly usually went on to score both marks here. Some candidates plotted the points but did not join them. Many candidates scored the follow through mark for plotting their incorrect values.

7 **(a)(i)** Very few fully correct answers were seen here. Many candidates attempted to find the median. However, having ordered the values they were unable to find the middle value, either giving 19 or 22 or both. Some found the middle value from the list without ordering, and attempts at the mean and range were also seen.

(ii) This was more often correct than the median, although some left the answer as 27 – 13, and others evaluated this incorrectly.

(b) Very few marks were awarded in this part, as candidates did not realise that they should compare the ranges. Explanations often compared medians, median and range or simply stated that more people attended on Friday.

8 Some very good constructions were seen here, with candidates clearly using the correct technique. However many candidates scored just one mark for drawing an equilateral triangle either by trial and error or by finding the midpoint of the base and using that to find the vertex.

Section B

9 **(a)** Many candidates referred to the length of sides eg 'because all the sides are not equal,' or 'the sides are not the same length'. Of those candidates who realised that the reason should involve sides being parallel many said that there were no parallel sides or that 'all sides should be parallel'. Few clear and correct explanations were seen.

(b) Few candidates were correct here and many left it blank. Common incorrect answers were rhombus and also, surprisingly, parallelogram.

(c) Despite the problems in the previous parts, this part was well answered. Most errors were trapeziums or poorly drawn freehand shapes away from the gridlines, where the candidate's intention was unclear.

10 **(a)** Almost all candidates scored some marks in this question as some correct listing of combinations was usually seen. Many candidates struggled with the doubles, so an answer 6 was often seen from rejecting eg HH and including the repeats of HP and PH. Other common errors were 3 from HM, HP and MP only, or 9 from a list including repeats as well as doubles.

(b) This was not well attempted with many trial and error attempts at non-calculator percentages, with 50% = 40 seen and then some estimation at the remaining 8, with answers of 58% being common. Other common errors were 32% (80 – 48) and 38.4% (48% of 80). Method marks for 48/80 were sometimes awarded.

(c) This was very poorly answered, with many candidates drawing a five sector pie chart using the values in the table and leaving the remaining 180° blank. Candidates who appeared to know what they were doing often gained marks for correctly drawing the sector for either pizza, chicken or both but then appearing to guess the angles for the other two sectors, perhaps due to unavailability of the required equipment. Candidates need to be aware that they will be penalised if they do not label sectors correctly with their names, rather than values or angles.

11 **(a)(i)** Many correct answers were seen here although some candidates did not realise that $6t - 3t$ was not fully a simplified expression.

(ii) Correct answers were not uncommon although many candidates gained only one mark, generally for getting the $7b$. Some candidates found both parts correctly but then combined them to give $9ab$. Errors came from problems with dealing with $-a$, with answers of $4a + 3b$, $4a + 7b$ and $4a - 7b$ common.

(b) Only the higher scoring candidates had any success with this question. Some candidates omitted the question or replaced the letters in the formula with digits leading to 52.5 – 34. Working was often seen for this part leading to many candidates being awarded M1, usually for seeing 12.5 and 12 which were often added rather than subtracted. Despite the fact that this was a calculator paper, 5 × 2.5 = 10 was often seen.

12 Candidates found this question very difficult. Although many scored one mark, this was often for shading six triangles to give order of rotation symmetry 6. Fewer candidates produced a diagram with order 3 using just three shaded triangles.

13 Given that this was a straightforward volume calculation, performance on this question was disappointing. A number of candidates added the lengths or attempted a surface area calculation. Very few candidates gained the mark for the units, with cm or cm^2 common, or units omitted altogether.

14 A significant number of candidates did not attempt this question or offered answers with no working that were generally incorrect. Many scripts consisted of random numbers not labelled or attached to any line of working so it was often difficult to tell what a candidate was trying to do, although the higher scoring candidates often showed clearly laid out, correctly annotated, fully correct solutions.

Seeing 24 × 25 = 600 was quite common but most struggled to find 15% of 650. Again, many candidates used non-calculator methods for percentage and were generally unsuccessful. Very few were seen to make use of a calculator to evaluate 0.15 × 650. A number stopped at 697.5, giving this as their answer. A few scored 3 special case marks as they found 15% of 600 instead, but otherwise gave a correct solution.

B276: Module Test M6

General Comments

Candidates were able to attempt the majority of the questions; however some candidates achieved marks of 5 or fewer as they had clearly been entered at too high a level.

Topics which were well answered included the questions involving graphs. Topics which were not well answered were division of decimals and questions involving geometry. Several candidates appeared not to have had access to a calculator for part B and not all appeared to have the use of a ruler.

Several candidates did not seem to realise that questions with 3 or 4 marks available should have working shown. Others clearly did not know how to approach these questions, or what mathematics was required.

Comments on Individual Questions

Section A

1 (a) The correct answer was rarely seen with 0·9 being the most common incorrect answer, with others stating 3 × 3 = 6.

(b) The most common answer was 5/15, sometimes simplified to 1/3, where candidates simply added the numerators and added the denominators to get the answer. Where candidates did convert the first fraction to 4/10, they almost always got the correct answer although a small minority added the denominator as well and then got a final answer of 7/20. Some picked up part marks for an attempt when using a common denominator other than 10. Other than 7/10 the correct answer was often given as 35/50 and very occasionally as 14/20, both of which earned full credit.

