GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education **J517**

Examiners' Reports

January 2011

J517/R/11J

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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

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Chief Examiner's Report

General Comments

As expected, with teaching for the new GCSEs now well underway for most year 10s, this session's modules showed a considerable decrease in the number of entries from year 10 candidates. Since historically the year 10s in this session, who are taking their early modules before moving on higher, have done better than the year 11s, there is also a decrease in the percentage gaining the target grade in many modules.

However, units B278, B279 and B280 have continued to show an increase in candidates compared with lower modules, showing that this specification continues to attract strong candidates as well as providing access for weaker candidates.

As has happened increasingly in the last couple of years, candidates for whom taking modules early has not been an advantage tend to transfer to the linear specification J512 for a fresh start when aggregating. This fact, combined with the increase in the number aggregating in J517 this session who are taking high modules at the same time, has made for a positive award – I am pleased to report an increase in the percentages of candidates gaining all grades this January in their final aggregation.

As usual, centres can analyse their results using Active Results at www.ocr.org.uk/interchange/active_results

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 would 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 .

B271 Module Test M1

General Comments

The performance of most candidates on this paper was pleasing, demonstrating that they had been well prepared and entered appropriately. Only a very small proportion of candidates scored fewer than 20 marks and many scored more than 30.

Candidates had sufficient time to complete the paper and most had access to calculators and rulers. It was pleasing to see more candidates showing their working out in questions, particularly on the non-calculator section, enabling them to gain part marks, even if their final answer was not correct.

Comments on Individual Questions

Section A

1 **(a)** Candidates generally answered this correctly.

(b) The subtraction was found harder than the addition, often with subtraction of the smaller digit from the larger one each time, leading to an answer of 67 rather than 53.

2 Candidates often struggle with the conversion of units, and even with a choice given, answers often seemed to be completed at random. High scoring candidates for the paper candidates generally answered this well.

3 **(a)** There were some pleasing answers to this question, with candidates identifying that one quarter of the shape was shaded. Some candidates did not score because their answers were imprecise, for instance stating that one half was not shaded or saying that the shape was not shaded through the middle, without clearly identifying what they meant by 'the middle'. Those who used the unshaded shape to show how it should have been done were usually correct.

(b) This was often answered correctly, with the expected wrong answer of 3 squares shaded also being seen.

(c) This was generally well answered, although some candidates worked out ¾ rather than ¼.

4 **(a)** Most candidates answered correctly, although some misinterpreted the question and gave the answer 5, the number of points scored for one try. There were few multiplication errors seen.

(b) Again well answered, but candidates who had made the above error generally repeated it here.

(c) It was helpful here that many candidates showed their working out, often as a list next to the list in the question. This enabled them to be awarded part marks if their final answer was not correct. A good proportion of correct answers were seen, although some addition errors were present, and some candidates omitted to add all three sets of points. A common error by lower scoring candidates was just to add the three numbers stated in the question leading to an answer of 12, which did not score.

5 **(a)** Candidates were generally well prepared to answer questions of this type, and many scored full marks. A small proportion omitted some arrangements from their list, and some included repeats, perhaps as they felt that all of the rows should be completed.

(b) Most candidates were correct for the first two parts of this question but often thought that the probability for a triangle was likely rather than evens.

6 Candidates knew what was required here, although they found completing the subtraction much easier than the division. Attempts at division often led to answers such as 8 or 6.

7 **(a)** Many candidates omitted this part, and a diameter rather than a radius was often drawn.

(b) Some candidates followed through and measured their line correctly. There were some very imprecise measurements, with lengths often being given to a whole number of centimetres, where perhaps candidates had misunderstood the question and thought that, rather than a decimal value, was required.

8 **(a)** A struggle to remember the difference between area and perimeter was evident and many answers of 9 were seen here. Candidates who attempted the perimeter often gave an answer of 13, rather than 14, when they had failed to count one of the squares.

(b) Many candidates did not draw a rectangle here, as the question had specified, so could not score. There were many copies of the original shape, sometimes with the 'extra' square moved and also shapes such as triangles were seen. Candidates who understood perimeter often found it very difficult to draw a shape with a given perimeter.

(c) Only the very highest scoring candidates scored any marks here, with many answers such as 'rectangle because it is bigger' seen. Few actual areas were found, and those who scored generally had given the difference between the areas of the two shapes. Many reasons referred to the perimeter or the length of a particular side rather than the area of the shapes.

Section B

9 **(a)** Many candidates identified odd numbers.

(b) Most candidates could continue the pattern.

(c)(i) There were many correct answers here, although some weaker responses gave any number including a 5.

(ii) Some good explanations were seen. However some candidates were imprecise, just stating that the number had 0 or 5 in it, rather than at the end.

10 **(a)** Candidates found this question difficult. Many could use compass directions, but did not understand how to complete the sentences correctly, answering West and North East rather than East and South West.

(b) Many candidates benefitted from showing their working out in this question and gained at least some of the three available marks. Common errors were for candidates to include all of the prices in the table in their calculation, to work out the price for only one night or to include two lots of £14 for the two adults.

(c)(i) Most candidates could read the time correctly and generally gave it in the form 2:50 rather than 'ten to three'.

(ii) Again candidates could find the time difference, often using the clock face to help reach the answer.

(d) This part was also well done, with times given in the correct form.

11 **(a)(i)** Most candidates answered correctly, but many used the markers on the axis for the width of the bar rather than trying to draw it the same width as the others on the chart. As there was only one mark for the question, they were not penalised for this.

(ii) Most answers were correct.

(iii) Most answers were correct.

(iv) There were many correct answers, although giving the population of Turkey (around 70 million), rather than the difference in the populations, was a common error.

(b) Many correct answers were seen, although rounding to the nearest thousand or nearest hundred were common errors as well as giving the answer 600 rather than 2600. Candidates generally realised that the answer needed to be rounded to 2600 rather than 2500.

(c) This was very well answered, with almost all candidates ordering the numbers correctly. If errors were seen, it was usually reversing 1012 and 1091.

12 **(a)** Some candidates struggled with giving the coordinates for a point on the axis, not realising that the 0 should come first or giving the *x*-coordinate as 1. Only a small minority of candidates reversed the coordinates throughout the question.

(b) Most candidates plotted this correctly.

(c) Candidates who had reversed the candidates in part (b) usually struggled to score here, as their line did not go through any integer coordinates. A common incorrect answer was (6, 7) where candidates appeared to try to complete a triangle.

13 Most candidates scored some marks here, although only the better responses gave a completely correct enlargement. Most candidates attempted the correct scale factor and many got at least two lines correct, although it was common to see the top line drawn as 8 cm, rather than 9 cm. It was pleasing to see most candidates using rulers here with many neat drawings produced.

B272 Module Test M2

General Comments

A wide range of marks was seen for this paper, though a disappointingly large number of candidates achieved very low scores with significant numbers of questions not attempted. There were, however, some very competent responses and good reasons given for decisions made.

Many candidates appeared not to have a pencil. Some drawings were scribbled out and a replacement attempted. This made it very difficult for them to be accurate. Some candidates apparently did not have a calculator.

A very large number of candidates did not show working in Section B and these candidates lost potential method marks when a wrong answer was the only response seen.

As a general issue, candidates struggled to use units correctly for length and mass. In addition, time calculations proved a challenge.

Comments on Individual Questions

Section A

1 **(a)** Almost all candidates gave the correct answer of 409.

(b) Very few correct responses of 'odd numbers' were seen. Common errors were 'digits', hundreds', 'four hundreds', 'pattern numbers' and 'door numbers'.

(c) There were many correct responses with the common wrong response being 441.

(d) Many recognised that this door was on the ninth floor but common errors were 'floor 23', 'floor 10', 'top floor' and many other floors.

2 **(a)** A number of candidates gave an answer in the high sixties but the most common error was to think that the scale showed a percentage in the fifties.

(b) Very few candidates noticed that the scale was different to that in part (a).

3 **(a)** Units clearly presented many candidates with problems. Few gave 3 as the answer. Common wrong answers were '300', '450' and '1.5'.

(b)(i) Some concise responses were seen and 'because 12 × 25 = 300' gained full credit. However, responses such as 'because they are squares they fit,' and 'He measured them so they will,' were common.

(ii) Despite being told that there were 12 tiles across the wall many 'restarted' with diagrams showing 5, 10, 11 and other numbers of tiles across. Few worked out that there were six rows of tiles and so 72 was rarely seen. Many candidates did not show any sensible working and so lost the chance of a method mark.

(c) This was a very well answered question and candidates knew exactly what to do.

(d) Many candidates gained full marks; the modal mark was 2.

(e) This question, involving units of mass, caused similar problems to part (a). Some candidates wrote 180 × 10 but could not proceed to 1800 without writing 180 ten tines and attempting to add, with 1080 a common wrong answer. Some gave 1800, earning a part mark, but few wrote 1.8kg. Many candidates who scored no marks wrote 190 as the answer.

(f) There were disappointing responses to a question that required candidates to find 25% of £22. Better responses gave £5.50, in many cases without working. A number of responses of 11 were seen and some of £5, again, often without working. Candidates who wrote '11' scored 1 mark as a method mark in the first stage of halving and halving again. Many of these candidates could not, or were not aware they had to, halve again. Candidates who just wrote £5 scored nothing as their method could not be determined. Some candidates attempted 10% but rarely achieved a correct result. This is a core 'numeracy' non-calculator method but few seemed to have mastered it.

4 This question was well answered by many candidates. Some chose not to use the boxes provided. They were able to score a mark for B, if it was placed between the boxes for C and A. A surprising number of candidates wrote events like 'lose' in the boxes. This appeared most commonly against 'Certain'.

5 Some good answers were seen to this question. Many scored a method mark for writing 29.7 + 29.7 + 29.7 or for the wrong answer of 63. Some candidates correctly worked out the length as 89.1 but gave the dimensions of the notice as 89.1 by 63 and scored only 1 mark. Only a very few candidates measured the length of the diagram.

Section B

6 **(a)(i)** Most candidates gave the correct answer of 0807.

(ii) Most candidates were, however, unable to work out the duration of the journey. Many gave times that were hours long.

(b) A pleasing number of candidates correctly worked out the departure time as 0821. Marks were awarded for part answers, such as 0825, and for identifying the correct bus. The whole question revealed a remarkable lack of functionality with time amongst the candidates as a whole.

