RECOGNISING ACHIEVEMENT

GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education **J517**

Examiners' Reports

June 2011

J517/R/11

Oxford Cambridge and RSA Examinations

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

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

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

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

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

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

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

CONTENTS

General Certificate of Secondary Education

Mathematics C (Graduated Assessment) (J517)

EXAMINERS' REPORTS

Chief Examiner's Report

General Comments

This is the last June session for this specification and, as a result, many of the year 10s who in the past have sat modules in this session were missing. There were however some entering modules who intend to aggregate next January as well as the majority who were aggregating in this session.

The percentage of candidates taking modules this time who have taken units B279 and B280 is again an increase (OCR reported an increase last June), with B280 showing an actual increase in numbers compared to last June, in spite of 'missing' year 10s.

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 will need to '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, with help towards teaching in a staged way; 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. For instance, there are links to actual papers and mark schemes for J562 units A and B for November 2010 and January and June 2011. The group may be found at http://social.ocr.org.uk/groups/maths .

B271: Module Test M1

General Comments

Many candidates responded well to the paper. Two clear weakness were the understanding of fractions and dealing with time.

Some candidates found it difficult to see links between questions or to develop strategies to answer questions that required a level of deduction.

It would be nice to see more candidates using rulers than on this occasion. Candidates also need to write down some working, even when they are using a calculator.

Comments on Individual Questions

Section A

1 Question 1 concerned arithmetic.

(a) This addition was often correct.

(b) Candidates generally answered this subtraction well, possibly because no "borrowing" was involved.

(c) Some candidates revealed their lack of knowledge of times tables in this question.

(d) This division also challenged times table knowledge and answers of 6 and 21 were not uncommon.

2 **(a)** Candidates often completed the drawing accurately and many used a ruler and pencil.

(b) Many correct answers were seen although giving the semi-perimeter in both cases and measuring in 'squares', thinking the length to be 22cm, were common errors.

(c) This question challenged all but the highest scoring candidates and answers of 17cm (the semi-perimeter) were common. No candidates gained the available method mark for showing working and adding their length and width and doubling the result.

3 Question 3 concerned factors and multiples (2s and 5s).

(a) Many candidates answered well and scored 2 marks. Some made an error with one of the final two responses and scored 1 mark.

(b) A large number of correct responses were seen although working was rare. 10, 20 and 30 were common correct answers and 26 one of the errors. (This, possibly the "next" card after 25.)

4 **(a)** **(i)** Many ruled lines were seen. Usually "P" was marked on the line but candidates clearly have problems with marking a point, as a cross was rarely seen. Some candidates did not place the P on the line and failed to score the mark.

(ii) Coordinates were often correct but, when P was not clearly marked, it was not always possible to determine the point that was intended. Reversed coordinates that had been penalised previously were condoned. Some candidates, who had previously shown coordinates correctly, reversed them in this part.

(b) The point G was usually marked. Some reversed coordinates were seen. The same problem in identifying the point existed, as in part **(a)(ii)**, when G was placed poorly and no cross was used to denote the intended point.

5 **(a)** 'Square' was usually correctly identified and sometimes, 'Pentagon'. 'Hexagon' was a common wrong answer for the second shape.

(b) The correct enlargement was frequently chosen.

6 Question 6 concerned fractions of a shape and challenged many candidates.

(a) Some candidates struggled to express the answer as a fraction. $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{7}$, 2 – 5 and many others were seen. Over 1 in 20 candidates failed to answer at all and 0 marks were awarded almost as often as 1 mark.

(b) **(i)** Good answers were seen, although some candidates were not able to respond sensibly. Some used only one type of tile to fill the octagon. A common error was to draw one A shape and one B shape only.

(ii) All candidates found this, and the next part, difficult. Answers such as $\frac{4}{1}$ were seen, suggesting that the concept of a fraction was poorly understood. Often the denominator was the same as the number of pieces, irrespective of size, used in the octagon.

(iii) Answers to this question demonstrated all the misunderstandings apparent in **(b)(ii)**.

7 **(a)** Many good answers were seen. 'Evens' was a common wrong answer.

(b) Many good answers were seen. A common error was to draw a new symbol, often clouds with a cross through them. This response received no mark.

Section B

8 Question 8 concerned bar charts.

(a) This question was well answered, although 1 in 6 candidates did not complete the chart. Some ruled lines were seen. A common error was to add one square to the column for sparrows on the sunflower seeds' graph.

(b) Again, this was well answered although some clearly did not understand the graphs and gave answers such as "Sunflower seeds taste better."

(c) Candidates responded well and few errors were seen.

(d) This question was more challenging for candidates. Many vague statements were seen. Better responses used figures to support their reasoning but many simply chose one of the foods and said, "More liked it". One error was "Starlings, there are more of them.

9 **(a)** Many good answers were seen. Only a few candidates reversed the order of the numbers. A common error was to reverse the final two numbers in the list.

(b) Many good answers were seen.

10 **(a)** Many candidates answered well, although weaker responses often gave 41, from misreading the scale.

(b) The compass was read well, with the error usually being "West North" and a few "South".

11 **(a)** Most candidates responded well with the common errors of 2 or 6.

(b) **(i)** Candidates generally found this question challenging and only those who were in the top quarter of the distribution scored consistently well. Candidates tended not to see the links between the questions. Common wrong answers were, again, 2 or 6.

(ii) Candidates also struggled with this question, possibly from thinking that it referred to the previous diagram showing 6 joined squares.

(c) Around one quarter of all candidates did not attempt this question. Answers such as "She needs to count them" revealed that candidates had not understood the link between previous parts to the question.

12 Listing was a topic that candidates dealt with well and many complete tables without repeats were seen. Candidates usually found at least three combinations.

13 **(a)** This was answered well and candidates rarely miscounted.

(b) Many good answers were given, rarely with any working. Some gave their wrong answer to part **(a)** correctly multiplied by 100, to score full credit.

(c) Only the highest scoring candidates did well with this question. Unfortunately, very few showed working and so awarding part marks was difficult. 72 was a common wrong answer (from 6 × 12, which was sometimes shown).

14 **(a)** All candidates responded well to reading the clock and finding the interval.

(b) There was a disappointing response to this question. Those who did showed no working and so it was not possible to determine where times such as 0930 and 1300 came from.

B272: Module Test M2

General Comments

A significant number of candidates had made an attempt to answer all the questions. However a lack of working shown meant that some candidates lost out on some possible method marks. Topics which were done well included reflection symmetry and naming solids. Candidates did less well on number work, especially converting between fractions, decimals and percentages, and also understanding two way tables.

Comments on Individual Questions

Section A

1 Question 1 concerned arithmetic.

(a) The majority of candidates attempted the multiplication. Several did not show any working.

(b) Many appeared not to know how to attempt a division questions and, as in part **(a)**, several did not show any written method.

2 **(a)** The majority of candidates attempted an angle from one end of the line while others drew an angle in the middle of the line. Clearly some candidates did not understand how to use a protractor, while others appeared not to have access to a protractor and perhaps estimated.

(b) **(i)** Some correct answers were seen, but again many candidates did not measure with a protractor correctly.

(ii) A wide choice of answers were seen, with many varieties of the spelling of obtuse. Acute was a common incorrect answer.

3 Question 3 concerned fractions and converting between simple fractions, decimals and percentages.

(a) Many correct fractions were seen. Common incorrect answers were 5 (number of sections) and 3/8 (number of unshaded sections).

(b) Some candidates realised they had to shade in four squares. It was, however disappointing that candidates did not attempt to work out 2/5 of the ten squares, and as a result either scored 0 or 2 marks. A significant number of candidates shaded 5 squares.

(c) **(i)** Many candidates were not able to convert between fractions, decimals and percentages, 1·4, 0·14, 14 were common incorrect percentages for 1/4.

(ii) 5/7 and 7/5 were common incorrect fractions for 0.75.

(iii) This part was less well done than the two previous parts, with 6·10 being the decimal seen most for 6/10.

4 Question 4 concerned interpreting a map.

(a) Birley Lane was generally given, although there was some confusion between left and right, with High Street being given as an answer by a significant number of candidates.

(b) Many more correct answers were seen here than in part (a), with Bank being the most common incorrect answer, with candidates again confusing left and right.

(c) Many fully correct directions were given and several other candidates scored 1 mark for two correct directions.

5 **(a)** Question 5(a) concerned a probability scale

(i) Not many correct answers were seen. Arrow D was by far the most common answer, possibly from the fact it was the fourth.

(ii) Many candidates gave the correct answer to this part. A small number wrote impossible rather than referring to the arrow pointing to zero.

(b) Several candidates gave the correct answer to this money calculation. Of those who did not, several gained 1 mark, usually for 18·45. Some candidates however did not show any method and therefore missed out on the opportunity to gain a mark. £2·45 was a common final answer.

6 **(a)** The part on recognising reflection symmetry was generally well answered, with several scoring 1 mark for two correct answers.

(b) The second part, completing reflection symmetry, was also well answered.

7 Question 7 concerned a simple number pattern.

(a) **(i)** The next number was generally found.

(ii) A correct explanation was generally seen.

(b) Candidates did not determine if 48 was in the pattern as well as they answered the two previous parts.

Section B

8 The majority of candidates scored at least 1 mark, with many gaining all 3. The most common error was naming the pyramid as cone.

9 Many made a good attempt at using this word formula and were successful. Several had no idea how to attempt this question and a common answer was 43 from simply adding 25 and 18.

10 **(a)** Many were able to divide 172 by 12 on their calculator and give the answer 14·3. Some missed the context of the question and rounded down to 14 rather than up to 15. A small number of candidates multiplied rather than divided.

(b) **(i)** The correct percentage from the scaled pie chart was generally given.

(ii) Some clearly understood how to read a scaled pie chart. However several candidates clearly did not understand the concept, with some stating that Sally was correct.

(c) Several candidates did not understand what finding 25% meant and simply subtracted 25 from 108.

(d) **(i)** Several correctly found the median, although few showed an ordered list of numbers. Many gave the answer as 21, the middle value of the original list.

(ii) More candidates were able to give the correct answer for the mode than the median. Some candidates confused median and mode and others attempted to find the mean in one of the parts.

(e) Few correct unit conversions were seen; the most common answer was 150g.

11 Question 11 involved a two way table.

(a) More candidates correctly answered this part, finding one price, than the next two parts.

(b) Many were unable to identify the two required amounts correctly from the table. Those who did usually went on to score both marks.

(c) Some were able to score all 3 marks. Others failed either to identify the two required journeys or to work out the cost for two adults and one child.

12 Question 12 involved a table of positive and negative temperatures.

(a) Many fully correct ordered lists were seen. Even in lists with errors, several candidates identified the smallest or largest number. The most common misconception was listing the negative numbers in reverse order.

(b) The difference was not answered as well as part (a).

(c) Some candidates did not understand adding to negative numbers. Many subtracted, giving an answer of –17.

13 The majority of candidates attempted the scaling with several giving an answer within the accepted range.

B273: Module Test M3

General Comments

The great majority of candidates were able to attempt all the questions. However Questions 7(b) and 7(c) had by far the highest omission rates and were not attempted by nearly a quarter and third of candidates respectively.

About three quarters of candidates scored more than a quarter of the available credit whilst slightly less than a tenth gained less than a quarter of the marks available. There was no firm evidence that a significant proportion of candidates were denied credit by virtue of any literacy skills limitations. The mean mark on Section A was just over 1 mark higher than that for Section B.