(c) The majority scored 2 marks here with a good many others scoring 1 mark but failing to cancel correctly. Many candidates knew the correct method for multiplying fractions together. There was some confusion about getting the same denominators first or trying to turn one of the fractions upside down, plus some candidates whose times tables skills were shaky, giving 6 × 1 = 7 and 7 × 4 = 24, 32 or even 25. The simplification was usually done well if it came from 6/28. Not all candidates simplified their answer and often 6/28 was the only mark gained. Some did have 6/28 = 3/14 then a final answer of 1/7.

(d) Not many fully correct answers were seen; most had no idea how to convert the fraction to a decimal. Several attempts were seen at division of 8 ÷ 5, so common incorrect answers included 1·6 as well as 5·8, 8·5 and 0·58.

2 (a) Several achieved the correct solution. Other candidates gained M1 for 4x = 14 or a fully correct flowchart, but there was a general weakness in solving equations algebraically. Errors included failing to apply inverses and weak number skills in subtraction and division by 4. Many candidates gave the wrong answer of 3·2 for '3 remainder 2'.

(b) Many candidates circled the correct part of the equation showing the error but then could not explain why clearly. Answers such as "She needs to do the brackets first," rather than 'multiply' or "It's not meant to come to 40," showed a lack of understanding of the concept of an expression with brackets. Some referred to BIDMAS but without explanation of what it meant here.

3 Several correct answers were seen here. However, there was a generally poor understanding of adding two simple decimals, with 0·18 being a very common answer for the addition. Many, however, scored a special case mark for correctly subtracting this from 1.

4 Poor geometry skills were evidenced here including not knowing what a regular pentagon was and a lack of accuracy in the use of a protractor, both shown in poor diagrams. Many candidates drew hexagons instead but sometimes other shapes too. Not all candidates draw a shape with all vertices on the circumference and some just drew radii or diameters to show what they knew about parts of circles. Very few did a calculation without then going on to draw the shape, but drawing 72° consistently was difficult for many.

5 Many correct answers with some excellent examples of working were seen, with many others gaining partial credit. Very few used 'long' multiplication to calculate 2.7 × 3·90. Correct answers were seen using a variety of methods. A great deal of poor arithmetic was seen and few candidates had a full method. Poor layout did not help some candidates.

6 (a) The rotation was attempted very well with full marks being awarded to many. Only a handful of candidates rotated anti-clockwise. A small minority of candidates rotated by the correct angle using the wrong centre, scoring 1 mark.

(b) Very few candidates gained 2 marks as most did not use the word translation, but wrote 'move' instead. Some could not count the squares properly, or wrote 'across' rather than 'right' as the direction. Unfortunately there were also lots of rotations and reflections described. It is disappointing that many also ignored the request for a single transformation, instead opting to describe, for example, a rotation and then a reflection.

Section B

7 (a) Very few correct answers were seen. Few candidates appeared to understand the term 'reciprocal' as 0·25 and 2·5 were common incorrect answers. Others gave their answer as a fraction (and rarely a correct fraction) as they had failed to read the question correctly.

(b) Many correct answers were seen. The most common errors were from those who had calculated correctly but did not round correctly eg 18·09… = 18·9 or 18·0 or 19·0 or 180·9 etc. Other candidates did not understand the order of operations or how to use the bracket keys on their calculator to get the correct divisor, with 22·1 being a common answer.

8 This was reasonably well answered. An attempt of writing a correct ratio was seen in the majority of scripts, earning 1 mark, but there were errors in simplifying so 21:28 and 6:8 were common final answers. It was very rare to find answers in the form 1 : n or n : 1. Few candidates seemed to have the ratio the wrong way round.

9 **(a)** Confusion of mean, mode and median was seen in this question. Many candidates gave 4 & 5 as the answer by looking at the most common values in the frequency column. Other errors included those who thought that mode meant frequency and wrote 28 or 30 instead.

(b) Similar problems occurred as in part (a). 30 ÷ 8 was the most common wrong method leading to 3.75. Several candidates used mid-point values. When the number of subjects was multiplied by the frequencies the common error was 0 × 5 = 5, giving 113 as the total. Of the candidates who had obtained a total from multiplying, several divided by 7, 8 or even 28 and not 30.

10 **(a)** This question was very well attempted by a significant majority of candidates. Some candidates had only one error (usually when substituting –1). Others just tried to make some kind of pattern using the 2 that was there already, so −2, 0, 2 , 4 was the most common incorrect answer.

(b) Most who plotted points joined them with a ruled line and some excellent lines were seen, but once again some candidates were not accurate enough and ended up with lines missing one or other of the end points by a considerable distance, hence losing the mark for the line. Many candidates picked up a mark for the follow through plotting of their points. Those who got the correct answers in part (a) were far more likely to get the correct answers in part (b) by plotting and joining the points properly. There was no evidence that candidates who got wrong answers in the table could go on to draw the correct straight line graph. Many had no idea that they were supposed to be creating a straight line and plotted their points, ignoring the fact that there was no pattern at all. Some plotted the points correctly but then did not join them up and scored only 1 mark.

(c) Many candidates were able to answer this question from the graph, either from the correct line or from their incorrect line. A common error was to substitute x = 4 into the equation to obtain 17. A small minority made no attempt at this question, even though they had a ruled line in part (b).