7 **(a)** Many of the candidates, but by no means all, correctly chose F.

(b) Some candidates chose C and others chose to write their own domino. Where this showed a correct and different form of matching 0.75 with 0.75, credit was given.

(c) Some candidates chose E and a few D. In the latter case, if they drew the domino in the diagram, they had to show the ½ matching with 50% to score the mark. Some candidates did do this.

Some candidates put the same domino down for all three parts.

8 **(a)** Most candidates correctly chose the tetrahedron.

(b) Most candidates placed a single flap correctly.

9 Many correct answers were seen. Other answers varied wildly, with the height of the statue as great as 45 metres in some cases.

10 **(a)(i)** This entire question was answered with reasonable confidence. Many candidates correctly ordered the temperatures with a few putting the temperatures in reverse order.

(ii) The answers to parts (ii) and (iii) were often correct but in some cases, they were reversed. Candidates who did this scored no marks.

(iii) The correct answer was often seen although $^-6$ was a frequent wrong answer, despite a correct order for the temperatures.

(iv) Responses to this part of the question were weaker and $^-12$ was a common error. Anther error was to try to calculate the mean, presumably because it was the only average not asked for: it is not required for this module.

(b) A significant number of candidates gave the correct answer of 113 without showing any working. However, many gave 111.3 without working and scored no marks. Some showed working, often because they did not have a calculator, and they usually scored a method mark for showing the intent to multiply 45 by 1.8, or to add 32.

11 **(a)** Very few candidates gave the correct response. 2.5 was a common error, from $25 \div 10$ and some changed this to 25, possibly realising that 2½ pence was a very small sum. 0.4 and 4 were also common errors, presumably from not changing pounds to pence correctly – however these answers earned the method mark. Working was rarely given.

(b)(i) A range of answers was seen, most commonly 25 closely followed by 5. Again working was rarely given.

(ii) A follow through mark was allowed and so candidates who answered '25' in part (i) often scored 2 marks in this part for '1 cake'. The correct answer of 2 cakes often appeared after false answers before. This received full credit in this question. Most candidates gave an answer that was an integer although some decimals were seen.

B273 Module Test M3

General Comments

Candidates were able to attempt the majority of the questions. Topics that were well tackled included interpreting scales and metric distances. Topics that were not well answered were division of decimals and questions that required an explanation in words. The majority of candidates appeared to have had access to a calculator for Section B, but not all appeared to have the use of a ruler.

Comments on Individual Questions

Section A

1 **(a)** Many candidates had written the digits 16 but failed to have the correct place value, with the common errors being 16 and 1600.

(b) This was less well answered than part (a), with the common errors being 0.147, 147 and 1.47.

(c) This question was answered poorly. Common errors were 12.87 and other variations of these digits, as a significant number of candidates did not divide by 3.

(d) Despite the wording of the question, some candidates stated the answer was correct. A common error was to state the decimal point was in the wrong place. Several candidates gave the correct answer, but failed to realise that a written explanation was required.

2 **(a)** Few candidates scored full marks. Several did score 1 mark for either 200 or 120, but the majority failed to realise that this question required two steps in order to find the correct answer.

(b) Many correct answers were seen. A small number of candidates did not appear to understand the 24-hour clock. Some candidates who did not give the answer using the 24-hour clock failed to state pm.

(c) Many correct answers were seen. It was pleasing to see that the majority of the candidates wrote the answer as a fraction. Of those who did not score both marks, several scored one. Some candidates answered using words, eg 'unlikely' or 'likely'.

(d) Many correct answers were seen. Several candidates did not state the units. Many did not show any working for this question. Others thought one litre was equivalent to 500 ml.

(e)(i) Many drawings were fully correct. The main error was an incorrect base line, usually drawn as 7 or 8cm. Some candidates clearly did not understand the concept of scale.

(ii) Many scored both marks for a correct measurement and conversion of their measurement. Some candidates who had incorrectly converted their measurement might have scored a mark had they written down their actual measurement.

3 **(a)** Many correct answers.

(b) Although many answers were correct, this was not answered as well as part (a), the common wrong answer being 6.

(c) Although many answers were correct, this was not answered as well as part (a), the common wrong answer being 1.

4 **(a)** Generally well answered; the most common errors were misreading the scales as 101 or 110.

(b) Almost all candidates were able to give the correct answer.

5 **(a)** This was well answered by many. Of those who did not give the answer 60, many scored one mark for 12 and 5 from evaluating the brackets. Some then went on to add rather than multiply. A common misunderstanding was 12 × 6 = 72 then 72 − 1 = 71.

(b) This was poorly answered. Very few candidates were able to give a correct explanation.

Section B

6 **(a)** Many correct answers were seen.

(b) Many correct answers were seen.

(c) This was less well answered than the two previous parts. Some candidates did gain 1 mark for 144 and 64 seen, although common errors were 24 − 16 = 8 or 42.

7 **(a)** This question was generally well answered, although 'metres' was the most common error.

(b) As part (a), however a number of candidates did state that an adult is about 1.7 cm tall!

8 **(a)** Many correct answers were seen. However, several candidates had added 51 and 15 rather than subtracting.

(b) The main errors were not starting the scale from zero, not using a linear scale and labelling the middle of the square rather than the line. Those who chose the scale 1cm = 10 had more difficulty in placing the heights correctly. The majority gained the mark for equal width bars and equal gaps between the bars.

(c) Some correct answers were seen and several scored 1 mark for dividing 40 by 5. Common incorrect answers were 10, 15 and 25.

(d) Several correct answers were seen. Some candidates appeared to have a misunderstanding of time; incorrect answers commonly seen were 1 hour 54, 1 hour 96, 2 hours 4, 2 hours 6 and 2 hours 16.

9 This was generally well answered. Common incorrect answers included £19.24 from candidates who only used one hour and £577.20 from candidates who misunderstood that the tips were a one-off, not every hour.

10 **(a)(i)** This question was generally well answered.

(ii) This question was generally well answered.

(b)(i) Many correct answers. Of those not scoring full marks many scored one mark for adding the numbers. Some however went on to multiply 76 by 8.

(ii) Many correct answers. The most common error was failing to evaluate 13 – 6.

(c)(i) Many correct answers within the range were seen. 6.2 was a common error from misreading the scale.

(ii) Although some candidates were able to give a valid explanation, many simply suggested the graph should be made bigger.

11 Several correct answers were seen. Some candidates only used the scale factor on one side of the triangle. A small number did not use a ruler.

B274 Module Test M4

General Comments

Candidates made a serious effort to show what they could achieve. About half gained more than 50% of the available marks and less than ten percent gained less than a quarter.

Performance was broadly similar if not slightly better to that of the equivalent module sat last January. There was a full spread of marks in both sections of the paper but overall candidates tended to do better on Section A than Section B by an average of about 3 marks. The reason for this difference was probably the presence of two of the more challenging questions (Q.6(c) and Q.7) in the latter.

There were a few instances of questions not attempted. In terms of omissions Q.3(d), Q.3(e)(iii), and Q.6(c) were the worst questions: omission rates for the first two were about 10% and 25% for the last. The omission rate was higher in Section B than in Section A.

There were no obvious cases of candidates misinterpreting the rubric although there was some evidence that in Q.6(c) some candidates interpreted water charges of 0.110p a litre as £0.11 a litre. The overall standard of presentation was generally satisfactory but there were instances where digits were less than clear. Candidates appeared to have completed the paper within the time allowed.

In common with previous years, there were candidates who failed to write down working and therefore failed to gain any of the available method marks; this was particularly apparent in Q.6(c) and Q.7.

Areas which candidates found particularly challenging were basic algebra (Q.3(d)), multi-step problems (Q.6(c)), plotting points in all four quadrants (Q.8(b)) and using word formulae (Q.9(b)).

Areas where candidates performed best overall included probability (Q.1), reflection symmetry (Q.3(c)), work involving patterns (Q.3 (e)) and coordinates in the first quadrant (Q.8(a)).

Comments on Individual Questions

Section A

1 **(a)** There were relatively few instances of odds or ratios being given as answers. Most errors involved giving a response of '3' or attempting to use 'probability words'.

(b) A significant number of candidates gained full credit. Errors, when they occurred, were similar to those observed in part (a).

2 **(a)** The prime difficulty for candidates was to realise that the correct answer was not an integer (34 and 35 were by far the most prevalent wrong responses). Part (ii) differentiated well, with descriptions ranging in quality.

(b) Overall candidates appeared to perform better than with similar questions on previous occasions. However, there was most certainly an element of guesswork involved – very little, if any, working was seen.

(c) This was well answered, with two thirds gaining full credit, but with a small yet noticeable number of candidates giving $\frac{1}{7}$ as their answer.

3 **(a)** As might have been expected most errors centred on candidates confusing rotation symmetry with line symmetry. Nevertheless slightly less than two thirds of all candidates gained full credit.

(b) Most candidates gained at least partial credit as a result, in many cases, of the follow through for answers to the second angle being half the value of the first. This was not answered quite as well as similar questions in previous sessions.

(c) Found accessible to virtually all candidates.

(d) Many candidates were insecure in their grasp of the algebra necessary for success in this part question. Many candidates omitted the '*P* =' and '4*b*' was another common wrong answer. The success rate was similar to that observed in the past.

(e) Part (i) was very well answered. A significant number of those who were unsuccessful with this part recovered to gain full credit in part (ii). Similarly, a number who failed to work out the 100th term correctly were still able to explain how the pattern was built up.

4 **(a)** Common wrong answers were usually 39 or 41, which is perhaps indicative of incorrect 'counting on'. Somewhat surprisingly only just over a half of all candidates were successful.

(b) This was well answered, with many gaining full credit. Some partial credit was available. The most common error was to 'multiply' rather than 'divide'. Varieties of non-calculator methods were seen for the latter.

(c) Most candidates realised that '3 × 2.4' or '2.4 + 2.4 + 2.4' was required but some found the pencil and paper calculation challenging, as illustrated by the prevalence of 6.12 as an incorrect response.

Section B

5 **(a)** Comparatively few correct answers were seen but partial credit was available for recalling and attempting to use the fact that a litre is a thousand millilitres. The lowest scoring candidates found this a challenging question.