In the main, numbers were clearly written. Written explanations were usually understandable with only occasional instances of almost illegible writing. Nevertheless a number of candidates ignored cues such as "explain how you decide" or "give a reason for your answer" and lost credit as a result of this.

Overall, candidates of all capabilities found Questions 1 and 3 the most accessible and Questions 4 and 5 the most challenging.

Areas of content which were found the most challenging included: using and substituting into formulae (Q.4(b)(ii)), squaring numbers using a calculator (Q.7(c)), converting between different metric units (Q.2(a)(ii)) and using and interpreting conversion graphs (Q.4(a)(ii)).

Areas where candidates performed well were: interpreting bar charts and tables (Q.1 and Q.4(b)(i)), solving simple linear equations (Q.6), performing simple pencil and paper calculations (Q.3) and using probability informally (Q.8).

Comments on Individual Questions

Section A

1 Question 1 concerned a dual bar chart.

(a) Found accessible by a large majority of candidates.

(b) A well answered question, correctly answered by the large majority. Full credit was given for March providing candidates also indicated December and February only.

(c) Most candidates were successful in naming all four months in which London had no freezing days.

2 **(a)** **(i)** Almost two thirds of all candidates failed to gain any credit. Partial credit was available for those who gave the sale price rather than the saving.

(ii) Not a well answered question – only a small majority achieved full credit. It was apparent that many thought 100 ml was equivalent to 1 litre. Follow through credit was available when this was clear from the shown working.

(b) **(i)** About one third of candidates gained full credit. The most common errors were either not halving £42.40 or failing to halve it incorrectly. Some serious misconceptions regarding decimal addition and place value were revealed in a few answers.

(ii) The majority failed to gain any credit for this part-question. Common wrong numbers seen were 15 and 45 but the most common was 20 (probably from reading the given time on the clock).

(c) Two marks were available here: one for the correct "number" and one for a reasonable unit of length measurement (e.g. centimetres or metres). Most gained at least one of these but slightly less than a third were completely successful.

(d) About two thirds of all candidates gained partial credit or better. There seemed to be no obvious pattern in errors other than a noticeable number who switched views D and A (the views involving the curved ramp).

(e) This was correctly answered by a minority of candidates. Partial credit was available for the correct measurement on the paper without using the scale; just under a quarter gained this mark.

(f) Overall about a third of candidates gained full credit. Most problems originated in drawing the wheel of the logo in the correct position.

3 The majority of candidates gained full credit. The most common error was to link $0.5 \times 4 = 0.2$ and $0.6 \div 3 = 2.0$, ie to switch the top 2 answer boxes. This question was found the most accessible by the highest scoring candidates.

Section B

4 Question 4 concerned a conversion graph.

(a) **(i)** The majority were successful in reading off. The most common error was 35.

(ii) This was found to be the most demanding part-question for low scoring candidates with few gaining any credit. About one in ten candidates did not attempt the question. The question attracted some naive answers, the most common being to consider 45 mph a greater speed because "45 miles is greater than 25 metres" without any attempt at conversion.

(b) **(i)** An accessible question with full credit gained by nine out of ten candidates.

(ii) Only a very minority were successful. It was found challenging by candidates of all capabilities.

(c) **(i)** Candidates tended to confuse which average was required. The most common error was 4.8 because of this. About one third of candidates gained full credit for the mean. Partial credit was available, but only if there was the appropriate evidence (keeping all working on a calculator, and not writing any down, rules this out).

(ii) As above the most common error was 4.4 due to confusion between averages.

(iii) About a third of candidates were successful. The most common error was to restate the question as the reason i.e. because "half the results are greater than 4".

5 **(a)** Only a minority were completely successful. The most common error was to halve 1112 but there were also a number of seemingly random answers.

(b) Very few candidates were successful with this problem. There was no obvious pattern in their errors.

6 Question 6 involved simple equations.

(a) The most commonly observed incorrect response was 10 which was possibly the result of some misconception/confusion regarding equations and place value. About half the candidates gained credit; this figure only dropped to a quarter for the least capable.

(b) A majority found this part-question accessible

(c) Two thirds of candidates gained full credit. The most common wrong responses were 0.4 or 2.5.

7 Question 7 tested the use of the calculator; order of operations, squares and roots.

(a) Almost two thirds of candidates gained at least partial credit. The most common error seen was 65 but another frequently seen incorrect response was 35.

(b) There was no obvious pattern in errors. Somewhat surprisingly the majority presented incorrect responses.

(c) This was found very challenging and only a few correct answers were given.

8 Question 8 concerned probability.

(a) This was attempted by a large majority of candidates with almost three quarters being successful.

(b) The majority found this part-question accessible.

B274: Module Test M4

General Comments

In general candidates seemed well prepared for the module. Candidates scored across the whole range of marks, although most marks were in the range 10 to 40. However few candidates were able to answer the straightforward questions on angle facts and mean correctly.

A number of questions required explanations and it was pleasing to see candidates producing some clear and accurate responses to these questions. More candidates are also starting to show clear working enabling them to gain part marks if their final answer is not correct.

Comments on Individual Questions

Section A

1 **(a)** Most candidates answered correctly, with few instances of reversed coordinates seen.

(b) Again, most candidates plotted C correctly. Intention was made clear by using a cross or writing C on the graph.

(c) Candidates found it difficult to plot D to make a square, even when C had been plotted correctly. The follow through mark was often awarded for correctly stating the coordinates of their point.

There were only one or two instances when candidates had reversed the coordinates consistently through the question: errors of this type appeared to be more a case of a slip than a misconception.

2 **(a)** When a valid attempt was made, most identified 0·25. The most common error was to include an extra decimal point, i.e. 0·2·5. Some candidates mixed decimals and fractions, writing 0·2½ . Other decimals such as 0·4 and 0·02 were also seen.

(b) Most candidates struggled with this part, and the most common answers were 4/8 or 0/48. Where a correct answer was given, it was usually 48/100 and attempts to cancel were rare.

(c) Candidates answered this part much more successfully than **(b)** and the answer of 7/10 was often given. Some answers of ¾ were seen, where candidates had estimated the fraction.

3 **(a)** The correct answer was often seen, and was usually given as a fraction. Where an incorrect form was used, it was usually 3 out of 10, and ratios were very rarely seen. If the answer was incorrect, candidates were usually able to gain a mark for the correct numerator: the most common incorrect answer was 3/7. Very few candidates gained a mark for just the correct denominator.

(b) Candidates with the correct answer in **(a)** were generally correct here as well. Very rarely was a consistent incorrect denominator used: following an answer of 3/7 in **(a)**, the answer was generally 4/6 in **(b)**, scoring 0.

4 **(a)** Most candidates failed to score here, as they appeared to have measured the angles, despite the diagram stating 'not to scale', rather than used angle facts.

(b) Again many candidates appeared to have measured, although slightly more used their knowledge of angles in a triangle. Having identified that the triangle was isosceles, many gave an answer of 40°, which did not score, however a minority did correctly calculate the missing angle as 70°.

5 **(a)** **(i)** Most candidates were able to read the distance off the graph correctly, although a minority gave the time rather than the distance.

(ii) Many candidates gave an incomplete answer involving the length of the line. Others were aware that the speed related to distance and time so gave an answer referring to a longer distance travelled in an equal/shorter time, which was sufficient to gain a mark. Only a minority of candidates referred to the steepness of the line.

(iii) When the correct time was seen it was usually in the form 1315. However some had correctly converted to the 12-hour clock. The most common error was to give the finish time of 1445, although some instances of misinterpreting the time scale were also seen.

(iv) Many candidates were unable to calculate the length of time correctly; some attempts to add time intervals were seen with varying degrees of success. Some gave the answer of 3:45 hours, i.e. the total time without stops, which gained the method mark.

(b) This was answered reasonably well, with many candidates knowing that a mile was further than a kilometre, although candidates who stated a conversion factor were penalised if it was incorrect.

6 A variety of methods were used to try to find the solution to this question from the more traditional long division to 'bus stop' method, chunking and multiplication. In the majority of cases the method used was either incomplete or wrong.

7 The correct answer to this question was almost never seen, and only the very strongest gained a method mark, most commonly for the answer $2n + 10$. Many candidates gave a purely numerical answer with no use of algebra seen.

Section B

8 **(a)** Most candidates identified at least one of the reflections correctly, but only a minority were correct in all three cases.

(b) Many candidates identified order three for the first pattern, but the expected error of order four, rather than order two, was often seen for the second pattern.

9 **(a)** **(i)** Candidates generally interpreted the scale correctly and gave correct answers. Some candidates did not read the second sentence carefully and gave the percentage of households in either 2007 or 2008 rather than the difference between them.

(ii) Despite the open nature of the question candidates answered very well. Most gave a clear and correct interpretation of one aspect of the graph.

(b) **(i)** The responses to this question were very disappointing. Despite it being a straightforward mean calculation, only around a third of candidates answered correctly, with very few being awarded any part marks as structured working out was seldom seen. The most common error was for candidates to attempt to find the median.

(ii) Fewer candidates were successful with an explanation in this part, as the descriptions, in general, were not clear or concise enough. In the main, the effect on the mean was not referred to at all, and the explanations were implicit rather than explicit.

10 **(a)** High scoring candidates had no problems with this part and generally were completely correct. Candidates who made a slip generally had problems multiplying up the 75, perhaps suggesting lack of a calculator. A common error was for candidates to use the wrong multiplier, often using 10 or 4 instead of 5, in which case one mark was awarded if they had used their multiplier consistently.

(b) Most candidates scored at least part marks for this question, and some very clear working was seen. Many candidates found £9·15 correctly, but there were problems in calculating the amount made for selling the cookies. Some candidates reached £18·75, but failed to subtract to get the final answer. It was not uncommon for candidates to multiply 75 by 4, rather than realising that they needed to calculate the number of bags of cookies that had been sold.

11 **(a)** Almost all candidates could continue the sequence correctly for the next two patterns.

(b) Candidates found it difficult to extend the sequence as far as pattern 25. It was common to try to multiply values from the table to get the answer, for example multiplying 17 by 5, to get from pattern 5 to pattern 25. Some candidates identified correctly that the pattern was going up in threes, but then used repeated addition to try to get to the 25th pattern which often led to errors. It was common to see an answer of 75, rather than 77, where candidates had realised that 25 lots of 3 were required, but had failed to add the extra 2.

12 Approximately a quarter of candidates omitted this question, suggesting that they had not covered trial and improvement. Where it appeared that the question had been understood marks were picked up easily, however the final mark was sometimes lost for omitting to put 27 on the answer line, or putting 32 instead. Where candidates did attempt the question and did not score, the two common errors were not to use the correct gap of 5 between length and width, or not to multiply the length by the width to find the area, despite the example having been given.

B275: Module Test M5

General Comments

There was no evidence that candidates struggled to complete either section within the allotted time. Some candidates seemed to be completely unprepared for the paper as they had many questions not attempted. Other candidates simply wrote down their answer for each question showing no working out at all thus denying themselves the chance to score Method marks. Candidates therefore need to be encouraged to show their steps of working and to write down their calculations, particularly on Section B where a calculator is permitted. Bearings and interpreting statistical measures were common weaknesses.

Comments on Individual Questions

Section A

1 **(a)** Many candidates were not able to round to one significant figure and gave the answer as 49000.