11 **(a)** Several correct answers were seen. There were reasonable attempts to evaluate $7x$ and $3y$ but errors occurred in the addition of the negative number and many gave a final answer of 43. Other candidates scored 1 mark for either 28 or −15.

(b) Poorly answered; some candidates tried to solve an equation. Generally candidates did not demonstrate a good understanding of factorising and quite often 6 × 9 was evaluated.

12 Generally candidates scored 1 for 60° but failed to give a correct reason with some having contradictory reasons – often Z-angles and corresponding angles. Others stated they were equal as they were on parallel lines, or gave opposite angles, corresponding, parallel and perpendicular angles instead. A small number gave the answer 120 as and then stated the angles on a straight line add up to 180.

13 **(a)** This question was answered very well. Most either picked up the full 2 marks, or 1 mark if the accuracy was poorer. Only a small number were completely incorrect in plotting the points.

(b) This was usually correctly answered but a few candidates contradicted themselves. Some weaker responses betrayed confusion with speed, time and distance, giving eg "The faster they run the further they throw the discus." There were also some very good descriptive responses. Occasionally the correct use of the word positive was seen.

14 **(a)** Poor geometry was displayed here with confusion over the names of the parts of a circle. Some lost marks because their line was not ruled or the had drawn more than one line, one of which was incorrect.

(b) There was some success in finding the area, with many correct answers seen. The common errors were to use $\pi \times d$ instead of $\pi \times r^2$. Over half of the candidates failed to write any units, despite the request to "Give the units of your answer". Others gave metres rather than m^2.

B277: Module Test M7

General Comments

A wide spread of performance was evident in this module, with a few very good papers being seen but conversely some candidates appeared to be unfamiliar with almost all of the topics assessed. It was recognised that this was a challenging paper and due account was taken when setting grade boundaries.

Scatter diagrams and sequences were the most successful topics. Finding the curved surface area of a cylinder and the construction of the locus were poorly answered. In addition, many candidates found setting up an equation and problem solving in various situations difficult. It was pleasing that most candidates showed working and this enabled method marks to be awarded in many questions. The majority of candidates made sensible attempts at questions involving explanations.

Candidates generally appeared to be adequately equipped for this paper but some examiners queried whether compasses were available for the construction, as many left this blank or only drew straight lines

Comments on Individual Questions

Section A

1 **(a)** Few candidates were able to set up the correct equation. A significant number understood the problem but recorded $x + 1 \times 2$ or $2x + 1$ rather than the correct $2(x + 1)$. Weaker responses tended to be single term answers.

(b) Most candidates had made some attempt in part (a) so full follow through marks were available in this part. About a third of candidates scored some marks but few achieved full marks. Many experienced difficulty in manipulating the equation and many of those who did progress fell at the last hurdle when they ignored the negative sign in their equation. Not surprisingly, those candidates who relied on a flow diagram or a trial and improvement method experienced difficulty when solving the equation.

2 The majority of candidates gained 1 mark for the cube of 3 or the cube of 5. Few progressed to recording $\sqrt{152}$, often because one of the cubes was incorrect. Only the best responses used 'recall of squares and roots to 15', so 12 and 13 were rarely seen.

3 **(a)** The majority of candidates correctly interpreted the scale and plotted the points. It was surprising that a number of candidates failed to attempt this part.

(b) Almost all candidates recognised that the correlation was positive. A few wrote a description such as 'as age increased time taken increased', which was condoned in this instance.

(c)(i) The majority of candidates drew an acceptable straight line. A significant number of candidates considered that the line needed to pass through (0, 100) and sometimes this resulted in a line outside the parameters.

(ii) Most candidates read correctly from their line of best fit.

4 **(a)** The majority of candidates found the three next terms correctly. Errors included - 2, 3, 8 and 3, 6, 9 and 3*n*, 8*n*, 13*n*.

(b) About half of the candidates worked out that 58 was the 12th term. The most common error arose from substituting $n = 58$ in $5n - 2$. Some worked out all the terms to 58 but then miscounted them.

(c) This part was slightly less well done but many candidates were successful in giving an acceptable explanation. Some thought, erroneously, that 'it is not in the 5 times table' or 'it does not fit the rule' would suffice.

5 **(a)** About half the candidates identified the correct calculation, C.

(b) Fewer than half of the candidates gained one mark for the explanation and few gained both marks. Many knew that answer A should be smaller as it involved multiplication by a number less than 1 but found it difficult to describe 'a number less than 1' often just calling it 'a decimal number' or 'a 0… number'. There was a lot more confusion about the effect of division by a number less than 1 with many not being clear whether they expected a larger or smaller answer. Answers using approximations were not well done as they often rounded to one or zero and then got stuck. Many also suggested the decimal point in the answer was in the wrong place.

6 **(a)** Just over half of the candidates were able to order the three fractions. Some clearly spotted that 4/15 was about 1/4, 9/20 was just less than 1/2, and 3/5 was more than 1/2. Others attempted to find equivalent fractions but often errors arose.

(b) Few candidates found the correct recurring decimal. Many attempted a division but without success. The most common wrong answers were 0·66666.. and 1·6.

7 **(a)** About a quarter of the candidates scored both marks for the correct construction and others gained one mark for a bisector within tolerance. Many candidates failed to appreciate what was meant by the bisector of angle B. If they had measured angle B, halved it and drawn the bisector, although not a construction, they would have gained one mark. Instead many knew that arcs were involved and drew them everywhere. Common mistakes were to use A and C for the centres of their arcs or to draw perpendicular bisectors of the sides.