(b) Despite generous limits as to what constituted half a spoonful, about a third of candidates were unsuccessful.

6 **(a)** Found accessible by the majority of candidates but with a number calculating the mean rather than the range. The question did however attract a number of what appeared to be random answers.

(b) There were many correct answers, with a large proportion obviously using calculators, as no working was seen. It was pleasing nevertheless to note that a number of candidates who made errors were able to gain partial credit by virtue of their working shown.

(c) This part question was poorly answered, with over three quarters of all candidates failing to gain credit. A common error was the interpretation of 0.110p as £0.11 or 11p. The route chosen by most was to calculate "500 × 0.11" rather than "53 ÷ 500". Some candidates did not achieve full credit because they failed to comment on their answers in the light of the original question.

7 A challenging question. Many candidates' order of working was less than clear, however over three quarters of all candidates gained at least partial credit.

8 **(a)** Over half of the lowest scoring candidates gained full credit – a well answered part question. By far the most common error in each part was to give the coordinates in the incorrect order.

(b) A significant number of candidates encountered problems dealing with points in the second and third quadrants. The success rate fell to just 10% for the lowest scoring candidates.

9 **(a)** As might have been expected a common error was to calculate the perimeter, or in many cases the semi-perimeter, of the screen. Just over half of candidates failed to gain any credit.

(b) About a third of all candidates were successful but, in common with part (a), errors generally involved adding, rather than multiplying, the two given distances. These were cases where answers seemed almost to have been guessed.

10 **(a)** Very well answered - about a third gained full credit. It was found accessible to the majority of candidates.

(b) This was not answered quite as well as part (a), with '3 and 18' or '3 and 30' common wrong pairings.

11 Many candidates felt the need, despite the rubric, to add ½ days in their answers. The majority gained at least partial credit with full credit given to about a third of candidates.

B275 Module Test M5

General Comments

Candidates did not generally seem fully prepared for this module. There were many blank or poor responses.

Many candidates did not appear to have the required equipment. They required a ruler (Q.8, Q.11, Q.13, Q.14 and Q.15), a protractor (Q.11 and possibly Q.13), a pair of compasses (Q.13) and a calculator (Q.9, Q.10, Q.11 and Q.16). Some candidates had none of these and most candidates were clearly missing at least one of these items.

There was a general lack of working throughout this module and, in these cases; the candidates could not get any credit for the use of a correct method.

Comments on Individual Questions

Section A

1 **(a)** This question was usually well answered, with the most commonly seen incorrect answer being Hele Farm.

(b) Many had the correct answer. Alternative answers seen were 5587, 5588 and 5488. A few candidates reversed the coordinates to give 8754.

(c) A huge variety of answers was seen, of which many were far too short.

2 **(a)** This part was very poorly answered. There were many who repositioned the decimal point to give 3.719 and 371.9. Some just removed the 9 to give 37.1.

(b) There were very few correct answers; some wrote 40.0 or 40.00, whilst 37 or 38 were common answers.

3 **(a)** There were some incomplete solutions such as $6b + 3a + 7b + 2a$ whilst other attempts gave $18ab$ after the correct solution had been reached.

(b) (i) This was well answered although there are still some candidates who embed their answers and do not seem to realise a value of x is required. The only common alternative seen was 17 obtained from 12 + 5.

(ii) This was found to be more difficult than the previous equation. Some reached $4x = 12$ then wrote 3 as the answer. There were a few flowcharts but these were generally unsuccessful. The big problem was 5 – 17 which few were able to do and even fewer could then divide the negative number by 4.

4 **(a)** Common wrong answers were 5^3 or 243 from evaluating the power.

(b) Many candidates treated powers as multiplication so 12 + 6 = 18 was a popular response. There were mixed responses such as 12 + 9 and 64 + 6. We also saw a number of incomplete responses, eg 64 + 9 with no result.

5 **(a)** A common answer was $\frac{6}{10}$. A common method was to halve continually which works for this particular fraction (but not every fraction!).

(b) (i) Many, having obtained the correct answer, then added the two parts to get 13.

(ii) A common answer was 12 and some candidates showed their method which was to start at $^{-}3$ and to add 3 five times hence reaching 12. Others gave 15 as the answer without considering the sign.

6 Many gave the correct answer but then struggled to explain how they found it. It was common to see 'They add to 100' even when the answer was given as a decimal. There were answers such as 'adding to a whole number', which demonstrates either poor language skills or a vague understanding of probabilities.

7 (a) Comparison between the two classes was fine when comparing means but not so good when comparing the ranges. Many thought that a larger range was 'better'. Some candidates felt that it was necessary to read extra interpretation into the figures and made comments about class sizes and thought that having a large range would mean that the highest mark would also be associated with that range. Some attempted to compare the mean with the range for each class.

(b) This question tested the understanding of the range and, as the previous part showed, it is not well understood. A common approach was to work out 100 – 39 = 61.

8 (a) Many thought that it was M and N, but there were plenty of correct answers to suggest that the candidates could visualise the 3-D shape.

(b) Despite seeing many correct lengths, the candidates seemed unable to use the appropriate formula to find the volume. Many of them attempted to find the surface area. Many gave no units at all, losing a mark.

Section B

9 (a) This was not answered well at all. Some added or subtracted the numbers 35, 14 and 18. A few calculated 35 × 14 but then failed to subtract 18. Many appeared not to have a calculator and this may explain why this question was answered badly.

(b) A common approach was to add 48 to 16 to get 64. Few candidates had any idea of how to use the formula.

10 Not many candidates knew how to convert to a total of 100, one approach was to state that 8 marks were lost so 100 – 8 = 92. Many without a calculator attempted to estimate the answer and gave 70.

11 (a) Candidates showed very little working in this question. A common answer was 32 though it was unclear how they achieved this answer. Some were unable to convert 90 to one quarter and then to find one quarter of 48.

(b) Few showed working and the answers varied so much that it is unclear how they attempted this part. Some probably measured the angle from the top clockwise; others did not have a calculator. It is also likely that many did not have a protractor and the line on the pie chart was often hand drawn.

12 **(a)** Answers to this question clearly demonstrated weak knowledge of the properties of quadrilaterals. Most candidates completed the top row correctly and nothing else. Some did not complete the table despite the instructions clearly requesting a tick or a cross in each box.

(b) More candidates gained this mark, possibly by guessing.

13 **(a)** This was answered well; some sides were just out of tolerance and others tried to make the vertical height equal to 6 cm. There was very little evidence of the use of compasses but, when used, the answer was usually correct.

(b) This was usually measured correctly.

14 **(a)** Most candidates worked out these values correctly. Some got either of the end values wrong. Another common error was to give 3, [6], 9 and 12 for the y-values.

(b) The points were usually plotted correctly, although some candidates did not join them with a straight line. Some points did not lie on a straight line yet this was not considered wrong by candidates.

15 The shape was either reflected or rotated to give order 4 symmetry.

16 Working was often sparse or poorly organised. Most candidates had trouble finding 30% and a process of halving was one chosen method. Once they had a value for this 30%, they would often complete the question correctly. Many did not use a calculator and arithmetic working could be seen.

B276 Module Test M6

General Comments

The paper overall proved appropriate for the majority of candidates. There was a wide range of ability demonstrated, with some candidates scoring full marks and others struggling with the content for this module. Some marks of zero were recorded. Work was sometimes well presented but there was a wide variety in the amount and quality of working shown. A number of candidates showed apparently random working lacking structure for Q.2 (calculation), Q.9 (volume) and Q.12 (equations), hence struggled to earn method marks, and often lost their way. On multi-mark questions, candidates should ensure that appropriate clear working is shown to ensure part marks where full marks are not earned.

Topics in which candidates were more successful include scatter graphs; views and elevations; probability and solving equations. The topics that were commonly answered poorly were calculation with decimals; ratio and reasoning; volume of cuboids; angle reasoning; reflection and drawing linear functions. Candidates had time to complete the two sections of the paper and Section A was answered better than Section B.

Comments on Individual Questions

Section A

1 **(a)** Many candidates were successful in plotting the four points correctly. A number had difficulty in interpreting the vertical scale of the graph with a common error to take each 2 mm square as 0.1 instead of 0.05. Some appeared not to read part (a) and did not attempt to plot the points, but were able to answer the rest of the question.

(b) Well answered. The majority gave the answer as positive and thus described the correlation rather than the relationship between the weight and the age as the question asked. Some gave the incorrect answer 'negative'.

(c) Most were successful in part (i) and drew a ruled line following the pattern of the points quite well. Some drew a freehand line or a curve for which there was no mark given. Others thought that the line must go through the origin (0, 3.0) in this case and drew a line that was too high for the pattern. A few attempted plot-to-plot lines.

Part (ii) gave a range of responses; most realised that a reading at age 5 weeks was required and showed some annotation of the graph, a number were successful with the reading but there was some misinterpretation of the vertical scale again in this part.

2 **(a)** This was very well answered and most candidates used a vertical working method with the decimals. A number made one processing error in the addition however, giving answers such as £17.20 or £16.50 for example.
A few were careless in misreading the prices of the meals from the table and some omitted the soup course from the calculation.

(b) This was answered less well than part (a). Many were able to find the cost of Alex's meal as £21.05 although a few lost the place value and gave £21.5. There were considerable errors in the subtraction of part (a) from this value however. Some tried to work vertically but placed the smaller value above the larger value for the subtraction.

(c) This was answered disappointingly. Working became far more random for many and they appeared to lose their way. Higher scoring candidates used the box method with the place values clearly shown and were able to add the values together correctly at the end. Other successful methods included (40 × 11) + (6 × 11) + (46 × 0.50) or slight variations of this. Common errors for candidates usually included conceptual errors where place value is not considered e.g. (46 × 11) + (46 × 50) or when using vertical working (11.50 × 6) + (11.50 × 4) instead of (11.50 × 40). Other errors involving multiplication by 0 were also quite frequent, eg 11 × 40 = 444. In many cases there appeared to be a lack of checking strategies used to decide whether the final answer appeared sensible for the problem asked.

3 (a) This proved to be the hardest question for candidates. Many attempted to simplify the ratio in the incorrect order and were unable to divide both values by any common factor correctly. Partial simplification would have earned 1 mark but this was only seen occasionally.