(b) This was reasonably well answered with many correct answers seen with either £3500 or commonly £3500.00. The most common error was to still include the pence part resulting in usually a wrong answer of £3500.52

(c) At least one number had to be rounded here and there were some of each acceptable correct answer seen (29000 × 20 = 580000 or 30000 × 20 = 60000 or 30000 × 22 = 660000). Most candidates did manage to round one of the initial numbers correctly – usually the 20 being used. A few candidates managed to find both the 30000 and the 20 and then ended up with a wrong answer of 60000 which was ten times too small. Answers without estimates being seen were rare. On the other hand many candidates simply either ignored the bold word **estimate** in the question or simply had no idea what it meant. These candidates then tried to find an accurate answer with varying degrees of success.

2 **(a)** **(i)** Virtually all candidates showed no working out here so gained either 2 marks for a correct answer or 0 marks. A method mark for any two correct equivalent fraction conversions was hardly ever awarded.

(ii) A small number of correct answers were obtained along with a few who managed to find the $\frac{10}{7}$ required for one mark. The vast majority of candidates incorrectly thought that the answer should be $\frac{10}{35}$

(b) A good number of candidates did know that 3^4 meant 3 × 3 × 3 × 3 and wrote this to obtain the first mark. Unfortunately many then wrongly believed the answer should be 12.

3 **(a)** Many correct solutions to this equation were seen, though sometimes written as embedded answers.

(b) Few correct answers were seen to this equation. The most common error was an answer of 2, which most likely came from a misunderstanding that 4*x* actually means 4 + x. Another regularly seen error was to add the 3 to both sides and then end up with *x* = 3. Sadly the majority of these candidates did not score the follow through mark because they did not use algebra in their solution or method and so could not score the M1.

4 **(a)** The large majority correctly obtained the possible totals for the two dice.

(b) The correct probability was often seen with only a few candidates opting to use the wrong terminology such as "6 out of 36" or ratios.

5 **(a)** Almost all candidates managed to find the correct village from the grid reference.

(b) **(i)** Around a third of candidates correctly found 4794 with common incorrect answers of 4795 and 4895 seen in equal measure.

(ii) There were many correct answers here with distances of 8 to 11 km seen. There were also a surprising number of answers such as 450 km or other very large distances seen.

(c) There were very few correct answers here. Nearly 90% of candidates seemed to have no idea what was meant by a bearing, with candidates usually attempting to write another distance when the angle was required.

6 **(a)** Many candidates did manage to understand that an equilateral triangle would have all three sides 6.5cm in length. The question did ask for the triangle to be drawn using compasses and this proved to be beyond most candidates even though some perfect drawings were seen.

7 **(a)** Many candidates managed to score very well in this whole question. A large number of candidates obtained correct values in this table with the 10 being the most successful. The *y*-value when *x* was $^{-}1$ did cause confusion for some candidates with *y* = $^{-}4$ being a common error.

(b) Most candidates managed to plot their points correctly though there were some who only plotted 5 rather than 6 points. A good number of correctly plotted points and correct straight lines were seen.

Section B

8 **(a)** In the first two parts a number of candidates simply mixed up the range and the mean. They gave evidence that they knew what to do procedurally but could not recall which method was required for each part. Some correct answers of 136 were obtained though a few left their answer as 210-74 without evaluating.

(b) There were some fully correct answers with a few simply attempting to find the sum of the values. Some found a total and then tried to divide by 9 rather than 10.

(c)(i) & (ii) Very few correct answers were seen in either part, with many having no idea which figure they should be trying to use in each case. Many of these candidates simply quoted both the mean and range in both parts thus demonstrating that they did not appreciate the significance of either. Some candidates tried to use the appropriate statistical measure but then incorrectly interpreted their figures, interpretation being the key element for these statistics at M5 level.

9 (a) A good number of correct values were obtained sometimes with substitutions and working out shown and other times simply as an answer. An equal number tried to do 3.1 + 2 + 2.7 which was then usually calculated to be 7.8. A small number of candidates did record that 2 × 2.7 = 5.4 without going on to find the required answer.

(b) (i) A significant number simplified to *c* or 1*c*. Unfortunately many candidates thought that the answer was '2' thus showing limited understanding of elementary algebra.

(ii) Some correct answers were seen, sometimes being written as $7x + {}^{-}2$ which gained full marks. Common errors usually led candidates to an answer involving either 17*x* or -10.

10 (a) Most candidates successfully placed the 2 by 3 rectangle in a suitable position. The 5 by 3 rectangle was less successful with some candidates either drawing it as a 5 by 2 or placing a correctly sized rectangle in a wrong place.

(b) Many candidates showed no understanding of the word volume, much preferring to count the squares on their diagram, in effect finding the surface area of their net. There were some correct answers but the majority adopted the surface area approach.

11 (a) Many candidates showed no working, often scoring 0 but in a small number of cases 4 marks. Those who did show their method were much more successful and gained part marks even if they could not gain full marks. Most candidates managed to find the '24' often by finding 10% and then doubling their answer. Most candidates then subtracted their value from 120 although finding $\frac{2}{3}$ of any amount was often a step too far.

(b) A good number of correct answers were seen here with many correctly identifying that bronze was three times gold. A few candidates used percentages to support their argument whilst a greater number of candidates supported their reasoning with reference to angles.

12 (a) (i) This was well answered with many correct answers seen though others left answers with two lines of reflection symmetry.

(ii) Correct answers usually shaded 1 or 3 quadrants though some more attractive designs were also seen. A common error was to shade half the diagram.

(b) A small number of candidates gained both marks here with the large majority gaining 1 mark for 2 or 3 correct answers. Very few got all answers wrong.

B276: Module Test M6

General Comments

Examiners felt that the paper was appropriate for the majority of candidates. A wide range of attainment was demonstrated; some candidates appeared ill-prepared for this module. Many candidates attempted to show their working but it was not always well organised. The vast majority of the marks were between 10 and 35 with fewer scoring above 35 than under 10. Candidates generally performed better on section A than section B.

Algebra and negative numbers caused the usual difficulties but angle properties and translations seemed to be better answered by a larger proportion of candidates than in previous sessions.

Comments on Individual Questions

Section A

1 **(a)** There was a wide range of responses seen by examiners. The most common error was to add numerators and denominators to obtain $\frac{6}{16}$ with some candidates picking up a mark for correct cancelling. Those who appreciated the need for common denominators generally used 12, but 24 and 48 were also seen. Most of those who reached $\frac{8}{12}$ did attempt cancelling and were usually successful.

(b) An answer of 2, from working left to right through the calculation, was far more common than the correct answer of 7. Another common error seen was correctly dividing 6 by 2 but then subtracting 10, leading to an answer of $^{-}7$.

2 **(a)** Many correct responses were seen. The most common error involved squaring 3 wrongly to obtain 6 leading to a final answer of 9. Some candidates unfortunately included *m* in their answers.

(b) Candidates were far less successful with this part of the question. Squaring $^{-}5$ proved problematic for many, with answers of $^{-}25$ very common. Using this value, answers of $^{-}30$, $^{-}20$ and 30 were usually seen and in some cases even the correct answer of 20. Some candidates picked up a mark for 25 if they showed working.

3 **(a)** **(i)** A majority of candidates obtained the correct range of 42 from the stem and leaf although some found random averages eg mean or mode. It was surprising how many slipped up when calculating 62 – 21. It was common to see the range given as 23 – 61 or 63 – 21 as the answer.

(ii) Many candidates struggled with the stem and leaf presentation finding it difficult to isolate the correct middle pair. Others thought there was just one middle number but often scored from it being 36 or 38. Weaker responses displayed little appreciation of the diagram, simply taking just the leaves and writing these out in order, trying to find their median.

(b) There were some good clear statements interpreting the median well. Some errors arose from stating that older members go at a different time to younger members but not specifying the times of day. For some there was confusion over what the figures represent, often taking the median value to be the number of attendees and so statements such as 'more people use the health club in the morning' or 'less people used the club at 7pm' were common. There were also candidates who gave an explanation of what the median is but didn't put it into context eg 'the median would explain which age was the middle age'. A surprising number of candidates appeared to misread 7pm as 7am.

(c) A majority obtained the missing probability for 2 marks. Many of those who did not gain 2 marks benefitted from the SC1 for 0·6 arising from 0·35 + 0·2 + 0·3 = 0·40. Another common wrong answer was 0·4.

4 **(a)** There were fewer correct answers seen than incorrect ones. The most common incorrect answers arose from incomplete simplification to $7 \times p^2$. Other errors commonly seen were $7 \times 2p$ or $2p \times 7$; some went on to simplify these as $9p$.

(b) Candidates found this more accessible than **(a)**. Many correct answers were seen but as always $12x - 5$ was common along with $-8x$ from the correct expansion. A significant number attempted to solve their expression as an equation.

(c) This proved to be the least successful part of the question. Many struggled to understand the term 'factorise' and a wide variety of responses were seen. Some simplified the expression to $5x$ or $-5x$ often showing a step of $2x - 7x$, $-7x^3$, $-6x^2$, $9x$, $x(x - 7x)$ amongst many others. Yet again some attempted to solve the expression as an equation. Many made no attempt at all.

5 **(a)** Many correct responses were seen. A common incorrect reason was 'angles on a straight line'. Some knew that the three angles added to 180 and stated this or showed a calculation but did not complete the reason with the word triangle.

(b) This produced a fairly even spread of marks with slightly fewer gaining one or two marks. More gained the mark for 62 than the mark for the explanation. Those who knew it was something to do with 'Z' or 'alternate' angles sometimes spoilt their answer by trying to elaborate using words like 'opposite' and 'corresponding'. Others know it was related to parallel lines giving reasons such as 'it is parallel to angle D so they are the same'. A common incorrect answer was 110, usually accompanied with the reason 'straight lines add up to 180'. Some candidates simply measured the angle and stated they had done this for their reason.

6 **(a)** The vast majority of candidates translated the triangle correctly. If the answer was incorrect then the triangle was usually displaced from the correct position by one square, either horizontally or vertically. It was very rare to see an enlargement or reflection given.

(b) The mark for 'scale factor 2' was given far more frequently than the mark for the centre of enlargement. Various expressions such as 'double' or 'twice as big' were seen and accepted. Only a small minority earned both marks. Some candidates were providing unclear attempts to describe the enlargement such as '2 squares instead of 1 for all sides' or '2 squares bigger'. Translations were often given, quite commonly with the correct scale factor.

7 Many candidates struggled to make any progress in solving the equation and the majority scored no marks. Some obtained $10x = 15$ but then stopped or attempted to divide 10 by 15. Others found dealing with the $-2x$ term tricky and often ended up with $6x = 15$, sometimes going on to earn some credit for finding the correct follow through solution. Another common error led to $6x = 19$. Many struggled to pick up the follow through mark finding division by 6 difficult. Quite a few lost the equals sign and gave an expression such as $10x + 15$ sometimes leading to an answer of $25x$.

Section B

8 **(a)** Many candidates were successful with the construction and usually picked up two or three marks. A mark was frequently lost for an inaccurate 48° and less so for the 10cm or 6cm.

(b) Measurement of the obtuse angle at S proved difficult for many. There were many cases where candidates read from the wrong scale on their protractor or counted the wrong way from 110°. Consequently less than half of candidates picked up this mark. The notation 'angle PSR' caused some problems with candidates giving all three angles or the total of all three as their answer.

9 **(a)** Candidates were usually successful in plotting both points. Where errors occurred (2·5, 235) was more frequently plotted inaccurately.

(b) This was well answered by the majority of candidates. Most referred to engine size and emissions rather than stating positive correlation. Some lost the mark by simply stating 'positive' or 'positive relationship'.

(c) Many scored here although not as many as in part (b). Only a minority answered without using a line of best fit.