(b) About a quarter of candidates drew a correct arc but very few identified the correct region. Some candidates appreciated that an arc was required but given the statement 'more than 5 cm from A' drew an arc of radius 5·3 cm or greater.

Section B

8 **(a)** The majority of candidates scored in this part. A few used incorrect notation or found the probability that either exactly 5 goals or more than 5 goals were scored. A very common wrong answer was 3/8.

(b) Nearly half the candidates gained full marks for the estimate of the mean. The most common error was to add the midpoints and then divide by either 5 or 32.

9 **(a)** The majority of candidates worked out the times, 2 hours and 2·6 hours, but very few were able to write the difference as 36 minutes. Some candidates failed to show working and then scored 0 for answers such as 35 minutes.

(b)(i) The majority of candidates found the number of litres, 12·5, and multiplied by 114·9 but then failed to convert into £ and p correctly. Some worked with whole numbers of litres and/or 115p. Some worked out the cost of 1 mile and then multiplied by 130.

(ii) About a quarter of candidates scored full marks in this part by increasing their answer to the previous part by 21%. Others gained a part mark for showing a correct method, but particularly when using a 'non-calculator approach', rounding errors arose. Some increased another figure, such as 65, by 21% and scored 0.

10 Very few correct answers were seen for the curved surface area of the cylinder as hardly any candidates realised that they needed to find the circumference of the circle. Most candidates found the volume of the cylinder and some attempted an area by multiplying the diameter by the height.

11 **(a)** Just over half the candidates correctly rearranged the formula. Common errors were $4x$, $4/y$ and $y/4$.

(b) Over a third of candidates completed a correct rearrangement, some with very little working. A few showed flow diagrams which often led to incorrect answers due to using the wrong order of operations, and gave an answer of $y + 7/5$ or $y/5 + 7$. A few candidates gained credit for showing a first correct step of $5x = y + 7$.

12 Many candidates gained 2 marks for correct working but the final answer was often wrong as the answer was given to 2dp rather than 1dp. Some got muddled with the expression and worked out '$x^3 - 2$' or '$x^3 - x^2$'. Most candidates did make some sensible attempts at working.

13 About a quarter of candidates completed a full solution to this question, but some of these gave a truncated answer of 8·4cm. Some candidates realised they needed to use Pythagoras' theorem but used 14 and 11 rather than 7 and 11 or wrongly used $7^2 + 11^2$. A significant number of candidates seemed to have no notion of using Pythagoras' theorem and finding the square root of 77 from 7 × 11 was a common error.

B278: Module Test M8

General Comments

There was a wide range of achievement on this paper but with only a few gaining very low marks. The majority of candidates were well prepared and appropriately entered.

Many made efforts to show working and attempted all questions and appeared to be equipped with a calculator for Section B.

The questions on adding fractions, expanding brackets, reading the median from a cumulative frequency graph, probability and tree diagrams and writing a number in standard form were the best answered. The questions on rearranging formulae, comparing two distributions using the median and interquartile range, reverse percentages, solving problems with values in standard form with a calculator and house price depreciation were the weakest topics.

Comments on Individual Questions

Section A

1 Most candidates answered this question on adding mixed numbers well. Some added the whole numbers and fractions separately and others choose to convert to improper fractions first before adding, then converting back to a mixed number. Some made arithmetic errors in the conversion to a common denominator or the conversion back at the end to a mixed number. There was a lack of understanding of how to add the fractions amongst some candidates, with the common errors being $\frac{1}{5}+\frac{3}{4}=\frac{4}{9}$, $\frac{4}{20}+\frac{15}{20}=\frac{19}{20}$ and $\frac{1}{5}+\frac{3}{4}=\frac{4}{20}$.

2 (a) For the first step in rearranging the formula, those that chose to multiply by 3 and those that decided to transpose the -4, were about the same in number. However neither lead to many fully correct final answers being seen. It was very common to see $3r = p^2 - 4$ from failing to multiply 3×-4 or to see $3r + 4 = p^2$ from failing to realise that 3×4 was also needed. The commonly seen incorrect answer was $p = \sqrt{(3r + 4)}$, which earned two marks in total provided the previous steps had been shown. A small number lost the final mark for not extending the square root sign far enough, giving $p = \sqrt{3} + 4$ as the answer. There were a small number of candidates who chose to give a fully correct flow diagram but then were unable to write the correct answer algebraically.
Candidates need to be aware that the mark allocation for this question indicates the number of steps required and that each step should be shown clearly, not combined, as marks are available for each next correct step shown even if the previous one was incorrect.

(b) Quite well answered on the whole. The negative signs caused confusion for a number of candidates and were sometimes either ignored or attached to the incorrect term. When combining $-5x$ and $2x$ it was common to see $7x$ or, more often, $-7x$. In a small number of cases, the x was omitted giving $x^2 - 3 - 10$ or $x^2 - 7 - 10$.

3 (a) Many were successful here and recognised that the gradient of the line was the coefficient of the x term, 3. Common incorrect answers were $3x$ or -4.

(b) Some confused the gradient with the *y*–intercept here and gave an answer of 3. There were many correct answers of –4. A coordinate answer of (0, -4) was also accepted. Common incorrect answers included 4, (0, 4), (0, 3) and (3, 4).