(b) Most had little idea of how to use the fraction 1/3 to compare the mortgage payments with Mike's annual earnings. Many gave a reason that had no processing or figures at all or hinted at a calculation but showed no evaluation of this. Around 20% of the candidates omitted this part. The few candidates that were successful usually recognised that multiplying £10500 by 3 and then comparing this answer to £35000 was the most efficient way to achieve the reasoning marks.

4 (a) Both parts were answered well. Some gave the answer 32 in part (i) by incorrect order of operations and in part (ii) the answer 27 or –23 was given by a few. A few made errors in evaluating 5^2 and gave 10 in their working.

(b) This was also well answered. Some candidates had multiple attempts and showed each evaluation before arriving at the correct arrangement.

5 (a) Most were successful with the bracket expansion. A few gave $3x + 6$ and some attempted to add the terms to a single term giving $21x$ for example.

(b) This was answered reasonably well, and most showed an understanding of the word 'factorise'. Some gave answers such as $7(a + 21)$ or $3(a + 7)$ or $28a$ or omitted this part.

6 Very well answered in both the side and plan views. Only a few misunderstood and attempted 3D drawings on the grids or drew squares within squares in the plan view in an attempt to show the 'tower' effect. A few had placed an additional square in the plan view and some drew three squares in a vertical line for the side view.

7 This was reasonably well answered. The decimal processing caused difficulty for some, and others stopped at 0.25, the sum of the two decimals, and did not then subtract from 1.

Section B

8 (a) Around half of the candidates were successful in this question.
In part (a), a number did not interpret the key, gave answers such as 214, and then repeated this error in the other parts. This error was penalised once only in the question. Some confused the mode with the median and gave an answer of 22.1. A few misunderstood the diagram and gave the answer 8 by looking at the 'leaves' only.

(b) This was answered slightly better than the other two parts. Some left their answer as a range eg 22.4 – 19.5. Some did not understand the term 'range'. A few again looked at the leaves only and gave an answer of 8 (from 9 – 1).

(c) This was similar to part (a) in the number of correct answers. Mode and median were sometimes confused and some miscounted the middle (13^{th}) value by giving the answer 22.5 rather than 22.1.

9 **(a)** Candidates found this challenging and in many cases did not understand the concept of volume. The most common misconceptions were simply to add the seven lengths given on the diagram to give 6.6 or in some cases even multiply the seven lengths together. Those candidates that did correctly identify the volume of a cuboid = $l \times w \times h$ usually correctly found 0.504 for the first cuboid. The common errors seen in the second and third cuboids from a genuine volume attempt came from the use of 0.6; the second cuboid was often calculated as 0.9 × 1 × 0.6 and the third cuboid as 0.9 × 0.8 × 0.6.
Around 2 in 5 candidates omitted the units despite the question specifically asking for them and many were unable to recall the correct units for the volume, losing a mark.

10 There was reasonable success at finding $p = 72°$ and $q = 42°$; the reasons varied from an attempt at a longer reason to corresponding/alternate used with a significant minority omitting the reason altogether. Some candidates who tried to use 'corresponding' and 'alternate' angles unfortunately got them the wrong way around or contradicted themselves by writing corresponding was a 'Z' angle and alternate was an 'F' angle. The longer reasons were very rarely awarded the mark as quite often it was incomplete omitting 'triangle adds up to 180°' or 'straight line adds up to 180°'. A few attempted to measure the angles with a protractor and wrote this as the reason as well.

11 **(a)** The enlargement scale factor was correctly given by the majority of candidates. The coordinates for the centre of enlargement caused a problem for many candidates. One common error was reversing the *x*-and *y*-coordinates, while other errors appeared more random.

(b) This was answered very poorly. Many appeared not to attempt a reflection at all. Rotations and translations were seen regularly, possibly from trying to reflect in a horizontal line and then move the triangle along to the point/line where $x = {}^{-}3$. Those attempting a genuine reflection often reflected in the *x*-axis and did not understand how to find the line $x = {}^{-}3$.

12 **(a)** Many were very well prepared for the equation and showed clear vertical working with the balance method being preferred. Some made errors in the inverse operations required at either the first or the second stage in subtracting $5x$ or adding 6 but provided working was clearly shown, follow through method marks were available for candidates making errors in a previous step. Many arrived at 8.5 without any errors shown. A few attempted a trial and improvement approach but this was less successful and does not score method marks if the answer is incorrect. Some were very random in their working and appeared to lose their way as a result and others tried to combine the steps, which is inadvisable.

(b) Those that were successful in part (a) usually had success in part (b). Most attempted to expand the brackets first successfully in many cases. A common error for some was then to simplify $12x - 3$ incorrectly to $9x$ to arrive at the answer 3 rather than 2.5. As in part (a), there were more random working attempts that often led to confusion for the candidate and some that used trial and improvement with mixed success.

13 This question was attempted very well by the more able candidates. They scored all 3 marks for a correct ruled line or often 2 marks for a shorter line. Some candidates correctly plotted every integer coordinate but then did not join the points. Some recognised that points were required first and attempted a table of values for x and y before attempting to plot. Some plotted one point only, usually (4, 4) or (8, 8), and the line $y = x$ was seen on a number of the grids.

B277 Module Test M7

General Comments

Examiners felt that the paper was appropriate for the majority of candidates. Some coped well and were able to attempt a good proportion of the paper and apply their knowledge to a worthwhile effect. Regrettably, a significant number of candidates appeared to be badly out of their depth. These candidates fared very badly, often with scores in single figures. The vast majority of the marks were between 10 and 35 with fewer scoring above 35 than under 10. Many candidates were handicapped by their failure to show sufficient working in questions where method marks were available. In general, good scripts were characterised by the presence of some working, allowing Examiners to award method marks even when the final answer was incorrect.

Comments on Individual Questions

Section A

1 (a) This was well answered by a large majority of candidates. Some qualified their answer with terms such as strong, weak, etc but these were ignored.

(b) Again, a majority of candidates earned the mark for the line of best fit. Some lost the mark for drawing a line with a positive gradient, some lines were not ruled and others were too short and others were outside the acceptable tolerances at the ends.

(c) Many were able to pick up the mark for reading from their line of best fit. Those who lost out usually misread the vertical scale or ignored their line of best fit.

2 (a) Very few candidates were able to give two square roots of 25. Many were able to give 5 but $^{-}5$ was rarely seen. Common answers included 5 and 5, 5 and 625, 5 and $\frac{1}{5}$ and frequently 5 and a blank space.

(b) (i) More correct answers were seen than incorrect ones. Common errors included 25^{12}, 5^{27}, 5^{3}, 5^{6}, 45 × 15 and 675.

(ii) Candidates were a little less successful with the division of the two terms. Common errors included 5^{3}, 1^{3}, 1^{6} and 45 ÷ 15. As expected, those who struggled in (a) usually struggled in (b).

(c) Candidates did not show a good understanding of recurring decimals and the vast majority scored no marks on this part of the question. Some attempted a division by 11 but often failed to go on to a recurring decimal. Some picked up a mark for an answer with the first two decimal places correct but many of these stopped at 0·45 or 0·4545 or simply placed the dot over the last figure only. Common wrong answers included $\frac{11}{5}$, 2·2, 2·222, 0·55 and 0·111.

3 (a) Roughly half of all candidates picked up both marks. Some earned a mark for the expression 0·14*n* + 18 rather than giving a full formula. However many struggled to cope and answers such as *C* = 18·14*n*, *C* = 18 + 0·14 and *C* = 18·14 were common.

(b) Rearranging the formula proved difficult for many candidates and far fewer correct answers were seen. Many started with expressions such as $C + 15$ or $15 - C$. Many went on to subtract 0·2 instead of dividing. Some began with division by 0·2 but usually forgot to divide 15 by 0·2. Another common error was simply to swap C and n.

4 Fewer than half of all candidates were successful with this question. Many favoured the grid approach to the expansion, while others simply showed the 4 terms. Common errors seen included $+ 7x$, + 28 and – 21. A small number gave the answer as $x^2 - 28$, simply multiplying the first terms and the last terms and ignoring the other products. Some candidates obtained $x^2 - 7x + 4x - 28$ but then went on to simplify this incorrectly. On this occasion, they were not penalised as the question did not ask for simplification, but this type of error would be penalised on a higher module.

5 (a) Many correct answers of 72 were seen. Some struggled to work out 6 × 12 and 66 and 78 were sometimes seen. Common wrong answers included 2, 6 and 12.

(b) There was a roughly even spread of marks across this question. Many candidates coped well with the expansion of the bracket and went on to collect terms correctly. A disappointing number of errors were seen trying to complete the solution from $4y = 5$. Answers such as 0·8, 1·1 and even 1 were seen. Some struggled with the expansion and answers of $4y + 5$, $2y + 6$ and $4y + 3$ were common but candidates were able to pick up some marks if they followed through correctly from these errors.

6 (a)(i) Examiners were looking for comments based on multiplication by a number greater than 1, the number of decimal places, the value of the final digit or the use of approximation. It was clear that many candidates had some idea about the answer but either struggled to explain the reason or failed to give enough detail. For approximation, it was sufficient to use 18 × 1 = 18 and include a comment on the result. A common error was simply to state that multiplication makes numbers bigger.

(ii) The majority found this more difficult than (i) and this was reflected in the number of candidates earning 1 mark. Examiners were looking for answers based upon approximation or the use of inverse operations. The use of approximation required a comment about the result. Some attempted to comment about 0·4 × 122 or rounded versions of these numbers and picked up the mark. A common error was to simply state that division makes numbers smaller.

(b) Almost half of candidates were able to give the reciprocal of $\frac{2}{5}$. Some candidates knew something about reciprocals but failed to evaluate $\frac{1}{0 \cdot 4}$.

7 Surprisingly the modal mark was 0. A significant number of candidates picked up a mark for an arc of radius 7cm centred at C but the vast majority had little idea that 'nearer to AB than to AD' required them to bisect angle A. Some candidates interpreted this by drawing the line AC. It was extremely rare to award all 4 marks.

Section B

8 (a) The majority of answers were correct. Common errors included 60 × 0·8 = 48 or a calculation involving the height of the pot such as 60 × 13 ÷ 0·8 = 975.