10 Those who attempted this question usually struggled since they were not given values of x. However they usually scored some marks. Some were able to complete the table correctly and plot the points correctly but then did not join them up. Those with errors in the table often benefitted from plotting their points correctly. A small number of candidates unnecessarily extended the table and used all integer values of x from 0 to 10.

11 **(a)** Many candidates struggled to simplify the ratio fully. Many who attempted it picked up one mark for a partial simplification such as 375 : 225, 75 : 45 or 15 : 9. Surprisingly, many candidates cancelled a zero from each number followed by cancellation of the digit 5 leaving an answer of 7 : 4.

(b) In most cases responses tended to earn either 2 marks or none at all. The most common error was $840 \div 3 = 280$ followed closely by 210 correctly calculated but then going on to do something else with it, such as $\times 3 = 630$ or dividing again, usually by 2.

12 **(a)** Almost half of the candidates failed to get anywhere with this question. Many did not enter the numbers as a single calculation but often gave answers to the numerator and denominator separately. This was followed by a variety of calculations including addition, subtraction and even multiplication. Some did divide correctly to obtain 6·465 but then failed to round correctly to one decimal place. Some truncated the value and others simply moved the decimal place to give 64·65. Those who evaluated incorrectly could earn a mark for correctly rounding but many experienced the same problems as those with the correct answer.

(b) Surprisingly, about two in every three candidates did not obtain the correct answer. Despite the hint in the question many still gave the answer as 2h 25min. In many other cases there was a wide variety of answers. Some calculated 2·25 × 60 to obtain 135 and then gave an answer of 1h 35min. In many cases the number of hours was not 2.

Candidates may benefit from being shown how to use the button marked ° ' " on their calculators to help with calculations involving time.

13 **(a)** The majority struggled to cope with this calculation. It was common to see 17·5 ÷ 500 and sometimes 17·5 × 500. It was very evident that many candidates did not attempt to relate their answers to the real-life situation. Many did not attempt the question.

(b) Again, many struggled with the requirements of the question or made no attempt at all with the vast majority scoring no marks. Some candidates picked up a mark for calculating the amount of feed used and others a mark for the area that could be covered by the remaining feed. Only a small number earned all three marks. A common error was 180 ÷ 17·5. Yet again, many candidates did not relate their answers to the real-life situation, with some answers greater than 17·5kg.

14 Candidates struggled to score any marks on this question. It was evident that many did not realise that the volume of water in the two positions was exactly the same. Many calculated the volume of the container and not the water. A few picked up a mark for 35 × 30 × 12 = 12600, but rarely went on to score any further marks. Many offered answers in the 20's, such as 35 – 8 = 27 or 35 – 12 = 23, often with no working. Only a few candidates successfully worked with the fraction filled by water or with the volume of the empty space.

B277: Module Test M7

General Comments

The paper as a whole appeared to be challenging but accessible to all candidates. There seems to have been no problems with time and most candidates were able to attempt the majority of questions. Poor arithmetic skills seem to have let many candidates down, notably in question 4. Questions with which candidates had misconceptions were question 7 when sometimes they constructed the perpendicular bisector not the angle bisector and question 10 where most had no idea what was required, with many not realising the question involved the area and circumference of circles.

Comments on Individual Questions

Section A

1 **(a)** This was a straightforward first question with many simplifying the ratio correctly. Very few failed to score at all.

(b) Again, the majority of candidates achieved both marks here. A few understood what they had to do but failed to read/answer the question properly, thus losing a mark. Most incorrect answers were due to not knowing what to do rather than through calculation errors; if they found '9' they didn't then use it.

2 **(a)** Plotting the points accurately proved difficult for many candidates, making errors in using the scale. Some did not attempt the first part.

It seemed that the majority of candidates failed to describe both the strength and type of correlation, as requested. Often, 'positive' was offered without an indication of strength. uite a few described the strength as 'weak'. A few used a sentence such as 'one value increases as does the other'.

Many drew a good line of best fit although some assumed that it needed to go through the 'origin'. Most candidates then successfully read the value from their line.

(b) The majority of candidates seemed not to understand the concept of lower bounds, with the correct answer seen rarely. Often answers such as 540, 500, or 541 were seen instead of 541·5.

3 **(a)** Many candidates knew how to solve an inequality and had a correct step in the solution, although gaining both marks was achieved by only about a quarter of the candidates.

(b) Many candidates were clearly familiar with this type of sequence question, with a correct expression often seen. There were plenty of good annotations of the sequence with '+5' but many candidates failed to convert these to the correct nth term. A small number of students reversed the numbers and gave $16n + 5$ instead of $5n + 16$.

4 **(a)** Many candidates appeared to recognise the word 'reciprocal' with '1/5' often appearing. However, there was less success in converting the fraction into a decimal with 0·5 seen far more often than 0·2.

5/9 was often worked out as 9/5, with 1·8 being a popular answer. Those who did 5/9 often could not cope with the division. A fully correct, recurring answer was seen rarely.

(b) In part (i) attempts to multiply out were made and 5^8 was seen, but on the whole this was successfully achieved, with many realising they simply had to add the indices.

In part (ii), just over half of the candidates knew they had to subtract the powers (or expanded and cancelled correctly) and gained the mark.

5 Only a small minority of candidates had no idea how to expand the brackets. A grid was often seen and many managed to pick up at least one mark. When mistakes were made, it was generally involving the – signs. The foil and grid methods were seen fairly regularly. Common errors in a grid were +15 and +3*x*. Some thought that *x* multiplied by *x* was 2*x.*

6 **(a)** Many candidates achieved the correct answer, cancelled or left as 50/200, although 200/50 and 1/6 were also seen and some gave an incorrect form such as 1 in 4 or even 4.

(b) Many wrote a lot but did not mention 1/6 or 33 etc . The quality of written communication was often poor. There were some rather garbled explanations; some suggesting that the candidate knew what they wanted to say but coherence was beyond them. The better comments often quoted the correct probability, but there were other types of good comment such as 'on a fair dice you would expect 50 sixes in 300 throws not 200'. Several candidates left this question blank

7 Constructing the angle bisector was neatly and successfully done by just over a quarter of the candidates. The ends of the lines were sometimes used as centres for the arcs. A few tried to disguise their use of a protractor with some random arcs. Some constructed the perpendicular bisector of both lines. Examiners wondered how many candidates did not have a pair of compasses in the examination.

Section B

8 **(a)** This was generally answered well. Most candidates scored full marks and many others scored 1 mark for 8*n*. It was pleasing to see that few candidates missed the *C* from their formula. Quite a number of candidates included £ signs in their formula and/or put 8 × *n* rather than 8*n*. Common errors seen include 10*n* + 8 and 18*n*, both with and without pound and multiplication signs.

(b) Using the formula was generally done well. Some used trial and error methods, often failing to complete the working. Very few candidates were awarded 1 mark, mainly due to no working being shown. Common wrong answers seen included 33 (200/6), 24 and 18 when candidates used £8 from part (a).

9 Most students scored at least 1 mark, calculating angle ABC = 81°, and then usually correctly getting *p*. There was a great variety in the quality of explanations resulting in a range of marks awarded. Most correct answers did use the 'angles in a triangle' and 'corresponding angles' route to the correct answer, although many students neglected to explain the angles in a triangle, showing just the calculation, and many did not use correct vocabulary relating to angles and parallel lines. Students were generally comfortable with using the diagram to help with their calculations. The most common wrong answers were 42 and 99. A few students also stated that the 42 corresponded to *p*.

10 **(a)** Candidates found this multi-step question very difficult. They got in a tangle with all the information and most did not find the circular area at all. There were very few fully correct answers to this, with many scoring 0 having no idea how to start, some guesses and some random calculations using some of the numbers from the diagram. In fact most students did not realise that this question had anything to do with circles. The most common way of scoring a mark was to take a number and multiply by 8/10, many of these starting with an area of 18 to arrive at an answer of 14·4. Most of the minority of candidates who did attempt to calculate the area of the circle did not then multiply by 8/10. A very large number of candidates decided on an area and then divided by 8, thus gaining no marks.

(b) Many of the errors and misconceptions from part (a) were repeated in part (b), Most had no idea how to find the curved surface area of the cylinder (or did not realise that it was required), hence very few scored full marks. Many of those who had scored 1 mark in part (a) got 1 mark here for 3·5 or 63 for the same reason in part (b). As well as failing to find the required area, the majority of candidates who had a method at all tried to divide their area by 5.

11 **(a)** Completing the table was generally well done, with common incorrect answers being −2,−2 and −4,−4. Some were undeterred by obtaining values such as 7 which did not fit on the grid.

(b) Most candidates scored at least 1 mark here by correctly plotting the points or following through from their incorrect points. Many good curves have been seen, however a significant number of candidates drew no curve. The most common mistake when the correct points were plotted was to join the points using a ruler, or to have a flat-bottomed curve; a few did have curves of a good shape but which missed one or more points.

(c) As usual a surprising number of candidates seemed to think that the curve intersected the axis only once, with relatively few giving two correct values. There were many who omitted this part, particularly if something had gone wrong previously in the question. Some candidates without curves offered solutions and on a few occasions even scored both marks by estimation.

12 **(a)** Many knew how to calculate an estimate of the mean and scored 4 marks for a fully correct answer. Many scored 3 marks for a fully correct method let down, even with a calculator, by poor arithmetic often brought about by poor layout, adding figures that were not aligned correctly or by early rounding or truncating. Most other candidates were able to make a start on this question and often scored two marks for finding the midpoints and multiplying midpoints by the frequency. Candidates lost marks by dividing their total by five or doing the division the wrong way around. The most expensive average price of a cup of coffee seen was £149!

(b) Finding the percentage increase was very badly tackled in general, with very few correct answers seen. The most common approach was to find the difference 0·15 and then give that as an answer or to multiply it by 100 and give an answer of 15%. There were some half-hearted attempts at trial and improvement. Among those who followed a correct method, several then failed to correctly round to the requested one decimal place.

B278: Module Test M8

General Comments

The entry was polarised between some very strong responses and some that struggled to answer any questions and it seems appropriate to suggest that they were trying to improve results from a previous attempt or to improve on their M7 result. Some candidates did not finish their sections and it is not clear whether they did not have enough time or they could not do the latter questions.

In section A many struggled with the first question, on algebra, and this was partly due to them not maintaining a balanced equation. The statistics and transformation questions were attempted reasonably well but the simultaneous equations question was not well answered.

In section B some candidates did not use a calculator, which was a handicap in the first question particularly. The knowledge of trigonometry was weak; many attempted to use Pythagoras' Theorem with the angles as lengths. It was surprising that many could not put numbers in standard form into their calculators correctly and many wrote the correct sum but obtained an incorrect answer. Again the statistics question was done relatively well. As expected the questions on dimensions and gradient of a straight line also had many struggling.

Comments on Individual Questions

Section A

1 **(a)** There were very few candidates who could rearrange the equation. Many failed to keep the structure of an equation and an equals symbol was not seen even on the answer line. Common errors were $6x + 4x = +/- y + 1$ and $6x – y +/- 1 = 4x$ leading to $(6x – y +/- 1)/4 = x$ together with variations on these. Answers of the form $x = (y+1)/(6+/- 4)$ were also seen.

(b) **(i)** This showed a very weak understanding of the order of operations in equations.

Those who cleared the fraction by multiplying by 2 often failed to multiply both terms on the right hand side. Many 'moved' $2x$ and 3 across to the other side as if the fraction did not exist. Confronted with simplified expressions such as $3x = –1$ and $11x = 5$ for example, negative signs were ignored and answers such as $x = 3$ and $x = 11/5$ were common.