(c) A number of correct equations were given but some spoiled an otherwise correct equation by omitting '*y* ='. The most popular incorrect response was $y = 6x - 8$. Others kept the intercept as –4 and changed the coefficient of *x*. Some gave $y = 4x - 3$.

Overall question 3 had the highest omission rates on the paper.

4 Many were able to select the correct expression for the volume but fewer were able to give a correct reason for this. The best answers referred to three dimensions or three lengths being multiplied or an area multiplied by a length and to illustrate this candidates often replaced the variables *a* and *b* in the expression with l to show how this would work. The weaker reasons were along the lines of 'because it has three lengths', but then never went as far as mentioning that the expression showed the products of three lengths. Others incorrectly stated that it was 'because it has π in it '.

5 For a few, this transformations questions proved very straightforward and they gave good answers showing the translation followed by the rotation on the grid, before giving the three correct elements of the description: rotation, 180°, around (2, 0). Most candidates scored partial marks however. The most common answers made an error or omission concerning the centre of rotation and (0, 2) was a common error for candidates scoring 3 marks. Other errors included giving two transformations in the description instead of the single one requested, or simply showing the transformations on the grid but then giving either no description or a completely incorrect description such as reflection. Some candidates were surprisingly unable to show a correct translation followed by a rotation of 180° on the grid.

6 **(a)** Responses varied here with the median better found than the interquartile range (IQR). There was evidence in some cases of unfamiliarity with the IQR: some gave the full range or the mean of the highest and lowest values.
Those showing some understanding of the terms mostly used the scales correctly but there was some incorrect use of 20 or 30 and 70 or 80, when trying to read the 25^{th} and 75^{th} percentiles. For the median, errors included reading the horizontal scale as 86 instead of 92. There were also a few cases of incorrect subtraction seen giving 100 – 82 = 28 not 18. Some gave the lower quartile of 82 for the IQR.

(b) This was not well answered. The main problem here was the lack of interpretation of the median and particularly of the IQR. Most were content to compare the medians and the IQRs with no interpretation. Of those that attempted an interpretation many linked IQR to the cost of supply and others referred to range - only a small number related it to consistency. Some failed to state which company they were talking about.

7 This proved to be the weakest answered of all the questions. By far the most common attempt was to find 40% of 1.8, with answers then of 7·2 or 0·72 or 2·52 (if added on to 1.8). Others identified the use of 60% but then often did 1·8 × 0·6 giving the answer of 1·08. Some recognised that 1·8 should be divided by 0·6 but then were unable to process correctly. Only rarely was the correct answer of 3 seen.

Section B

8 **(a)** The tree diagram was completed very well. Candidates used the correct decimal values generally and did not attempt to convert to fractions. A few confused the placement of 0·3 and 0·7 on the second set of branches.

(b) Many answered this correctly and the vast majority tried to multiply the two probabilities from the two lower branches. Some did make arithmetic errors however, despite this being in the calculator section, and answers such as 0·14 or 4·9 were sometimes given. A few did not know how to combine the two probabilities correctly and attempted to add rather than multiply.

9 This question on similarity led to a range of responses. Some recognised immediately the corresponding lengths to use to find the correct scale factor and found 8 ÷ 5 before then multiplying this by 7 to obtain 11·2. A considerable number used the incorrect lengths of 5 and 3 to try to obtain the scale factor and gave answers such as 11·66… .
Some candidates had little idea of similarity and added 3 to 7 because 8 is 3 more than 5. There were others who incorrectly attempted a trigonometric or Pythagorean calculation.

10 **(a)** Solving this equation involving a fraction was not well answered. Most candidates were unable to remove the fraction correctly as the first step; many attempted to add 1, take x or take 2 as the first step. Some realised that multiplying by 3 should be the first step but then did not perform this correctly and errors such as $15x - 3 = x + 2$ or $5x - 1 = 3x + 2$ or $5x - 1 = x + 6$ were seen. Candidates were rewarded for each correct step they showed, even following earlier errors, and there were fewer errors in the second step, the collection of terms and numbers. Only a small number of fully correct answers were seen.

(b) This was tackled much better than part (a). Most recognised the correct method and attempted to set up two brackets. There were occasional errors in the factors or the signs in the brackets eg $(x - 3)(x - 10)$ or $(x + 5)(x - 6)$. A follow through mark for the solutions was allowed from the candidates' factors, providing either the product of them was 30 or the sum of them was –11. Many obtained fully correct factors and then gave correct solutions. A few gave the factors only and gave no solutions thinking they had answered the question.

11 **(a)** Many answered this correctly. The main errors were in knowing that, for standard form, the first figure given should be between 1 and 10 and errors included 86.4×10^4 or 864×10^3. Other errors included rounding the first figure to 8·6 or even 9.

(b) Full marks were rare in this part. Many were unable to recognise that the larger value should be divided by the smaller value to answer the question (or to recognise which of the values was larger). Attempts to add or subtract the values were often shown in working. Those that chose to divide the values often tried to write out the full values and did not demonstrate that they knew how to enter the values into a calculator correctly in standard form. Those obtaining a correct value of 333221· 7… usually did not complete the final step of writing the value in standard form correct to two significant figures.

12 **(a)** Many were able to gain one mark for one correct value, usually the index 3. A selection of errors was seen for the multiplier, m, such as 2%, 0.02, 1.02 or 0.94. A few candidates gave a word response for m and n such as 'percentage' and 'months'.