(b) Examiners generally awarded 2 marks or none. A lack of sufficient detail in the working meant it was difficult to award part marks. Better responses tended to divide by 2·4 (from 60 ÷ 25). Others worked out the unit cost as 8p and then 25 × 8p = £2. This could earn a method mark but not the accuracy mark. Some would give an answer of £2 without any working and this scored 0. It was common to see attempts to work out the cost of 30 litres, 20 litres, 10 litres, etc. and work out the cost of 25 with some combination of these. Without sufficient working, these often scored 0 when the answer was incorrect. Other common errors included 25 × 4·92 = 123 and 60 ÷ 4·92 × 25 = £3.

(c) A greater number of correct answers was seen in this part. Some candidates worked out the amount of fibre or the amount of soil required rather than sand and picked up partial credit. Common errors included 3 × 75 = 225 and 10 × 75 = 750.

9 The majority of candidates picked up some marks for this question with roughly half getting all four marks. Obtaining the midpoints proved no problem to most candidates and in most cases these went on to evaluate their *fm* values correctly. Some divided their total by but most attempted division by 49 or their version of the total frequency. Some candidates failed to give their answer to one decimal place. Common errors included division by 5, dividing the midpoints by the frequencies and using incorrect midpoints.

10 (a) This proved a challenging question for many candidates. Many did not realise that Pythagoras was needed and many simply multiplied or added the given lengths together. Of those attempting Pythagoras theorem, many went on to earn 3 or 4 marks. Some squared and added but did not take the square root while others multiplied the squares before taking the square root. Some struggled to find the length of 0.7.

11 (a) A large majority of candidates earned the mark for this part. Common errors included $\frac{26}{54}$ along with poor notation such as 26 : 80 and 26 out of 80.

(b)(i) The point of the question was missed by most of the candidates. Reference to the size of the sample or the fact that the sample was random was required. Most candidates latched onto the fact that 15 × 80 = 1200 and stated that it would be easy to multiply by 15 to obtain an estimate for the school.

(ii) Many correct answers were seen, especially from those who commented on multiplication by 15 in (i). Common errors included 1200 ÷ 26 and 26% of 1200.

12 A majority of candidates picked up at least one mark, usually for the area of the square. Many candidates appeared confused, frequently using 8·4 as the radius rather than 4·2 and failing to spot that semi-circles were needed. Circumference was often used for area and in some cases $8{\cdot}4^4$ was used for the area of the square. The formula πr^2 was sometimes interpreted as $(\pi r)^2$ or as $\pi^2 r$.

13 Over half of all candidates earned at least one mark for one correct trial. Relatively few picked up all 4 marks but many achieved 3 marks. Reasons for losing one mark included a failure to give the final answer correct to one decimal place, giving the value of the expression as their answer rather than the value of x and insufficient rigour in reaching an answer of 2·8. Common errors included the use of '–4' rather than '–4x' and a failure to evaluate their trials to at least one decimal place.

B278 Module Test M8

General Comments

A wide range of attainment was demonstrated on this paper and some candidates appeared ill prepared for this module. Most candidates showed their working but it was not always well organised. The questions on probability, solving linear equations and moving averages were generally tackled well by candidates. Straight lines, combined transformations and trigonometry were the weakest topics.

Comments on Individual Questions

Section A

1 **(a)** Most candidates expanded the brackets correctly but only about half reached the correct solution $x = -6$. Errors arose when rearranging the terms, often reaching $3x = 18$ or $3x = 22$ or simply $3x + 18$, or, having reached $3x = -18$, giving the solution $x = -6$.

(b) The majority of candidates recognised that they first needed to multiply both sides of the inequality by 4 but a significant number multiplied the numerator of the LHS as well. Some, having reached $x + 5 < 8$, gave the solution as $x < 13$. Many candidates chose to work with an equation rather than an inequality and failed to convert back at the final stage.

2 Most candidates managed to gain at least one mark for this question. The more successful method was to record the two probabilities and then explain that the two fractions had to be multiplied. Those who listed or drew diagrams or explained that there were 6 ways on the dice and 2 on the coin and $2 \times 6 = 12$ generally failed to explain that 'a head and a six' was just one of these 12 outcomes.

3 **(a)** The majority of candidates arranged the numbers in the correct order. Common errors were to reverse 4.54×10^{-2} and 2.78×10^{-2} or to reverse 3.47×10^{-3} and 2.78×10^{-2}.

(b)(i) About half the candidates failed to score in this part. Most candidates who scored full marks worked with the powers. Candidates who tried to convert to ordinary numbers tended to make an error in the conversion or the multiplication and have too few or too many zeros into the answer. Common errors included multiplying the powers and not changing the 18 into 1.8. There were a significant number of candidates that left the answer in a non-standard form format with 1 800 000 000 or 18×10^8 being common incomplete responses.

(ii) Candidates were slightly more successful in this part, often for reaching the figures 603. In this part, working in standard form usually resulted in answers such as 9×10^8. Many of those who converted to ordinary numbers made an error in the conversion or the addition but overall this was the more successful approach.

4 The majority of candidates scored in this question but only about a third gained full marks. Many knew the correct inverse of each operation but used some of them in the wrong order. A common wrong order of operations was + 3, square root, ÷ 5. Some lost a mark after correct working, as the square root sign did not enclose the whole expression. A few used flow diagrams but they were often then unable to write the rearrangement as a formula.

5 Most candidates seemed to understand the concept of a box plot but few managed to interpret the question fully and gain 3 marks. Many simply recorded the values from the table so gained 1 mark for 15 and 32 correct. Candidates often failed to work out the maximum mark and upper quartile. They often included a line at 56 in the place of the upper quartile on the diagram rather than in the middle of the box. Some failed to use the scale correctly, which resulted, for example, in the minimum value at 10 and/or the median at 52.

6 (a) Slightly less than half the candidates correctly completed the table. Common errors were 15/15, −15/3, 3/3 and −3/−3.

(b) Most candidates scored the points mark although some errors were evident when plotting $y = 3$ or −3. The second mark was only scored for the correct curve but it was pleasing that many good quality curves were seen.

7 (a) The correct answer of 3 was given by just a few candidates. It was more common to get 1 mark for an answer of $3x$ or $y = 3x + c$. Many candidates drew a triangle on the graph but they were then confused and could not proceed. A few appeared to find the intercept and recorded this as the gradient.

(b) Candidates were slightly more successful in this part as those who recognised the gradient in part (a) generally recognised the parallel lines in (b). Others reached the correct answer by reasoning and some gained follow through marks.

Section B

8 Few candidates scored full marks in this question. Many candidates seemed confused by the style of the question and many ignored the advice to draw the transformations using the grid. Some failed to appreciate that they were expected to describe the single transformation and simply rewrote Bob's statement. More scored for 180° than for the centre of rotation. A significant number of candidates chose Anna on the basis that only reflections could be involved.

9 (a) This question was generally well done. The most successful method was to multiply by 0.88.

(b) Most candidates, having multiplied by 0.88 in part (a), decided to multiply by 1.12 in part (b). Generally, only the high scoring candidates recognised the need to divide by 0.88. There was little organisation of the information which might have helped candidates recall the appropriate method.

10 (a) The majority of candidates managed a partial justification of similarity but few managed to explain why the angles were the same. Some weaker responses referred to similar angles. Some introduced information from part (b) and referred to the sides but this approach did not score.

(b) A minority of candidates were successful in this part. Many realised that they needed to use a scale factor but a common error was to work out 6/4 = 1.5 and then 1.5 × 4 = 6. Some reasoned that 10 – 4 = 6 so CB = ED + 6 = 9. Others assumed that the triangles were right angled and used Pythagoras' rule.

11 The majority of candidates used an appropriate method in this question and many successfully used 6500×1.04^3. Those candidates who used the correct method of repeatedly finding 4% then adding that to the yearly total often lost marks due to errors in their calculations. A significant number of candidates scored 1 in total for an answer of 6760 (1 year at 4%) or 7280 (simple interest for 3 years). A number of candidates used the correct method but then lost the final mark by failing to round to the nearest pound or pence.

12 **(a)** Most candidates scored full marks on this question. Occasionally candidates worked out the 4-month moving averages or did the correct method but then used the calculator incorrectly to give answers of 130,134.100. A few candidates just found the moving average for the last 3 months.

(b) Most plotted the points at the correct heights but fewer than half plotted at the midpoints.

13 **(a)** A minority of candidates scored in this part and few gained full marks. Candidates who scored marks generally used cos 64° but this was often multiplied by 9 rather than finding 9/cos64°. A few candidates did successfully use tan 64° and then Pythagoras but these candidates often made rounding errors and ended up with an answer out of tolerance. Better candidates were able to identify the information they needed to use from the diagram and produced neat answers. A significant number of candidates erroneously assumed that triangle ABC was right angled and used tan 26° together with the side of length 12cm. Lower scoring candidates did not know the correct trig ratio to use even if they identified the correct triangle. Many chose the wrong side to calculate or could not rearrange the trig equation correctly.

(b) A significant number of candidates failed to attempt this part. Very few candidates found the angle of 48.5° and a correct bearing was rarely seen. Some tried to find an angle using $\cos^{-1}(9/12)$ but many of these did not indicate the angle they were finding. Some again used triangle ABC assuming that it was right-angled. Others gave calculations involving angles 64°, 90° and 26° but did not attempt any trigonometry.

B279 Module Test M9

General Comments

This paper produced a wide spread of results, with some questions accessible to all candidates but several to test the strong ones.

As ever, it seems that there is plenty of room for improvement of algebraic skills still for many candidates. It was a pleasure to see confident elegant use of algebra and numerical work from some of the strong candidates.

Questions requiring geometrical reasoning need candidates to be more precise with language and to use the correct mathematical words. Many candidates generally who knew what to do in Q.8 lost marks here for inadequate explanations.

Comments on Individual Questions

Section A

1 **(a)** The vast majority evaluated 25^0 correctly. A very few answers of 0, 25 or 250 were seen.

(b) Finding $25^{\frac{1}{2}}$ was also answered well. Common wrong answers seen were 12·5, 1/5 and occasionally 625.

(c) The combination of a negative power operating on a fraction proved too much for all except the very best candidates. The need to square both the 2 and the 3 was often missed and the negative power not generally well understood.

2 The question produced a good spread of marks. Those achieving 1 mark usually did so for 5×10^6; those achieving 2 marks had usually reached 15×10^{-17}. Candidates attempting to convert and calculate in ordinary form usually had errors partly caused by poor layout of working. Other common errors included treating 5 million as 5×10^7 and incorrect conversion of 15×10^n into standard form.