(ii) This was by far the best answered part of question 1, with most candidates being able to factorise correctly and the majority of those also giving the correct roots. A few gave the factors as $(x – 7)(x + 3)$. Other pairs of numbers used were 4 and 7 and 1 and 21. Some candidates introduced a square root into their working as if trying to use the quadratic formula but without any idea of what they were doing.

2 **(a)** Many completed the rotation correctly but some rotated clockwise. Tracing paper was used and some minor errors happened due to shifting paper or the use of the wrong centre, especially the origin.

(b) Those who did the rotation correctly often then counted the translation incorrectly by an extra square in each direction. Those who rotated in the clockwise direction often then did the translation -5 in the horizontal direction and -1 in the vertical direction.

(c) Those candidates who did the first two parts correctly usually answered this part correctly also.

3 Usually the higher scoring candidates answered this question correctly. Wrong working included answers of 6 ⅓ from 2 × 3 = 6 and ½ × ⅔ = ⅓. Other common wrong working was incorrect conversion to improper fractions, for example $^{8}/_{3}$ instead of $^{11}/_{3}$, incorrect attempts to put both fractions over a common denominator and failure to multiply both numerators and denominators, so working like $^{15}/_{6} \times {}^{22}/_{6} = {}^{330}/_{6}$ was seen. A few candidates confused multiplication with division and they inverted the second fraction then multiplied.

4 Weaker responses usually involved incorrect trial and improvement. Most knew they had to multiply the equations; some multiplied only one equation. When both the equations were multiplied sometimes the candidate would then forget to multiply the number on the right, or they would choose the wrong operation, or make errors in the *x* coefficient.

5 **(a)** This was usually well answered except that the maximum value was often plotted at 5.5 and not at 6.

(b) The median was generally found well, except by those who gave 1.5.

(c) Usually one mark was awarded as some comments made the same comparison twice, some failed to link the comment with the context and many confused 'average' with spread.

Section B

6 **(a)** Disappointingly, many candidates used a method where they worked out each year's total separately. They would often incorrectly write 1.32 as the multiplier or do 3.2 × 3 to get 9.6 and then use that as the multiplier. Rounding or truncating was done before the end value reached so errors were seen in the working. Simple interest was often calculated.

(b) The common errors were to use the incorrect factor such as 1.08 or 0.08 or to multiply by 0.92. Many candidates failed to realise that the answer should be higher than the given value.

7 **(a)** Few answered this part correctly because, as the equations were not all written in the same format, most could not distinguish the gradients in the equations from the intercepts. A and D were popular answers.

(b) Some candidates appreciated that parallel lines had the same gradient even when they were unable to determine the gradient. For example, many thought that lines with gradients -3 and 3 were parallel.

8 **(a)** This was poorly answered. Many thought the first one was 'none' as it had four components, the second one was more successfully answered but many thought it was an area.

(b) Common responses often included "areas have to involve either π or a squared term". There were very few answers that addressed the counting of the dimensions.

9 **(a)** This was answered well, the few who did not gain full marks usually calculated 1 ─ 0.42 incorrectly or they changed the probabilities in the 'second shot' column.

(b) Many identified the correct path but they added the probabilities instead of multiplying them.

10 **(a)** Most candidates answered this correctly but a few either ignored the powers of ten or they did not know how to use a calculator for standard form.

(b) The majority attempted this question, as it was intended, by working out the population density as defined in the question. Some of these did not obtain the correct answer from their calculator. Some worked out the land area per person but usually they chose the highest value which was China in this case. Others found the difference between the population and land area or they would just use the actual population and again choose China.

11 **(a)** The two main methods were (i) to put angles on the diagram and most either stopped at 34 for angle CBN or they put 34 at angle ACB, or (ii) they noticed that the two bearings subtracted gave 90. It was a pity that most did not realise that angle BAC was 34 and instead often wrote it as 124.

(b) Many used Pythagoras' Theorem with the angles as lengths or they used trigonometric functions with obtuse angles. Some failed to use the fact that ABC was a right-angled triangle.

B279: Module Test M9

General Comments

The entry for this session had changed on previous years with predominantly year 11 candidates taking the exam and a much smaller number of year 10 candidates this time. Although there were a number of excellent candidates scoring highly on the exam, they were fewer than in previous June sessions, and for most this level was stretching their understanding of the mathematics.

All candidates appeared to have sufficient time to complete the exam and standards of presentation and inclusion of working were as expected at this level.

The topics that were tackled best were parts of indices and standard form, similarity and length calculations, interpreting histograms, simplifying rational expressions, stratified sampling and probability.

Areas that were less well understood were calculations involving bounds, algebraic verification from a problem, gradients of a line and the relationship with a perpendicular line, similarity and area, angle properties of circles and the graph of an inverse proportion relationship. Arithmetic on section A was weak for a number of candidates.

Comments on Individual Questions

Section A

1 **(a)** This was answered very well. There were occasional incorrect answers of 0 and 64 given.

(b) There were a number of successful candidates but considerably fewer than part **(a)**. Some interpreted the negative index correctly but left an answer of $\frac{1}{6^2}$. Others did not understand the negative aspect of the index and gave answers such as –36, -12, or even $-\sqrt{6}$.

(c) This proved the most difficult part and was omitted by a number of candidates. A number recognised the index as meaning $\sqrt[4]{16}^3$ but were unable to evaluate this correctly. Some were able to find the fourth root as 2 but then multiplied by 3 instead of cubing. Some confused the numerator and denominator of the fractional index and attempted $\sqrt[3]{16}^4$. The most common incorrect answer was 12 from $16 \times \frac{3}{4}$.

2 There were a number of excellent answers that fully resolved the fraction and gave an answer of $r = \sqrt[3]{\frac{3V}{2\pi}}$. Others understood the order of the process but left the fraction unresolved and gave answers of $r = \sqrt[3]{\frac{V}{2/3\,\pi}}$ for which they scored two out the three marks.

A method mark was available for those candidates who were able to show one correct step in working. Many picked up one mark only usually for dividing by π at some stage or for cube-rooting at the final stage. A number made the error of cube-rooting at the first

stage however and, when considering inverse operations, subtraction of terms rather than division was also a common error.

3 Most candidates worked with the values in standard form and did not attempt to convert to decimal form. There were a number of correct answers with candidates rounding the values to one significant figure and then using the rules of indices to calculate the product. Many left their answer as 32×10^{16} and did not complete this to give their answer in standard form. Common errors included multiplication errors eg $4 \times 8 = 28$, errors with the indices, errors with rounding eg 4·093 = 5, and some who did not estimate but attempted to find the answer to the full calculation.

4 Most candidates considered the bounds of both 66 and 66.3 when calculating their answer. Only a small percentage scored all three marks, however. Many were able to show the correct upper and lower bounds of both values but the most common error was to use both upper bounds to find the upper bound of the difference and 66·5 – 64·35 = 2·15 was a common answer. Some used the upper bound of 66.5 and subtracted the lower bound 64·25 but were unable to calculate the difference correctly. Other common errors included 66 – 64·3 = 1·7 then 1·75 as the answer or adding bounds together eg 66·5 + 64·35 = 130·85.

5 This question discriminated well. Many were well prepared and found the areas of each bar correctly before adding. There were a surprising number of arithmetic errors when evaluating the products and finding the total but most earned a method mark for writing the products down. Others were unable to read the horizontal or vertical scale correctly and made errors with the widths of the bars and the heights on occasions. The height 5.8 was commonly misread as 6.8.

A few did not understand that the area of each bar represented the frequency and they attempted to add the heights of each bar.

6 **(a)** This proved very challenging and many were unable to link the expressions for the dimensions of the rectangle to the area of 18 to make an initial statement. Some attempted the product of $(2x + 5)$ and $(x – 2)$ and gave the correct expanded expression but were unable to make further progress. A large number began with the equation to be found, $2x^2 + x – 28 = 0$, and attempted to factorise it or work backwards.

(b) **(i)** This part discriminated achievement well. A number obtained the correct factors but then did not go on to give the solutions, thinking that the next part (b)(ii) was requiring these. Some made errors with the signs but had the 'correct' pairings. Others were able to produce a pair of factors that gave two correct terms when expanded, eg $(2x + 14)(x – 2)$, for which there was some credit. A number of candidates had little idea of how to factorise and attempted inverse operations methods suitable for solving linear equations.

(ii) Only a few candidates were successful here. A follow through was allowed from the answers to the previous part provided a positive and negative answer was given. Many gave the answers as the solutions to their factors from (b)(i). A few had the correct idea and chose the positive root but there were occasional arithmetic errors in the evaluation of the length and width of the rectangle. This part was omitted by 18% of candidates.

7 **(a)** A few worked with the coordinates, but many attempted diagrams which was accepted provided the vertical change of 6 and the horizontal change of 3 were used in the explanation. Some incorrectly attempted horizontal change divided by vertical change e.g. $\frac{-3}{6} = -2$. Others found combinations of values to give ⁻2 eg 3 – 5 = ⁻2.

(b) Many were able to give an equation of the appropriate form with the constant + 5 for which there was some credit. Only a small percentage understood the relationship between the gradients of perpendicular lines and gave the correct gradient of $\frac{1}{2}$ in the equation. Common errors included gradients of ⁻2 or 2.

This part was omitted by 18% of candidates.

Section B

8 **(a)** This part was well received by most candidates who recognised the difference of two squares. Some incorrectly gave $(x - 4)^2$ or $(x + 8)(x - 8)$, and few went onto give 'solutions' after giving the correct factors, which examiners condoned.

(b) Many recognised the need to factorise the denominator of the fraction before cancelling any common factors and were successful in completing both aspects. Some made sign errors in factors of the denominator e.g. $(x - 1)(x + 4)$ but then cancelled their factors for which they received credit for the cancelling. A follow through was also allowed from an incorrect part (a).

Some attempted to cancel without factorising or having obtained a correct answer then incorrectly cancelled further.

9 Many recognised the need to work with proportions here and most were able to calculate the proportion of 'over 40's' in the workforce and used this with the sample size of 100 to obtain 17·6. A few did not then interpret this in the context of the question and earned only 1 mark. A common error was to divide the total workforce by 3600 to give an answer of 5·66… or to divide 3600 by 100 to give 36.

10 **(a)** This was well answered. Most candidates obtained the correct scale factor of 1·25 and many selected the correct corresponding length of 10 cm to use this with to give a correct answer of 12·5 cm. Some chose the 9 cm length and gave an answer of 11·25. A few had little idea of similarity and added 3 to 10 to give 13 presumably because 15 – 12 = 3 also or attempted to use right-angled trigonometry to find the missing length.

(b) Only a few candidates were successful here. The majority worked with the linear scale factor from part (a) and divided 68.81 by 1.25 to give 55.0.. . Those that recognised the area scale factor of 1.25^2 invariably went on to obtain the correct answer.

Some attempted area calculations using the trig area formula but usually with an incorrect angle. There were a very few that used a fully correct longer method e.g. using the cosine rule to find the enclosed angle and then the trig area formula.

11 **(a)** Many candidates obtained the value 65° for the required angle but only a very few were able to support their answer with a precise geometric reason using the correct terminology. Some candidates had clearly learned the alternate segment theorem and used this reason despite the absence of a tangent on the diagram, others mentioned 'bow ties', sectors, alternate angles or corresponding angles which were all incorrect. Some attempted to use the reason involving cyclic quadrilaterals but omitted the key word 'cyclic' from their explanation.

This part was omitted by 11% of candidates.