(b) Some responses made the link between this and part (a). The most efficient method shown was $250\,000 \times 0{\cdot}98^6$. Some who used this approach miscounted the number of months and used 7 as the index. Others attempted a staged calculation for each month and often went to the seventh stage. Some simply subtracted 12% from 250 000 and did not appreciate the compound depreciation.

13 Only a few candidates managed to answer this trigonometry question entirely correctly but many earned 3 marks for using trigonometry to calculate either angle A or angle B correctly. The bearing part of the question was misunderstood by most, who did not realise that the angle clockwise from the North line at A to the line AB was required. Some realised that trigonometry should be used to find an angle but had insecure knowledge of the techniques and showed random working with poor notation and struggled to earn method marks as a result. Others attempted Pythagoras' theorem to find the length AB but then did not really make further progress.

B279: Module Test M9

General Comments

Examiners felt that the paper was appropriate for the majority of candidates. Candidates found Section A more straightforward with fewer very low marks and more high marks than Section B. Overall the majority of the marks were between 10 and 40 with slightly fewer scoring above 40 than under 10. Some coped well and were able to attempt a good proportion of the paper and apply their knowledge to a worthwhile effect. Some appeared to be out of their depth, faring badly, often with scores in single figures. Working was shown by the majority of candidates although this was often messy.

Comments on Individual Questions

Section A

1 (a)(i) 9^0 was evaluated correctly by almost all candidates. Common errors were 0 and 9.

(ii) Candidates were slightly less successful with $64^{1/2}$ although many did obtain the correct answer. Common errors included answers such as 32, $\frac{1}{32}$, $\frac{1}{8}$ and 4.

(iii) Many candidates had 1·8 in their answer but there was a great variety of powers of 10 and very few managed to get 10^{-4}. Many coped with the multiplication and obtained the most common answer of 18×10^{-5} but failed to answer the question completely as it asked for standard form. Those who attempted to go further often gave the answer as $1{\cdot}8 \times 10^{-6}$.

(b) By far the most common answer was 8, showing some knowledge of powers but being unable to cope with the signs. Common wrong answers included 12, –8 and –4.

2 (a) This was well answered by almost all candidates. When no marks were earned it was usually as a result of incorrect probabilities for bag B.

(b) Most candidates knew what here to do but some made errors with the arithmetic. Common errors included $\frac{3}{8} \times \frac{1}{3} = \frac{4}{24}$ and $\frac{3}{24} + \frac{10}{24} = \frac{13}{48}$. It was also a common misunderstanding that when multiplying fractions the denominators should be the same. Others were confused over when to add and when to multiply.

3 (a) It was rare to award part marks for this question. Over half of the candidates knew what was required and obtained the correct answer. Although there were a few partially factorised answers the majority of the rest of the candidates obtained no marks at all. For these it was common to see attempts to factorise into two brackets, with two terms in each.

(b) Quite a lot of candidates factorised, correctly or not, but then did not continue to solve the equation. Of those who did go on to solve the linear equations many struggled to solve $2x - 3 = 0$ correctly and gave answers such as $x = 3$ or $\frac{2}{3}$ instead of 1½ . There was also some evidence of trial and improvement being used to find solutions, but no attempts to complete the square or use the formula (M10 techniques which are sometimes used by M9 candidates).

4 Most candidates knew what to do here with only a minority merely adding the frequency densities. All too often the work was spoilt, however, by poor arithmetic such as 1·6 × 10 = 160 or incorrect addition of the frequencies. A small number misread the frequency density scale and some used 10 instead of 20 for the last interval. Overall, just under half of all candidates earned all three marks.

5 There was an even spread of marks for this question. Better responses had the steps clearly set out. For the rest a variety of errors were seen including subtracting m to eliminate m from mv^2, subtracting mu^2 to isolate mv^2, taking a square root at too early a stage and cancelling m in the denominator with the m in the numerator.

6 (a) Well over half of all candidates expanded and simplified well and obtained all three marks. Common errors included $3x \times 5x = 15x$ and $+2 \times -2 = 0$ and incorrect addition of $-6x + 10x$.

(b) Candidates were less successful on this factorisation. The better responses used the 'difference of two squares' and were often successful, so the part mark was rarely awarded. Most started from scratch to find two factors by trial and improvement and this was rarely successful. Some appeared to have some idea that 'difference of two squares' was required giving, for example, $(x + 3)(x - 3) - (y + 3)(y - 3)$.

Section B

7 Over a half of all candidates scored both marks. A small number picked up one mark for an answer of an answer with insufficient accuracy or attempting to find a product using at least one of the lower bounds. It was common to see 8·6 × 12·8 evaluated and the lower bound of this value given as the answer.

8 (a) Surprisingly few (about one third) candidates were able to apply Pythagoras' theorem correctly and obtain the correct answer. A few used wrong values for one or other of 5 and 10. The coordinate grid setting appeared to lead many into presuming a question about gradient at this point.

(b) The majority of candidates struggled to get anywhere in this question. Some candidates had a vague idea that gradients and reciprocals were involved but did not fully answer the question. Some earned a mark for finding the gradient or the equation of AB. Many candidates appeared not to understand that 'm' and not 'mx' is the gradient when using $y = mx + c$. Weaker responses focused on the lines meeting at a point or just said they met at right angles.