3 **(a)** Good expansions were seen with virtually all candidates getting 4 terms. The majority of the mistakes were either sign errors or missing the square on the leading term.

(b) The difference of squares was generally correct. Occasionally $(x - 5)^2$ was seen.

(c) The quality of responses to solving this quadratic equation was quite variable. Multiple undeleted attempts were common. Almost all candidates attempted to find two binomial factors, but often these would only produce two correct terms on expansion – coping with the $2x^2$ term was beyond the lowest scoring candidates. Quite a few candidates stopped after the factorisation stage. A very small number of candidates did not factorise as requested, using the quadratic formula instead.

4 **(a)** An interesting mixture of graphs was seen, of which about 35% were correct.

(b) Lower scoring candidates often did not know where to start, but most made a good attempt at this question, with over half the candidates scoring 2 or 3 marks. Some obtained k = 30 but either gave no final equation or an incorrect one. A number of candidates left the proportion symbol in their final answer.

5 **(a)** The majority of the candidates interpreted the histogram correctly. The most common wrong answer was 5.

(b) Many candidates ignored the given area scale and made life harder for themselves by calculating frequency density. There seemed to be a lack of comfort in handling divisions that lead to answers less than 1 – thus even some able candidates who knew how to find frequency density chose to perform 8 ÷ 2 and 8 ÷ 3 rather than the correct 2 ÷ 8 and 3 ÷ 8.

6 **(a)** Finding the equation of the parallel line was well done by many, although some did get parallel and perpendicular mixed up here.

(b) A reasonable number of candidates knew that use of $m_1m_2 = -1$ was required. However, there was very little evidence of (10, 4) being substituted into any $y = mx + c$. Final answers of $y = -\frac{1}{5}x + 4$ and $y = -\frac{1}{5}x - 4$ were quite common. Weaker candidates tended to give $y = 10x + 4$ or to omit the question.

Section B

7 **(a)** Most candidates were able to produce an image triangle that was an enlargement of the original triangle, and candidates' enlargements were mainly correctly centred on the origin. However, overall, the idea of a negative scale factor was not very well understood and quite a significant proportion of responses showed a triangle that was *reduced* in size, the actual scale factor usually being ±½ or occasionally ±¼. Candidates who understood where the image triangle should be generally located their triangle sufficiently accurately to gain both marks.

(b) This was generally poorly done, and correct understanding in this part did not seem to be particularly well correlated with success in part (a)! Many more candidates gave answers of 2 or –2 or ½ than understood that the correct answer was –½.

8 **(a)** The correct angle of 66° was obtained by the vast majority of candidates, but it was not always supported by the correct reason. However, a substantial percentage did earn the 2 marks here. The common errors were, as expected, 'edge' or 'outside' for circumference and 'origin' or 'middle' instead of centre. Some used 'half' instead of 'twice' and usually gave it in the correct context. Others just showed numerical calculations and no reasons, or simply stated the 'arrowhead theorem'.

(b) As in part (a), the correct angle was found by many candidates. Most attempted to give the reason that the tangent and radius are perpendicular to each other, but very often 'radius' was not given, but instead phrases such as 'tangent to a circle is 90' or 'the line from the centre to the circle is 90', were used. A good number did correctly give 'the sum of the angles in a quadrilateral is 360'. Others stated that 'opposite angles in a cyclic quadrilateral add up to 180', but had failed to score the 'tangent/radius' mark justifying that the quadrilateral was cyclic, so could not earn this mark either. Other approaches covered in the mark scheme were also seen occasionally, although often without thorough reasons.

9 Many candidates correctly found the upper bound of the area. Otherwise, it was common to give the method mark for seeing one or more of the upper bounds of the relevant sides. A common answer was 306 from adding the 185.5 and 120.5, not multiplying. A few chose to do 185 × 120 first and then found the upper bound, giving 22200.5 as an answer and gaining no credit.

10 As usual, this kind of algebraic manipulation caused problems for all but the highest scoring candidates. It was mostly a question of awarding 3 or 0 marks. Where a method mark was earned, it was nearly always for the correct first step. From this point, numerous errors were seen, such as $6a - ac$ becoming $5a$, or 'illegal' cancelling of terms. Others just isolated one of the two terms containing 'a' and then division by 6 or by c was attempted. Knowledge of the correct way to finish the question by those who got as far as factorising correctly was generally good, and it was quite rare to see candidates scoring just 2 marks out of the 3 available for the question. Many had no idea of how to approach this question.

11 **(a)** Nearly all candidates completed the tree diagram correctly. Calculating the combined probability was generally well done, with many scoring full marks, even amongst the lower scoring candidates. Working was usually laid out well and the majority did know to multiply along the branches, with only a few additions seen instead. If not the correct answer given, then the most common other was 0·74, from just using two of the correct branches; this suggests that they either missed, or did not understand the significance of the 'at least one'. A small number of candidates chose to work in fractions, even though it was a calculator paper, usually with success. It was very noticeable that only a few chose the quick calculation of (1 – 0·4 × 0·2).

(b) Quite a good proportion of candidates obtained the correct answer in part (b), although the method by which it had been obtained was not always very clearly shown. In this part of the question, it was quite unusual for the three correct numbers to be used wrongly. Those candidates who did not get the correct answer usually failed because they did not make use of all the available information. For example, ignoring the numbers of students in the various year groups and just calculating 50 ÷ 5, or by discovering that 66 was 16.5% of 400 but not knowing what to do next. Presumably, in many cases such errors arose because candidates either did not read 'representative stratified sample' carefully enough or else did not really know what these words meant.

12 **(a)** This was not well answered. By far the most common answer was 24 cm^3. The idea of volume scale factor being the cube of the length scale factor seemed largely unknown. Some candidates did know to cube something, which was usually 12, giving an answer of 1728. Others did try finding the cube root of 12, but then lost their way. Some showed a cuboid of lengths 2 × 2 × 3, but then failed to double all of the three lengths, before finding the new volume. Of course, there were a fair number of candidates who obtained the correct value of 96 cm^3, either in their heads or following a correct statement of the volume ratio. Some correct answers (or more-or-less correct answers) were seen via finding the cube root of 12, doubling and then cubing, but sometimes this method failed, eg because the cube root was rounded or truncated to 1 decimal place.

(b) An encouraging number of attempts using a correct method were seen, even from lower scoring candidates. A small percentage of these candidates failed to score full marks due to not giving the final answer to the appropriate degree of accuracy. Many got as far as scoring the first mark for the correct volume of the sphere, but a significant number used r^2 not r^3, either in their statement or in their calculation. Most then went on to multiply by the density and were given credit for doing so; only a small number chose to divide by the density.

B280 Module Test M10

General Comments

A balanced range of scores was seen from candidates for this paper, and they were able to complete each section of the paper in the available time. Most candidates seemed well prepared for the exam with only a few being totally out of their depth.

Comments on Individual Questions

Section A

1 **(a)** There were many correct answers here with most candidates being aware that *a* was the radius of the circle. Common wrong answers were 25, $\sqrt{50}$ or $\sqrt{5}$

(b) There were many excellent and fully correct answers here. Some candidates plotted the wrong line, with $x = 2y + 1$ often being chosen. Some lines were correct for the positive quadrant but failed to allow marks to be awarded for the third quadrant due to poor line drawing. There were also occasional misreads from the scale and failures to include negative signs.

2 **(a)** The first stage of obtaining the common denominator seems to have been well understood, most then continuing to numerators comprising $5x$ and the product of 3 and $x + 2$. The main error was a failure to deal with the minus sign when clearing the brackets from $-3(x + 2)$. Many thought the denominator should be multiplied out to $x^2 + 2$ and some thought it should become $x^2 - 2x$. Sadly, there were many instances where students arrived at the fully correct solution and then erroneously cancelled the x^2 or other spurious factors.

(b)(i) The majority of candidates answered this part really well. Nearly all candidates found the $^-6$ but some did stumble when trying to find *b*. The 36 was quite often added to 40 instead of being subtracted from it. There was also evidence that some thought $(^-6)^2$ was either $^-2$ or 12.

(ii) There were not many fully correct answers here with some candidates managing to get their *b* correct whether it was correct or follow through. A common mistake was to copy their answer *a* from above. A number of candidates failed to realise the connection to the previous answer and often produced fruitless additional working.

3 **(a)** Candidates usually gained strong marks here. Some students failed to cancel their correct fraction $\frac{102}{999}$. Another common result was to think they needed to work out $100x$ rather than the required $1000x$ to solve the problem. Virtually all candidates knew the process they were trying to carry out even if they made errors along the way.

(b) Candidates found this difficult though often they did manage to score the W1 mark at some stage, usually with $3\sqrt{10}$. Some candidates failed to cancel their integers in the numerator and denominator to reach the required solution.

4 **(a)** There were many fully correct histograms drawn, a large majority of candidates knowing they had to calculate the frequency densities from the table. Sadly arithmetical errors sometimes let them down. However, these students usually did manage to get three correct heights so they were rewarded with 2 marks.

(b) The most commonly occurring acceptable 'difference' statement related to the different ranges, though sometimes candidates were credited when using wordy statements rather than using the statistical word range.

The most common 'similarity' statements mentioned either the modal classes being the same (condoned in the mark scheme) or, in a few cases, the skewness for each distribution being the same. Most weak answers considered one class interval only, usually the amount collected between £0 and £10. Other weak answers related to the amount of money collected rather than reference to the either boys or girls. Others referred to means or medians without any supporting evidence. Some talked about the highest frequency density or the height of the bar without showing understanding or interpretation.

5 **(a)** Around half of candidates made a good attempt at reproducing the cosine curve with a vertical translation of one unit. Common errors were to move the graph horizontally (drawing $y = \cos(x + 90)$), or drawing $y = \cos 2x$ or $y = {}^{-}\cos x$.

(b) Most of the candidates who attempted this obtained one mark for $a = 3$. Many students failed to understand that b was the coefficient of x required and frequent answers of 180 were seen from the graph for *b***.** A few candidates reversed their values whilst others thought that b should be -2 or 2.