(b) Only a few candidates obtained the correct angle of 25° from a valid method. Many however recognised that angle ABC was 115° or angle ABD = 90°, often by annotating the diagram and they received some credit for this. Some obtained 25 through a false assumption eg angle ABD = 65° and angle ABC = 90° and then 90° – 65° = 25° for which they did not receive credit. Omissions were more frequent in this part. Other common incorrect answers were 32·5° or 65°.

This part was omitted by 12% of candidates.

12 **(a)** Well answered. Most completed the tree diagram correctly. A few added extra branches to the 0·6 branch of the tree diagram, which examiners ignored.

(b) Many obtained 0.88 and showed a correct method. There were a variety of incorrect methods shown as well. Some multiplied all 3 probabilities ie 0·6 × 0·4 × 0·7, Others added when they should be multiplying probabilities and vice versa even when the answer gave a value greater than 1 eg 1·3. The most common error was to use 0·6 × 0·7 however.

13 Those who recognised the graph's shape was that of $y = k/x$ were usually able to sketch an acceptable pair of curves. Some drew in the first quadrant only. Many attempted graphs of other functions, however, and linear, quadratic and cubic graphs were often seen.

14 The majority of candidates recognised that Pythagoras' theorem was required to obtain the vertical height of the cone. Some were unable to use Pythagoras' theorem correctly however, adding instead of subtracting the squared values. Those who obtained the height of 24 cm invariably went on to find the volume of the cone correctly. The most common error was to use the slant height of 26 cm within the volume formula. Other common errors included finding the curved surface area instead of the volume or miscopying the formula from the formula page eg Volume = $\frac{1}{3}\pi r^3 h$.

B280: Module Test M10

General Comments

A wide spread of performance was seen on this paper, with fewer high scoring candidates and more very low scoring candidates than in recent sessions. There were some very good candidates with excellent skills who presented accurate and well written answers. However there were also many candidates who showed limited understanding of the topics on this paper.

In many questions candidates appeared to have met the topic but their understanding was shallow and misconceptions were evident, particularly when algebraic manipulation was required. Two other particularly weak topics were transformation of graphs and using vectors to interpret a geometrical situation.

Two questions on the paper required candidates to set up equations prior to solving them. Many candidates started with these equations rather than starting with the information provided, manipulating the algebra and concluding with the equation. Also, in the similarity question candidates would have been better advised not to use the value of SR at the start of their response.

Comments on Individual Questions

Section A

1 (a) (i) Most candidates scored 1 in this part, though many did not spot the obvious 2/3 and went for the 10*x* = …approach. It was more common then to see the answer as 6/9 rather than the cancelled version of 2/3. A number of candidates gave the answer of 6/10.

(ii) Only a minority of candidates were successful on this part with few recognising that they simply needed to divide the previous answer by 10. Many started from scratch again, but it proved harder to produce 6/90 from $0.0\dot{6}$ than to produce 6/9 from $0.\dot{6}$, and the extra zero caused many candidates to make an error in their working even if they understood the basic method.

A common wrong answer in this part was 6/99, sometimes just written down with no explanation and sometimes more clearly following the error of thinking that the decimal was 0.060606… .

(b) Few candidates scored full marks in this part. The most common answer given was 76/99 earning the special case mark. Others scored a method mark for reaching the correct but not simplified fraction or for a correct method. A few candidates attempted the method 7/10 + their 2/30 but more attempted to multiply 0·76 recurring by 10, 100 and 1000 but often errors arose.

2 (a) Few candidates answered this part successfully. About a quarter gained a part mark for showing partial factorisation or cancelling. However they then proceeded to spoil this step by, for example, wrongly 'cancelling' $\frac{3x^2+x}{2x}$ to give $\frac{3x^2+1}{2}$, or similar. Many others made totally incorrect first steps such as multiplying the numerator by the denominator to reach $4x(6x^2 + 2x)$ or reducing the numerator to a single term

(either following some incorrect 'cancelling', or because it was assumed the two given terms could be 'added' directly) to reach $6x^2/2$ *or* $8x^3/4x$.

(b) Candidates were more successful in this part. The majority recognised the need for a common denominator and reached the correct numerator. Some did, however, write $3(x + 2) + 7x$ as $10x + 2$. Many candidates having reached $\frac{10x+6}{x^2+2x}$ proceeded to 'simplify' this further, usually by some sort of 'cancelling' leading to an expression such as $\frac{8x+6}{x^2}$.

3 **(a)** The majority of candidates interpreted this question correctly and wrote a statement involving the squares of the three sides. However for some this was an incorrect Pythagoras statement, such as $(x + 4)^2 + (2x + 1)^2 = x^2$. Generally candidates then proceeded to expand the two binomial terms correctly but they sometimes forgot the x^2 from the third side. Those who started with

$(x + 4)^2 - (2x + 1)^2 = x^2$ often then wrote $x^2 + 8x + 16 - 4x^2 + 4x + 1$.

(b) A significant proportion of the candidates omitted this part and many others failed to appreciate that they needed to solve the equation in part **(a)**. Some candidates who realised they should start with the equation $4x^2 – 4x – 15 = 0$ unfortunately did not seem to recognise this as a quadratic equation. However candidates who attempted to solve the equation by factorising were often successful, though quite a few examples of wrong factors were also seen (and indeed wrong answers from correct factors). Attempts using the quadratic formula often contained errors and the very occasional attempts using completing the square were virtually always wrong, as candidates could not cope with the coefficient of x^2 being greater than 1. Candidates obtaining one negative and one positive value of x from the quadratic often failed to identify the positive root as the unique answer to the question actually asked.

4 Attempts at this question were mostly poor, and few candidates got the right answer. One of the major errors arose because candidates thought that a fraction could be 'simplified' by multiplying the numerator by the denominator; hence many solutions merely consisted of trying to evaluate $\sqrt{3}\left(12+\sqrt{3}\right)$. Candidates who tried to multiply both numerator and denominator by $\sqrt{3}$ were often let down by a poor understanding of basic principles, eg writing $\frac{12+\sqrt{3}}{\sqrt{3}}\times\frac{\sqrt{3}}{\sqrt{3}}$ correctly enough, but then evaluating the numerator as $12+\left(\sqrt{3}\times\sqrt{3}\right)$ instead of $\left(12+\sqrt{3}\right)\sqrt{3}$. Those who got as far as $\frac{12\sqrt{3}+3}{3}$ correctly still often contrived to go wrong, eg by 'cancelling' wrongly, or even at this stage resorting to multiplying numerator and denominator. Some candidates tried a different simplification method, eg trying to re-write 12 in some kind of factorised form in the original expression. However, such attempts often went wrong immediately, eg because candidates confused 12 with $\sqrt{12}$.

5 **(a)** Throughout this question candidates demonstrated weaknesses in their understanding of the transformations of graphs. In this part about a third used the correct translation. Answers of (7, -2) and (4, 1) were common errors.

(b) Nearly half the candidates reached the correct (4, 1). Common errors were (7,1) and (7, -2).

(c) Few candidates gave the correct coordinates. Many clearly recognised the need to multiply by 3 but answers of (12, -6) and (12, -2) were as common as the correct (4, -6).

6 **(a)** Most answered **(i)** correctly, using the correct vector notation. Part **(ii)** was also well answered although many failed to simplify their answer, which might have helped in **(b)**.

(b) Fewer than half of the candidates were able to use **(a)** to communicate a correct deduction about the points A, B and C. Very few stated that A and C were equidistant from B and that A, B and C were collinear. Some candidates failed to score because of poor communication – for example 'they are equally spaced' without reference to specific points or 'they are all parallel' without referring to lines. Weaker responses included wrong or irrelevant statements such as 'they are all different lengths' or 'they all start from O'.

7 Only about a quarter of candidates scored full marks in this part. Those who had a basically correct idea of the method almost always correctly added the two given profits for 2009 and 2010, but occasionally used the moving average from 2008 (or some other year) instead of the relevant one from 2009. However, many others appeared really to have little idea of how to handle moving averages, and showed mainly rather aimless-seeming working that was very hard to follow; usually they seemed to be trying to find an average of three numbers taken from the graph, or else were calculating year-to-year changes in (average) profits.

Section B

8 **(a)** This part was omitted by about a quarter of the candidates and many others failed to score as they just tried to manipulate the given expression or to solve the equation. About a third gained full marks for this part. The majority of candidates who recognised that they had to substitute $y = 3x - 5$ into the circle equation wrote a correct equation with brackets in the correct places. Most went on to expand their brackets correctly; the main errors in expansion were omitting the 'x' in $-15x$ or $-30x$, or ending with – 25 instead of + 25. At this stage some then ceased to complete the equation, omitting '= 16'.

(b) Just over half of the candidates scored in this part but some errors did arise. The main error in using the formula was to use $b = +30$ rather than $^{-}30$. This sometimes led to $^{-}2{\cdot}66$ and $^{-}0{\cdot}34$ but often to completely wrong answers as $^{-}30^2$ was evaluated as $^{-}900$. Using the 'short line' instead of the long line and forgetting to use the denominator led to various wrong results.

9 **(a)** Only about a quarter of candidates realised that they just needed to use similarity. Many failed to calculate the total slant height of 60. Some simply wrote 40 – 24 = 16. There was much wasted calculation of trapezium areas, volumes or surface areas of cones and use of Pythagoras' theorem. A few candidates tried to use a scale factor of 1·5, but frequently arrived at it for the wrong reasons.

(b) This was answered correctly by many more than in part (a) and the majority knew they should use πrl. The problems arose in choosing r and l. Some wrong answers came from working with the diameters rather than the radii. Others came from using the partial slant height, for example $\pi \times 20 \times 36$, leading to the common wrong answer of 2261·9.

10 **(a)** A large majority of candidates appreciated that the probability was 0 and gave an adequate reason. Incorrect answers included giving non-zero probabilities or stating 'impossible' or 'never', rather than 0.

(b) The most common, valid, working seen was a list of all ten outcomes that gave a multiple of 9, although the impossible 99 was sometimes included as an 11th outcome. Fewer candidates realised that there were 90 possible outcomes, with totals of 81, 91, 98 and 99 being common alternatives. However, there was evidence of good approaches to identifying the 90, such as $^{1}/_{10} \times {}^{1}/_{9}$.

11 About a quarter of candidates gave a fully correct answer. Many other candidates scored either 2 marks, usually for correctly obtaining both totals (38 and 40), or 3 marks for correctly obtaining one percentage but with an error in the other. Some candidates, having correctly obtained both $^{38}/_{70}$ and $^{40}/_{78}$ failed to show any form of comparison to support their final selection. Candidates who used a counting squares approach had reasonable success in finding the totals above £8000, but it was rare to see attempts at the overall totals by this method. There were also a large number of very confused attempts. Obtaining frequencies merely by summing the heights of the bars, or thinking frequency = (frequency density)/(class width) were quite common amongst low scoring candidates.

12 **(a)** A large majority gave the correct answer of 4. The usual incorrect answer was 343 (from 7203 ÷ 30 ÷ 7). Some embedded answers were seen in this part and the next.

(b) Candidates found this part more difficult but a significant number scored at least 1 mark. Most of the successful answers began with $25^{n} = 1/5$, which at least gave them the chance to get the power as 0·5. Those who wrote $25^{n} = 0{\cdot}2$ generally either stopped at that point or went on to obtain answers through trial and improvement.

13 About a quarter of candidates achieved full marks. Others struggled to apply the necessary initial, straightforward, geometrical reasoning needed to find angle ASB. However, many attempts to use the sine rule did not involve the angle ASB; they just involved angles of 26, 35, 64 or 90 and occasionally 125 with no indication of where the angles were placed within the triangle so could not gain method marks. A variety of non-productive attempts were seen, with the cosine rule (despite having only one length known) and attempts to divide the diagram into right-angled triangles being common.