9 Well over half of candidates struggled to make any headway and scored no marks. It was common to see angle EBD = 58° as the first step, even if it was not used to find angle BCD. Some gave a correct value for one or both of BED and BDE but it was rare to award the mark for the correct reason. Common wrong reasons were opposite angles, alternate angles and occasionally corresponding angles. If BDE was correct it was common then to work out BCD correctly, although in many cases reasons were not given for each step. Common wrong assumptions included triangles BCD, BED and BEC were isosceles.

10 Candidates were more successful with this question and a majority went on to score full marks. Some lost a mark by failing to round their answer of 23·8. Weaker responses simply divided 40 by 3.

11 (a) Many candidates got as far as $y = 2{\cdot}5x^2$ by using one set of values. Some went on to check that another pair of values were satisfied by this formula. Relatively few realised they needed to check the third pair as well. Some candidates misread the question and tried to use $\sqrt{x}$ or inverse proportion. Many failed to use the 'square' at all and tried to show y was directly proportional to x. Many others spotted
3·6 ÷ 1·2 = 3, 10 ÷ 2 = 5, 19·6 ÷ 2·8 = 7 and used this as their argument. It was rare to see candidates working along the rows to show the proportionality.

(b) Those who had some idea from part (a) generally scored the mark for 14·4. A common wrong answer was 14·8.

12 There were many disappointing responses seen. The most common wrong answer was 78 from those candidates who found the linear scale factor of 1·25 and used this instead of the area factor to work out the area of PQRS. Others realised the need to use $1{\cdot}25^2$ but then went on to multiply instead of divide. Others performed the correct calculation but premature rounding of $1{\cdot}25^2$ as 1·56 lost these candidates the final accuracy mark.

13 There were several good responses seen, even from candidates who had struggled on many of the other questions in this section. Many of those who knew how to approach the problem lost the final mark for failing to give the angle to sufficient accuracy. Some candidates managed to pick up two marks for correct use of Pythagoras' theorem. Others struggled to identify the triangle containing the required angle whilst others still read the dimensions incorrectly, giving eg PC = 12.

B280: Module Test M10

General Comments

Both sections discriminated well, with a full range of marks seen in Sections A and B.

Timing did not appear to be a problem with Section A. In Section B there were a few unfinished tree diagrams but examiners felt that in general there was no evidence that questions towards the end were not considered - any blank spaces seemed to be due to the fact that candidates couldn't actually do the question rather than any lack of time.

In Section A Q.5 (transforming a graph) was done very poorly. In Section B the second mark of Q.9(c) (comparing averages) and the Q.11(c) mark (vector reasoning) were rarely obtained.

It was pleasing to see some high-quality algebra, with most candidates able to factorise successfully. As usual, however, some candidates were entered who seemed to have little knowledge of the topics required for this module and in whom the level of algebraic manipulation required was lacking.

Comments on Individual Questions

Section A

1 (a) The general idea of this question was quite well understood, and many candidates were able to factorise the numerator correctly. However, work on factorising the denominator was very much less successful, and very many candidates either did not recognise, or did not know how to deal with, a case like this involving both a common factor and then another process. Very few factorised the denominator fully and correctly as $3(x – 2)(x + 2)$, and candidates who managed to arrive at a correct form of answer for the question overall most often got there via the partial factorisation $(3x + 6)(x – 2)$ – this was given full credit. There was a fair amount of evidence of poor understanding of the process of cancelling, eg thinking that $x – 4$ in the numerator could somehow be cancelled with $x^2 – 4$ in the denominator. On the other hand, examiners were pleased that there were fairly few candidates this time who obtained a correct answer which they then spoilt, eg by 'cancelling' individual terms from top and bottom.

2 (a) Those who knew what they were doing often quickly obtained the correct $6\sqrt{5}$, but $36\sqrt{5}$ was a common answer. Many gained 1 mark for an incomplete simplification of $\sqrt{180}$. Those starting with $3\sqrt{20}$ or $2\sqrt{45}$ often added the next number extracted to reach $5\sqrt{5}$ instead of $6\sqrt{5}$. Many knew the technique of looking for perfect squares, but were not sure what to do with them when they found them, with square root symbols often being used almost randomly by some candidates. Those who tried the factor tree method were rarely successful.

(b) The majority attempted to remove the brackets though sign errors were common. The greatest loss of marks came from the inability to simplify $+\sqrt{3}\times-\sqrt{3}$ to $–3$.
.

3 There was quite a high success rate with this question, with many displaying good skill in eliminating y and reducing the result to $2x^2 - 7x + 3 = 0$. Few candidates had no idea of how to begin. There was some carelessness in manipulation leading to errors with signs and numerical coefficients. Those who equated, rather than attempting subtraction for the first step, were often more successful in rearranging their equation to zero. Candidates almost always looked to factorisation as the next step, only rarely applying the quadratic equation formula. A few tried to find an equation in y by using $x = \frac{y+4}{2}$ but attempts at simplification produced errors (and then abandonment).

4 (a) Most candidates were able to fill in the correct values of y for the positive values of x, and, to a lesser extent, for $x = 0$, but attempts at the negative values of x were quite frequently wrong. Where the positive values were wrong it was often because the candidate had confused 2^x with x^2, and where the value for $x = 0$ was wrong, the wrong value was usually 0. For the negative values of x the most common wrong values were 2 and 4, leading to the sort of 'parabolic' curve that many candidates seemed to be expecting to have to draw. Other wrong values, such as $-\frac{1}{2}$ and $-\frac{1}{4}$ or even –2 and –4 also appeared in the table, in spite of the incompatibility with the grid supplied for sketching the graph.