Section B

6 **(a)** Most candidates did manage to get the correct answer of 250, appreciating the need to make $t = 0$ for the start of the reaction. Common wrong answers of 125.3 ($t = 1$), 2500 or 2.5 were seen.

(b) The majority of candidates answered this well and usually also rounded their answer to a suitable degree of accuracy.

(c) There were many correct answers here although some candidates still insist on writing their final answer without showing any supporting evidence. Candidates should heed the instruction "Show how you decide," show their trials, and evaluate them. Some candidates correctly found the right value of t and then wrongly assumed the required answer to be 2.4. Other candidates tried to work in with answers of either 210 or 240. A further selection of candidates thought the answer was 0.995

7 **(a)** It was very pleasing to see so many all correct answers here, though some went on to make the equation = 0, usually finding the correct solutions to their equation. A few candidates tried to find numbers that added to give +4 and multiplied to give -21, which led them to wrong brackets. Almost all candidates arrived at the right type of double brackets.

(b) There were many excellent solutions seen. Some candidates wrongly substituted their values, usually mixing up their *b* and *c*. Some poorly structured answers were seen with short square root signs but often these students did manage to recover by applying the square root to the full expression even if their initial writing suggested otherwise. A few candidates suffered from using their *b* as -17 at the start of the formula, often arriving at two negative answers. A number of candidates failed to heed the request for answers to be given to two decimal places. A few weaker responses attempted to rearrange the equation to arrive at the solutions, whilst one or two candidates tried to complete the square, with little success.

8 This proved to be a very successful question for candidates with many fully correct solutions seen. A few candidates did try to work with replacement and their score was limited as a result. Sadly, there were common mistakes of 3 × 2 = 5 and 2 × 1 = 3 and 1 × 0 = 1 seen in numerators, which spoiled otherwise correct responses. Most candidates clearly did know what they were attempting to do even if poor arithmetic skills let them down. For some reason some candidates tried to choose three pens.

9 This was the most discriminating question on the paper. Candidates were obviously more familiar with finding the minor segment. Many candidates attempted 140/360 of the area of the circle and used $1/2 \times ab\sin C$ but were then unable to link them to find the area required. A few candidates used the sine rule or cosine rule to find the area of the triangle with mixed degrees of success. It was good to see very few candidates working with circumferences or arc lengths.

10 **(a)(i)** Almost all of the candidates correctly found the right answer.

(ii) Almost all of the candidates correctly found the right answer, although some left the answer unsimplified

(b) This proved a step too far for almost all candidates. Very few realised that they had to find an expression for vector OD. Of those who did, they often got a wrong answer for OD and therefore could not attempt proving why OD and AC were not parallel. Some candidates did not understand that AB had to be **produced** to D and so chose to put point D between A and B with the resultant loss of marks.

11 Very few candidates scored all 3 marks as they often tried to use angles AOP and BOP to prove congruence. Some candidates' attempts at reasons were somewhat inaccurate even though they knew which sides were equal. Many candidates tried to include angles in their reasoning and therefore could not obtain the third mark.

B281 Terminal Paper (Foundation Tier)

General Comments

For this January entry, the number of low scoring candidates was relatively small. Both sections were attempted well, with few candidates failing to attempt a question. No one question caused difficulties for all candidates although some were more challenging.

As usual, some candidates lacked a calculator or did not use it when appropriate. Lack of working by some continues to mean that for such candidates, part marks are not available when their answer is wrong. However, in questions where the demand to show working was explicit, as in Q.16(a), most did show working and hence were able to gain credit.

Comments on Individual Questions

Section A

1 **(a)** Part (i) was well answered, with some strange spelling but recognisable as the required number. Errors seen included 'five thousand and fifty two' or 'fifty seven thousand and fifty two', for example. Part (ii) was usually correct, but there were a few more errors in part (iii), with errors such as 5682 or 5662 being seen.

(b) This was mostly correct. A few candidates omitted it, but most managed to get at least the mark for a correct digit.

2 Very few candidates failed to get the marks for the cylinder or the cone but trapezium was often given as rhombus and pentagon as hexagon.

3 **(a)** Nearly all were able to interpret the pictogram to find the day when most were sold.

(b) Nearly all correctly interpreted the whole symbols, though a few gave the number of symbols rather than the number of people.

(c) Interpreting the part symbols was found slightly more difficult, as expected.

(d) There were frequent errors in arithmetic here, but most candidates picked up at least one of the marks.

4 **(a)** Nearly all gave the coordinates of A correctly.

(b) There was some reversal of coordinates here in plotting B, but follow through meant that marks in later parts were still available.

(c) There were some correct attempts at isosceles triangles but also many where C was one square away from a correct position. A common error was to draw a right-angled triangle instead.

5 This question on number machines was answered well, with some imaginative correct responses for part (c). Few showed the result midway for the two-operation machines, so that part marks were rarely earned if there were errors.

6 **(a)** Those candidates who used 6 and 300 or 320 usually gave correct answers but some attempted to work out the exact answers rather than an estimate.

(b) Many correct answers were seen with a variety of methods for working out this long multiplication, gaining at least some of the marks if not all 3. Some, however, thought that $37 \times 14 = 30 \times 10 + 7 \times 4$ and so gained no credit.

7 **(a)** Most correctly calculated the angle, but many failed to state the reason why the angles added up to 360°.

(b) As expected, this was found harder than the previous part, with not all knowing that the sum should be 360° and fewer expressing the reason well, with parallelogram or trapezium often being mentioned rather than quadrilateral or 4-sided shape.

8 Nearly half the candidates gained all 3 marks in this percentage question, although a number did not know how to begin whilst others could not proceed further than finding 10%. The error of finding 15% by dividing by 15 was also seen on occasion.

9 **(a)** Constructing the stem and leaf diagram was usually done well but often the key was missing or incorrect or double-digit stem or leaves seen. Some candidates had little knowledge or remembered little of the topic.

(b) 76 or 77 were often seen as the median instead of 76·5, but most gave 40 as the range. The comments in part (ii) were varied, with many explaining correctly the changes to the median and range but some repeating vague statements.

10 **(a)** Completing the table was poorly done by some, with over 40% of the candidates gaining no marks. However, high scoring candidates knew in general how to proceed and expected symmetry in their results.

(b) Many gained the mark for plotting their results, although the mark for the correct curve was not often awarded. Some, who had the correct points, then used ruled line segments for the joins. In the last part, many read off their curve correctly at the first intersection, but seeing the two answers was rare, whilst some candidates omitted this part.

Section B

11 **(a)** The side was usually accurately measured, although there were a few missing units and some poor reading of scales, giving 3·2 and 4·3 instead of 3·7. A few candidates obviously did not have rulers.

(b) Many did not know what 'perpendicular' meant, so that this was poorly answered with CD being the common error. Quite a few candidates put down just one letter.

(c) This was generally correct, with reflex being the favourite wrong choice.

(d) Candidates often measured the angle well. Answers of 145 and 125 were common errors of reading the scale, whilst some without protractors estimated the angle.

12 **(a)** Many candidates interpreted the timetable correctly, although some made the error of using 100 minutes in an hour and some gave an arrival time at Wolverhampton.

(b) Good explanations were seen but few were straight to the point that the train does not stop at Oakengates.

In part (ii), some did not refer to the context of the question but stated the last time shown on the timetable, 1054. However, a follow-through allowed the mark to be gained in the next part.

(c) This was often answered correctly, with £1.75 and £8.15 being common errors.

13 **(a)** The city with the lowest temperature was usually given correctly, with –9 or Oslo as the common wrong answers.

(b) Most correctly calculated the difference as 10 (–10 was accepted) but a few 11s were seen.

(c) This was nearly always correct.

14 **(a)** Very few failed to draw the correct line of symmetry, although it was not always ruled.

(b) Nearly all completed the diagram with correct line symmetry.

(c) Candidates, as expected, found completing the diagram with rotational symmetry harder, but nearly 70% of them gained both marks.

15 **(a)** Many answered this well, but there was the usual confusion between area and perimeter.

(b) There was less confusion here, with about four fifths of the candidates drawing a rectangle with the correct area.

(c) Only a minority of candidates calculated the area of the right-angled triangle correctly, with 8·6 and 16·8 being common errors. Some candidates decided this was about Pythagoras' theorem, calculated the hypotenuse and then found the perimeter.

16 **(a)** The candidates who worked in a methodical way showing clear steps scored full marks. Many calculated the total cost of the different items and found how much is spent on fares but failed in the calculation of the number of journeys.

(b) In this conversion question, truncating and rounding other than to the nearest penny were the main errors besides multiplying instead of dividing.

17 **(a)** Most gave the correct solution of 4 to the first equation. A few embedded answers were seen and the occasional 36 and 9.

In part (ii), many answered this two-step equation correctly, but some did not know how to begin. A few picked up a method mark for showing $2x = 9$, but usually, algebraic working was absent.

(b) Some candidates found the simplifying challenging, and many of them had one or none of the terms of $7t + 3w$ correct, although there were also plenty of correct answers. In the last part, many did not simplify enough, leaving their answer as $3 \times c^2$, with some candidates not getting that far.

18 **(a)** Most completed the table correctly. There were a few blanks.

(b) Finding the probabilities was often done well, although some counted in the headings and others only the first two rows in the table. Common wrong answers were therefore 5/34 in part (i) and 2/12 in part (ii) as well as those with wrong notation such as 4 in 24. Many correctly answered 0 in the second part, and a follow-through mark for the denominator helped some candidates in the last part.

19 **(a)** Many candidates did not use a correct method for finding the circumference of a circle here. Of those who did, few gained full marks, with most leaving their answer with up to 8 digits instead of rounding to an appropriate accuracy for the perimeter of a cricket pitch, and hence gaining just 2 of the 3 marks.

(b) There were some good attempts at using proportion here, with well over half the candidates gaining at least one of the two marks.

20 A few correct answers to this percentage reduction question were seen. The difference was often found but not used any further. Many candidates tried to use trial and improvement methods, often not successfully. Some did not attempt the question.

21 Some candidates used Pythagoras' theorem successfully and obtained 3 or 4 of the 4 marks available. Many candidates had no idea what to do and attempted various sums of lengths, with 123 being a common wrong answer.

B282 Terminal Paper (Higher Tier)

General Comments

Candidates demonstrated a full range of attainment on this paper and some good responses were seen to challenging questions. It was disappointing to note that there were some inappropriately entered candidates, many of whom appeared to have been exposed to harder concepts despite very limited mastery of the basics.