B281: Terminal Paper (Foundation Tier)

General Comments

This paper discriminated well. Examiners were pleased to see that few scored below 10 marks in each section, and that some scored in the 40s in each section. In general, section A was found to be more accessible than section B.

In both sections, an inability to do algebra was demonstrated by some candidates. Manipulation of algebraic expressions and also of negatives in both the algebra and the arithmetic questions were a problem for low scoring candidates.

As always, problems in reading and understanding the requirements of a question and expressing ideas in written answers were evident. Where candidates did not show working, method marks were lost where the answer was wrong; however this year there were some questions, such as question 16, where working was needed and this was often set out clearly.

Comments on Individual Questions

Section A

1 **(a)** Writing the number in words was generally well done, with the few errors being usually the inclusion of million for thousand or hundred.

(b) Nearly all candidates realised that they needed to subtract or 'count on', and most did so correctly. Some incorrect subtractions led to 58 or 78.

(c) This was almost always correct, with very few rounding to the nearest hundred or thousand.

(d) Almost all correctly identified the largest number.

(e) In **(i)**, candidates either added correctly or reached an answer of 23 from adding the cost of one adult and one child instead of two adults and one child. Many correct answers to the time problem in **(ii)** were seen. Few method marks were awarded as working was seldom seen, and candidates who had made errors usually had the hour correct with incorrect minutes. Some did not convert minutes to hours and minutes and added 90 to 1015, reaching an answer of 11:05.

2 **(a)** Candidates were often correct here in expressing 30% as a decimal, giving either 0·3 or 0·30. Common errors were to answer 3·0 or 30·0 and occasionally 0·333… or 0·03. Very few gave the answer as a fraction.

(b) Expressing $\frac{3}{5}$ as a percentage was less well answered than **(a)**, with a range of incorrect percentages seen including 35%, 75% and 15%.

(c) Candidates had some difficulty with finding 20% of £42, many struggling because, rather than finding 10% and doubling it, they started by calculating 50%, 25% etc and trying to estimate 20% from there. Some candidates reached the correct answer but used the incorrect money notation of 8·4 rather than 8·40.

3 **(a)** In identifying the shapes, the first part was well answered, although many candidates struggled to spell hexagon. Common errors were pentagon or octagon. The second part was less well answered with rhombus, trapezium, rectangle and quadrilateral being common alternatives.

(b) Many candidates drew a correct shape, although some rotations or reflections of the original or shapes using more than six triangles were seen which did not score. Some 6 triangle shapes had 2 lines of symmetry and creating a parallelogram was quite common.

(c) Some candidates struggle with rotation symmetry, and answers of 4, 0, 180, clockwise, and 2 lines were all seen.

(d) Almost all candidates completed the table correctly. Many correct answers with an acceptable reason were seen for the number of triangles in Pattern 6, although some explanations did not make it clear that the 'add 4' was repeated. The most common error was 28, from doubling the result for pattern number 3.

4 **(a)** It was pleasing to see a high number of correct explanations seen from all candidates. Those candidates who did not score were usually confusing the word 'evens' and even numbers. Most candidates identified the correct probability arrow, with the most common wrong answer being D.

(b) All of part **(b)** was generally well answered, with very few candidates using incorrect notation or probability words.

5 **(a)** Many correct answers were seen in the first part, although it was common to see the incomplete simplification of $8x - 6x$. Answers of $7x^2 - 6x$ were also sometimes seen. In the second part, many candidates achieved 1 mark for reaching $5c$, since dealing with the $-4d$ caused problems. Some candidates ignored or misunderstood the subtraction and reached $5c + 9d$ or $5c - d$. It was common to see $1d$ rather than d alone.

(b) Many correct solutions to the one-step equation were seen, and also the expected common error of 7 rather than 17. Few embedded answers were seen. Many correct answers were also seen in the second part. Although this was a two-stage equation very little working was seen; however part marks were awarded for $2x = 9$, or for the correct follow through solution from $2x = 8$ or $2x = 7$.

6 **(a)** Many candidates drew the correct cuboid, although there were some with one dimension incorrect and a few 5 by 5 by 5 cubes were seen. Some candidates appeared unfamiliar with isometric paper and did not know how to align edges. Some candidates' drawings ended up going off the bottom of the grid and were awarded 0 as they had not completed a cuboid.

(b) Many correct volumes were seen, although surface area calculations were also frequently attempted. Pleasingly, more candidates gave units than previously, although there were still many missing or incorrect (usually cm^2) units (last June over half the candidates omitted the units, this year under half did).

7 **(a)** High scoring candidates were usually correct here, although some tried to use the laws of indices and answered 10^5. Lower scoring candidates often confused 5^3 with 5×3, leading to an answer of 60. It was also common to see candidates attempting the two parts and then adding them rather than multiplying. Some incorrect attempts at $5 \times 5 \times 5$ were seen, commonly leading to 75 or 100.

(b) This was generally well answered ,with -10 as a common error.

(c) Many candidates seem to expect that any calculation involving negatives should have a negative answer and -15 was a very common answer here.

8 Some correct answers were seen but many candidates struggled, showing little knowledge of interior and exterior angles. Many answers were seen with little or no working out, with candidates appearing to guess what the angles might be. Few method marks were awarded; marks were most commonly awarded for correctly following through with their *y* equal to 180 – their *x*.

9 **(a)** Many candidates completed the table correctly using the equation, although some candidates appeared to guess a number pattern for the *y* values, such as 2, 0, -2 or -6, -4, -2.

(b) Most candidates scored here for plotting the points they had found in **(a)**, although candidates who find that their points go off the given grid should realise that they have done something wrong. Most candidates did join their points, usually with a ruled line.

10 Very few completely correct answers were seen. Lower scoring candidates tended either to omit the question or just subtract the figures given, without attempting to use a common denominator, leading to the answer $3\frac{3}{2}$. Of those who attempted common denominators, many scored just 1 mark, as they could not then deal with $\frac{5}{15}-\frac{12}{15}$, with the answer $3\frac{7}{15}$ being common.

Section B

11 **(a)** Most drew bars of the correct height and of equal width, guided by the lines marked along the bottom axis. Most labelled their bars correctly. Of those that lost marks here, most were for the incorrect height of the cooker or light bulb bar.

(b) Many candidates benefitted from the two marks given for digits 174 as plenty of answers of £174 or £17·4 were seen

12 **(a)** This was generally well answered. There was some confusion between 'obtuse' and 'reflex', but most knew 'acute'.

(b) Candidates measured the angle reasonably well (where they had a protractor). There was occasional evidence of inaccuracy, but some candidates had an obtuse answer for what was clearly an acute angle.

(c) The length of the side was usually measured correctly. Most knew how to find the perimeter and correctly multiplied their previous answer by 10, although a few thought the star had 9 sides.

13 **(a)** Most candidates interpreted the pictogram correctly.

(b) Completing the pictogram was also done well. A few ignored the key and just drew the number of figures.

(c) Identifying the session with most visits was done well.

(d) Many were able to find the total number of visits by adults; the strategy of putting the totals next to each row of pictures was very common.

(e) Many used the middle two numbers of the list, without ordering the numbers. Many gave 42 or 46 as their answer. Some calculated the mean instead of the median. The comparisons were done poorly in general; many of the incorrect responses referred to 'more adults' rather than more books. Awarding both comparison marks was not that common and some candidates did not get a second mark because of the repetition of their ideas. There appeared to be candidates who simply will not attempt this kind of question.

14 **(a)** Most of those candidates who understand substitution had this part correct.

(b) With two values to substitute and multiply, there were some errors here, but many who knew what to do gained both marks.

15 **(a)** The factorising was poorly done. Some candidates took out 10 or 2 as a common factor, leaving a decimal inside the bracket. Many gave an answer of 15x. Some candidates try to solve an 'equation' whenever they see x.

(b) Many gained the mark for 4x, but not many gained both marks, with 4x + 3 being more common than the correct answer of 4x – 3.

(c) Rearranging the formula was beyond many candidates, who omitted the question or just swapped the positions of x and y. Those who knew what to do quite often rearranged successfully.

16 Quite a few candidates picked up marks for 250 × 229 and then multiplying by 6 or 60 or even 360, but many candidates lost all track of units and had difficulty explaining why the result of their multiplication became 20·6. Only a few candidates tried changing the original dimensions into metres at the very beginning and these were often successful in gaining all four marks.

17 **(a)** Finding the average speed was poorly done. Many made an attempt at dividing the distance by the time taken, and gained a mark for doing so, but their main downfall was an inability to convert hours and minutes to hours, with the correct 2·25 hours being seen rarely. There was full follow-through credit given in the second part for converting their speed to km/hour, but as expected many were confused as to what to do with the 5 and the 8.

(b) This money conversion was answered well, with most wrong answers being the result multiplying by 1·2 instead of dividing.

18 **(a)** Finding the mean was poorly answered. Many calculated money taken correctly but did not divide by the total number of tickets sold. A weaker response was to just divide 480 (the number of tickets sold) by 3.

(b) Few candidates used decimal values of 0·65 or 0·35 but preferred to use 10% = 1·8 and try to work from there. Many found the reduction in the cost, rather than the discounted price.

(c) Drawing the pie chart was done quite well, with many knowing what to do, with full marks earned reasonably often. A few students did not use a ruler. Generally the measuring of angles and labelling of sectors was good, although some simply estimated and some used the numbers of seats as the number of degrees, so ended up with half a pie chart. There was barely any evidence of working anywhere. Those candidates who did not score all 3 marks but obtained 1 mark for one sector correct usually did so for the 90° angle.

B282: Terminal Paper (Higher Tier)

General Comments

A wide range of performance was evident on the paper with comparatively few candidates entered at an inappropriate level. Overall the paper gave candidates the opportunity to demonstrate what they knew and could do. Most candidates attempted to show the stages in their working and they benefited from the many method marks which were available throughout the paper. Presentation of working would be further improved if candidates set out the steps in a clear, preferably vertical, order.

Questions answered well included those on products of primes, fractions, indices, percentage reduction, currency conversion, mean of grouped data, solving linear equations and rearrangement of a simple formula. Questions on lowest common multiples, interquartile range and drawing simple linear graphs were answered less well than anticipated.

Candidates found some multi-step questions such as Q.3 (angles) or those which expected use of a combination of skills such as Q.1 (stem-and leaf table, frequency graph) and Q.17 (circumference, speed, standard form) more difficult . It was, however, pleasing to see the good responses to two of the more novel questions Q.5 (interpretation of a graph) and Q.10 (probability) and to the multi-step area question, Q.20.

Comments on Individual Questions

Section A

1 **(a)** Many candidates found this question a challenging start to the paper, not realising how to convert the stem and leaf table to grouped data. Many simply plotted individual points. Of those using grouped data, most chose the intervals 0-9, 10-19 etc and usually gained full marks. Other intervals tended to lead to errors in counting, with consequent loss of marks. Bar charts were more popular than frequency polygons; the common error in the latter was not plotting midpoints. A few candidates produced histograms.

(b) The majority of candidates demonstrated that they were able to interpret the stem and leaf table in order to work out the probability. There was little evidence of incorrect probability notation, with just a small minority using ratio to describe the required probability. Decimals and percentages were also very rare. A few gave the answers 43/60 and 17/43 and a few had incorrect values, through adding too many or too few frequencies.