Plotting the points, and drawing a reasonable curve through them, was generally well done. Very few candidates, for example, made the error of using straight line segments between their points, and very few drew curves that 'missed' the plotted points by a significant amount.

(b) The great majority of candidates knew that they should read off the x-value on their curve at a value of 5 on the y-axis, and candidates' graphs were usually sufficiently correct in this region to allow a correct value to be found. A small number of candidates made no attempt at this part, or gave an answer that must have been obtained by some quite wrong process, but the main reason for failing to gain the mark for this part was misreading the scale on the x-axis, and this occurred rather more frequently than one might have hoped.

5 (a) There were some correct sketches, but the great majority of candidates drew a curve above the given one instead of a curve between it and the x-axis.

(b) The equation offered usually represented a translation of 3 units in the y-direction. Some of the better responses gave $y = f(x - 3)$ but could go no further. The correct answer usually came from the top quartile of candidates.

6 Many were able to score at least two marks here. The usual error in forming the equation was to use the wrong formula for the volume of a sphere, such as $\frac{4}{3}\pi r^2$, or, if the formula was correct, to state $3^3 = 9$. Many gave the correct formula for the volume of the cylinder. Most appreciated the need to equate their respective volumes. Of those who equated before substituting for the two rs, some wrongly cancelled by r. A significant number of candidates left π in their answer and/or made basic mistakes when dealing with the 3 in the denominator. This question discriminated well, with some candidates able elegantly to obtain the height of 9 cm from very few lines of working.

Section B

7 **(a)** A large majority were able to give a sufficiently clear explanation. The most common response involved reference to the 1% being taken off a lower amount each month. A few compared the answers obtained by the incorrect and the correct methods.

(b) Many gained full marks here, especially those who chose to answer in one-step via $\times 0.99^{12}$. However, many evaluated month by month and still managed a high accuracy rate, though there were some who 'gave up' after a few months, or stopped after 11 months. The special cases in the mark scheme were rarely applied.

8 Many candidates earned the method mark for substitution into the quadratic formula. The most common errors were in omitting/combining the negative sign in $c = -4$ with the subtraction symbol (49 – 48 being extremely common), or to have a short fraction line. Final answers, correct or incorrect, were usually given to the required 2 decimal places. Giving an answer of $-2{\cdot}80$ was the usual rounding error. Those who attempted to complete the square were almost invariably unsuccessful. A few tried factorisation, obviously without success, and would benefit from the advice that when answers to quadratics are requested to 2 decimal places, the expression is very unlikely to factorise.

9 **(a)** Most candidates used the frequency density correctly, but an answer of 16 rather than 8 was quite common (from counting the shaded rectangles in the appropriate part of the histogram).

(b) Many interpreted the cumulative frequency diagram correctly to give 34 people, but 35 was a common wrong answer.

(c) As expected, interpretation of the histogram caused some problems but readings from the cumulative frequency diagram tended to be better. Comparing the averages was the more difficult demand, and most seemed intent on giving one squad or the other as heavier. Supporting evidence was often missing and, when it was present, it was usually insufficient or incorrect. Few candidates were able to identify both medians correctly. Those who used modal classes did not fare much better. In each case, finding the relevant information from one graph was fine, but from the other required very good interpretation skills.

Responses for spread were much better in terms of marks scored. Many correctly identified London Irish as having the greater range and a good number of these gave the range values correctly. A few commented only on the upper values. Others wrote general comments relating to the shape of the graphs, which was not enough.

10 The cosine rule was applied quite well. A correct evaluation of the length of AC was usually obtained but quite a few candidates failed to calculate the extra distance. Answers were usually rounded sensibly. If an error was made in the calculation for AC it often involved evaluating $(3{\cdot}7^2 + 5{\cdot}1^2) - (2 \times 3{\cdot}7 \times 5{\cdot}1)$ before multiplying the result by cos108. Various wrong approaches were seen, such as attempts using the sine rule or Pythagoras' Theorem.

11 **(a)** Candidates who scored full marks were equally divided between using route $\overrightarrow{AO}$ + $\overrightarrow{OP}$ and route $\overrightarrow{AB}$ + $\overrightarrow{BP}$. Both produced some good, clear explanations.

Weaker responses often scored one mark for $\overrightarrow{OB}$ = **a** + **c**. However, the question was not well answered and the most common approach was to state that one needed to go two thirds of the way along $\overrightarrow{AB}$ and one third of the way along $\overrightarrow{AO}$, with little or no justification. Diagrams were sometimes drawn but still rarely showed a correct route clearly enough.

(b) Many found the required vector correctly.

(c) Only a very small number of candidates were able to demonstrate that the two vectors were multiples of each other. The usual incorrect response merely referred to the shape being a parallelogram, whilst some candidates omitted this part.

12 Very few spotted the quick method for 'at least one plain chocolate' being 1 – P(both not plain). A few correctly combined milk and white into 'not plain' to simplify the situation and used the sum of three probabilities. .The majority made the answer more liable to error by adding five probabilities, or gained partial credit for adding the probabilities of at least three of these five branches. There was a widespread good understanding of the conditional context and when to multiply and when to add probabilities.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553