The highest facilities were demonstrated in the questions that assessed the use of percentages, addition of fractions, evaluation of a formula and use of Pythagoras' theorem. It was not surprising that some candidates found questions towards the end of each section difficult but it was pleasing that there were few blank spaces.

Candidates made incorrect assumptions in a number of questions. This particularly affected performance in Q.2 where they assumed that the quadrilateral was a parallelogram and Q.17 where they assumed right-angled triangles. Similarly, in Q.14 they drew frequency diagrams rather than cumulative frequency diagrams and in Q.18 read the frequency densities as frequencies.

Many candidates were unclear how to attempt a question requiring them to 'show that …' Questions of this form are often designed so that candidates have access to a later part of the problem. Unfortunately, many candidates start with the provided answer and often get involved in a circular argument.

Candidates appeared to be appropriately equipped and most demonstrated good calculator skills. Presentation varied with some candidates using the working space for very rough jottings with no attempt to set out the work in sequence. The quality of graph drawing was noticeably better than in recent examinations.

Comments on Individual Questions

Section A

1 Most candidates scored full marks in this question. Errors arose in the arithmetic where candidates attempted 0.85 × £8.40 or where, having used an appropriate non-calculator method such as 10% then 5% to reach £1.26, incorrectly subtracted from £8.40.

2 **(a)** Almost half the candidates failed to score in this part, generally because of assuming that the quadrilateral was a parallelogram. Having incorrectly, stated that $\angle$ABD = 68° and so $\angle$BDA = 60° some gained a part mark for angle x being alternate to $\angle$BDA. Some of the candidates who used the correct reasoning failed to give the correct reason for $x = \angle$BDA, with 'corresponding angles' and 'alternate segment' being common errors.

(b) Few candidates gained the mark in this part. The majority stated that the quadrilateral was a parallelogram, having made this assumption in part (a). Those that did state 'no' generally gave an incomplete explanation such as 'only one pair of parallel sides'. Some responses, such as 'no, the angles are not all right angles', indicated a lack of knowledge of the properties of a parallelogram.

3 **(a)** The majority of candidates made a reasonable attempt at a stem and leaf table. Marks were lost for incorrect or incomplete keys and missing values in the table. Some simply recorded the values in the correct groups, ignoring the stem. Others drew tally charts and even pictograms.

(b)(i) About three quarters of candidates made a good attempt at the median and range although some, having reached 76 and 77, failed to progress to 76.5.

(ii) Most candidates were able to provide the basic comparison required in this part but some of these responses did indicate a rather shaky deeper understanding of the term range. A few gave two responses but both referred to the median.

4 **(a)** The majority of candidates scored at least one mark in this part. Some scored just the one mark because they wrote expressions only for Beth and Cara's ages.

(b) Those who wrote the correct expression in (a) generally proceeded to equate $4x + 7$ to 55, solve the equation and find the three ages. Those who had reached $3x + 7$ in part (a) generally solved their equation correctly. Some restarted when they recognised that $x = 16$ did not satisfy all conditions. Candidates who had not coped with the algebra in part (a) generally employed a trial approach in part (b), but not always successfully.

5 **(a)** The majority of candidates correctly evaluated the formula. Some evaluated $(5t)^2$ and reached $h = 5$ for $t = 1$ and $h = 60 – 100$ for $t = 2$ but they then corrected, possibly after attempting to drawing the graph, to $h = 40$ for $t = 2$. Some of the candidates clearly recognised the symmetry of the graph and so solutions such as 0, 15, 30, 45, 30, 15, 0 were seen.

(b)(i) Most scored the mark for plotting their points and many scored the mark for the curve. The quality of graphs was better than seen in recent years, with few straight segments or thick curves.

(ii) Most used their graph to find a solution to the equation but the majority failed to provide 2 solutions. A few added or subtracted their readings.

6 **(a)** A very high percentage of candidates answered this part correctly.

(b) Most candidates were able to find the prime factors but some failed to express them as a product.

(c) About half the candidates found the HCF of 150 and 240. Errors included finding a factor or the LCM.

7 **(a)** Most candidates recognised that they needed to find $1/6 \times 1/6$ but answers of 2/12 and 2/36 were common. Those candidates who failed to show the product scored 0 in this part.

(b) About a third of the candidates were able to explain their choice of Amar fully by listing the possible ways of finding the two totals and/or finding the two probabilities. Some scored one mark by giving a partial explanation. A significant number of candidates did not understand the significance of 3, 4 being different to 4, 3 etc and so did not manage to get the listings correct. Some stated that 'you have more chance to roll two different numbers than two numbers the same' ignoring that each pairing has the same probability, and some stated that 'there are always more ways to get a bigger number than a smaller number'.

8 Most candidates were able to add the 2 fractions. Some made an arithmetical slip such as $14 \times 4 = 42$ and some were unable to change their correct improper fraction into a mixed number. Only the lowest scoring candidates failed to convert the fractions into twelfths.

9 (a) The majority of candidates solved the inequality. Some solved as an equation and gave an answer of $n = 3$. Common errors were $2n \leq 10$ and $8n \leq 10$, candidates not having correctly 'balanced the two sides'.

(b) About half of candidates were able to rearrange the formula. Most realised they needed to multiply by 4 first but errors then arose at this stage. Some then subtracted the 3 before multiplying by 4. Others multiplied only one term by 4 (either $2x$ or 5).

10 (a) The majority of candidates gave the correct answer 3. Some candidates clearly had little idea what was required in this part. A few reached $\sqrt{9}$ yet failed to proceed to 3.

(b) Those candidates who used a grid were generally able to proceed and score at least 1 mark. A common incorrect answer was $16 + (\sqrt{3})^2$.

11 (a) About half the candidates were able to reach 125 or x^6 but only about half of these candidates were able to give a fully correct expansion.

(b) Few candidates recognised that they needed to factorise this fraction before simplifying. Most just cancelled terms or attempted erroneous calculations such as $3x^3/ x^2 = 3x$ and $^-12x/^-2x = 6$, which did not score.

Section B

12 Most candidates substituted correctly and reached $^-26.1$ but a significant number failed to round to the nearest whole number.

13 About half the candidates found the correct percentage decrease. Others found the 2008 figure as a percentage of the 2003 figure but failed to find the percentage reduction. Some attempted to find the % decrease by trial and improvement. Some candidates appeared to think that a percentage has to be given as a whole number - a few gave an answer of 65%, which, unless figures that are more accurate were shown in the working, scored 0. A common error, which also scored 0, was to divide 55700 by 36500.

14 (a) Most candidates worked out the circumference but many failed to give the answer to a suitable degree of accuracy. A small minority found the area or substituted $d = 70$ in the circumference formula.

(b) This part was generally correct. One common error was to use 20/6 = 3.3 and then multiply by 51 to give 168 rather than 168.

(c)(i) Over half the candidates failed to score in this part. Many drew frequency polygons or histograms. Those who drew cumulative frequency graphs often plotted at the midpoints rather than the endpoints.

(ii) Similarly about half the candidates failed to score in this part. Some, who had not scored in the previous part, obtained the answer correctly from the original table. Some failed to interpret their cumulative frequency curve correctly, simply reading from the graph.

15 Most candidates were successful in this question. Some did not achieve full marks as they found the hypotenuse of only one small triangle.

16 This question was well answered by many candidates with full marks often gained. Most used the method of equating coefficients and many who did not score all 4 marks scored at least 2 for correct multiplication and addition/subtraction as appropriate, usually with an error in dealing with the negatives. Weaker responses sometimes omitted to multiply the RHS of the equations. Those candidates who attempted a substitution method were rarely successful, as they tended to make errors when simplifying their equation.

17 (a) About half the candidates were successful in this part, usually by stating AB = 20/sin 40° = 31.1[...]. Some candidates found length BC and then used the sine rule in triangle ABD but errors often arose. A circular argument using Pythagoras theorem was sometimes seen.

(b) A minority of candidates were successful in this part, generally through use of the sine rule. Some found other lengths but this method only scored when the lengths were identified. Some assumed that triangle ADB was right-angled. Some candidates calculated the length of AC and then decided that AD was half AC.

18 About half of the candidates were able to interpret the histogram. Others thought that the height represented frequency and gave 11 from 5 + 6 as the number of visitors under 15. Use of both squares and frequencies was seen, with some finding the number of squares, but then using 450 rather than 85. Some made arithmetic errors in calculating 450 from the histogram, when the value had been provided in the question. A number of candidates used frequency densities rather than frequencies.

19 (a) Most candidates scored at least half marks in this question and about a quarter scored full marks. Generally, candidates correctly found the volume, although there were some who used 0.33 or 0.3 rather than dividing by 3. Many did not know the conversion factor between cubic centimetres and litres, with 2000 rather than 20000 commonly used. Many scored the final mark for correctly rounding their answer down. Few answers were left as decimals.

(b)(i) Only the highest scoring candidates recognised the connection between the sector radius and the cone and used Pythagoras' theorem. Many candidates produced 'circular' arguments, using the radius of 11.7cm to find the area or circumference and then working back to give a radius of 11.7cm.

(ii) Few candidates were able to find the angle of the sector, principally because they did not understand the connection between the sector and the cone.
Some candidates had an idea of what was required, but few reached the correct final answer. Ratio methods were common, although there was some confusion between using sector area with curved surface area and arc length with circumference of cone. Frequently 1 mark was scored for one correct quantity found, but then candidates did not know how to proceed. Some candidates simply estimated the angle.

20 About half the candidates were at least partially successful in this question. Full marks were lost from leaving the answer as $\propto$ instead of = or, having reached k =100, recording $y = 100/x$ rather than $y = 100/x^2$. Many candidates misinterpreted the question and worked with $y \propto x$ *or* $y \propto 1/x$. Answers of $y = x - 1$ and x^{2-} 21 were seen from candidates finding a formula which satisfied $y = 4$ and $x = 5$.

21 Few candidates gained full marks for this question. Common errors were to divide 260 by 5 and give this as the answer or to give the lower bound or 65 as their answer. The other common error was to use the lower bounds of both distance and time to give 255/3.5 = 72.8... Those who did use 255/4.5 were sometimes uncertain how to present their answer, occasionally truncating to 56.

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

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