2 **(a)** A large majority of candidates gave the correct answer. However a significant number of candidates did not appreciate the reason for the given calculation and attempted to multiply the two numbers. For those using the given information, common errors usually involved the incorrect position of the decimal point. There was little apparent checking of given answers to see if they were reasonable. Estimation would have provided the opportunity for this to take place, eg $24 \times 2 = 48$ so the answer could not possibly be either less than 1 or greater than 100!

(b) This part was less well answered with the main error being the position of the decimal point. The commonest wrong answer was 180. Some attempted to cancel the fraction, but often gave the answer as an improper fraction rather than as a decimal. Again, a quick estimate of 4000/2000 would have indicated the order of magnitude was roughly 2.

3 About half the candidates gained full marks in this question and just a small minority failed to score. There were some good responses with candidates showing a clear method, setting it out in a logical progression. For many others working was often untidy, sometimes written in any direction on the page and showing little logical progression. The main problem seemed to be in finding x. Many used the exterior angles of a polygon successfully and some tried to use the formula for interior angles, with less success. The majority used the relationship $x + y = 180$. In very many cases working was spoilt by wrong arithmetic, even in subtracting from 180. Many found $y = 45$ without realising the relationship with x.

4 **(a)** Most candidates scored at least 1 mark in this part for finding the factors 2 and 3 and the majority expressed these as the correct product. Using a factor tree was the most common method. Some added their factors on the tree, for example 6 was broken down to 3 and 3 rather than 2 × 3. Some of those with a correct tree could not transfer this into a correct answer and $2^2 + 3^2$ along with 2, 3 were often seen, showing a lack of understanding of the term 'product'.

(b) Candidates were less successful in this part with under half the candidates scoring a mark. Correct solutions followed from using prime factors or listing common multiples. A significant minority attempted to work out the highest common factor or simply any common factor. There was clearly some confusion between factors and multiples.

5 **(a)** **(i)** Almost all candidates scored in this part with the large majority giving fully correct answers. The most common mistake was to marking the 5th game as a win (WLWWWLW), whilst a few gave all as wins and a few candidates read the percentages from the graph and entered these in the table.

(ii) Most candidates gave a correct fraction or a follow through fraction but many then had problems converting to a percentage. It was disappointing the number of candidates who could not change 5/8 into 62·5% correctly (65 or 67·5 being popular). Similarly some of those who gave 6/8 from a mistake in **(i)**, obtained 80% as an answer. Sometimes those who wrote percentages in the table went on to try to average these. Some just wrote down an answer of 62 or 63 with no working.

(b) **(i)** About half of the candidates found both the median and the IQR correctly. Others were generally more successful in finding the median than the IQR. The method used to find the IQR was often hard to follow as the lines were not always drawn on the graph and small figures were scattered around the page.

(ii) The majority of candidates scored 1 mark on this part but few scored both marks. Often candidates simply read 42 from 50 runs and failed to interpret 'more than' 50 runs. Many failed to use the IQR to judge the most consistent player, chose to use the highest median instead and gave Malik as the preferred choice.

6 Over half the candidates scored full marks for this question. Others generally earned a mark for correctly using a common denominator of 15, with one of the numerators correct. Nearly all chose to use the improper fraction approach in dealing with the fractions and it was only calculation errors that stopped some candidates from gaining the 3 marks, rather than from any misunderstanding of fractions eg 65 – 27 was often seen as 48 or 28. The last mark for converting their improper fraction to a mixed number was usually successful. Those choosing to deal with the whole numbers and fractions separately arrived at the fractions 5/15 - 12/15 and often then gave this as – 7/15, failing to borrow from the whole number 3.

7 **(a)** The majority of candidates scored full marks for this part and most candidates made a reasonable attempt. Mistakes included incorrectly expanding the brackets such as 2x – 4, adding rather than subtracting 19, failing to deal with the negative and writing $3x = 27$. Those presenting their work in clear stages, line by line, made far fewer errors than those whose work was less well organised.

(b) The majority of candidates found the correct factors and solutions. A few candidates attempted to use the quadratic formula and a few stopped at the factorisation stage. Some scored part marks for an incorrect use of factors. However about a quarter of candidates failed to score in this part. Many of these tried to use a method more suitable for linear equations, either combining the x squared and $-7x$ terms in some way, or just ignoring one of them. A few attempted to use a trial-and-improvement method.

8 **(a)** This part caused few problems with most candidates giving the correct answer of x^2. Wrong answers seen included x^4 and $\sqrt[3]{x^2}$ but there were no predominantly wrong answers as it was usually left blank if there was no correct answer.

(b) Almost all candidates answered this part correctly, the common error being to multiply the indices rather than add them.

(c) About a third of candidates scored some marks in this part but few reached the correct answer. Many began by combining the denominator $6x^3 + 9x$ to give $15x^4$ which they often cancelled with the numerator of $3x$. The other common error was to cancel the numerator $3x$, or just 3 or x with only one of the terms in the denominator sometimes just $6x^3$ and sometimes $9x$. Some gained a mark for fully or partially factorising the denominator but didn't cancel out their common factor with $3x$. Unfortunately a few who correctly factorised and cancelled then spoilt their answer by just writing $2x^2 + 3$ rather than $\frac{1}{2x^2 + 3}$.

9 **(a)** Many candidates realised that they had to use the second point (-3, 19) to produce the second equation and achieved the correct answer $19 = 9c + d$.

The most common error was to use $(-3)^2 = -9$. Those who didn't use (-3, 19) just attempted to rearrange the given equation and gave an equation involving x and/or y or made up some data.

(b) The candidates who achieved the correct answer in **(a)** were usually able to complete part **(b)** correctly and solve to get $c = 3$ and $d = -8$. Many who gave an incorrect linear equation in **(a)** were able to gain credit by correctly equating coefficients and subtracting their equations. The solutions were then usually fractional and they found it difficult to find the value of d. It was clear that many had 'second thoughts' and they went back to revisit some of their working.

10 Most candidates achieved at least one mark and over a half were awarded full marks. Many candidates used a tree diagram to support their method. Some decided that the boys should have an equal probability of success so all answers of a third, a half or a quarter were seen even after attempting to use a tree diagram. Almost all answers were correctly given as fractions, decimals or percentages with very few given as 1 in 4 or 1:4 etc.

11 **(a)** Less than half the candidates scored the mark for this part. Comments seen were often partially correct, many stated that both are right angled triangles but then went on to comment on the common sides or the lengths being in proportion. Others tried to prove congruency or wrote about angles being similar rather than equal. Some did use the right angle and the shared angle (or less commonly the corresponding angles) to show two equal angles and hence AAA. Many simply said triangle AOB was an enlargement of triangle COD without realising they were stating the fact they were meant to be justifying.

(b) Just under half the candidates used similarity in this part. However very few achieved the volume scale factor $\frac{27}{125}$ and even fewer went on to the final answer of 54. Fortunately for many they were able to gain a mark by giving the volume 150 as proof of using the ratio 3: 5. Many gained a mark for giving the length scale factor $\frac{3}{5}$ (or its reciprocal) but after evaluation to 0·6 (or its reciprocal to 1·66) they got bogged down in poor arithmetic and could not complete the calculation. A few tried without success to use the formula for the volume of a cone.

12 **(a)** Just over a quarter of candidates achieved full marks. Some candidates obtained $(x – 4)^2$ but then struggled to complete the square correctly with +27 and +43 being frequently seen. There was limited evidence of method seen for the final two marks. Common wrong answers included $(x – 4)^2 + 27$, $(x – 8)^2 + 27$, $(x + 4)^2 + 43$, $(x – 4x)^2 + 27$, $(x – 8x)^2 + \ldots$ or $(x – \sqrt{8})^2 + \ldots$.

(b) Just under a quarter scored in this part, even though a follow through mark was available. Many gave no answer even after attempting **(a)**. Few spotted that the bracket would be zero for the minimum value and tried substituting in values. Some mistakenly gave 4 or -4 as their answer and 27 was another common wrong answer. Many candidates were seen factorising or completing the square afresh.

Section B

13 **(a)** **(i)** The majority of candidates knew that they had to divide 306 by the time interval but the problem of hours and minutes resulted in many dividing by 2·15 rather than 2·25. Some used a time of 135 in minutes and did not convert to hours at all. Answers of 142 and 2·26 were very common. A few used unrecognisable time intervals with little supporting working. Some considered the time difference issue and were given appropriate credit for this method.

(ii) Most candidates followed through from their answer to (i), gaining 2 marks by dividing by 5 then multiplying by 8. It was far less common to see multiplication by 1·6. Some candidates did not use their answer to (i) but restarted using 306 and converting this distance to km and then, usually but not always, to speed. A common mistake was to divide by 8 and then multiply by 5. Some candidates would have benefited from considering whether their answer was sensible – excessive speeds were evident.

(b) A majority of candidates were successful in this part. The most successful method and most common method was 90 ÷ 1·2. A few candidates used the method 1 ÷ 1·2 = 0·833333 then 90 × 0·833333. A significant number of these candidates lost a mark for accuracy due to early rounding (eg 90 × 0·83 = 74·7). Common errors were to multiply by 1·2 or by 0·8.

14 (a) This part was generally well answered with about half the candidates getting full marks. Working out was generally shown clearly. Some added the three ticket prices and divided by 3 giving (18 + 15 + 10)/3 =43/3 while others added the number of tickets reaching 480/3 = and others reached the $\sum fx$ stage but then divided by 3 or by 43. Those using the correct method often rounded to the nearest 10p without any evidence of a more accurate value.

(b) This part was very well answered. Answers of 11·7 were relatively common but not penalised on this occasion. Some increased the price by using a multiplier of 1·35 in working. Some used a two stage approach to the calculation – finding 35% then subtracting – but the most common approach was to find 65% of the value. A few found 35% but failed to subtract and gave an answer of 6.30. Some used non calculator methods, finding 10% then 5% but errors tended to arise. A few found 65% of the wrong value.

(c) A majority of candidates gained full marks for this part. Neat, accurate diagrams within the generous tolerance, correctly labelled, were the norm. Some weaker students made divisions of 100, 45 and 35 degrees. Few calculations were written down, usually when candidates were using percentages. Some did not show the sizes of their angles and gave incorrect sectors but the 90° sector was usually correct for a consolation mark.

15 (a) (i) About half the candidates scored one mark for this question. Of the remainder more scored 2 than scored 0. The most common error was to expand the bracket incorrectly and reach $10x - 6x + 3$ and then $4x + 3$. Others were clearly confused by the $10x$ and proceeded to a 'double bracket expansion, working out $(10x - 3)(2x + 1)$. A few changed the expression into an equation $10x - 3 = 2x + 1$ and then solved it.

(ii) About half the candidates scored full marks for this part, expanding the double brackets $(x + 3)(x + 3)$. Most of the other candidates gave $x^2 + 9$ and scored 0.

(b) Most candidates gained full marks for this part with answers usually supported by clear working showing both steps. Very few used a division symbol and it was good to see almost all using a full fraction line for the division by 4. Common errors included $(y - 7)/4$ or confusing the 7 and 4 in the numerator and denominator. Some answered $7y/4$.

16 (a) The majority of candidates understood this question and referred to 'usual tickets' and 'cheap tickets'. If the mark scheme had insisted on 'number of' then there would have been far fewer correct responses. Occasionally the answers were reversed. Most common errors involved giving the numbers 35 and 15.

(b) (i) Most candidates scored some marks in this part but only a small minority scored full marks. The mark for $y = 15$ was the most commonly earned. Many had both of the other two lines coming from the origin or, in the case of $20x + 12y = 720$ simply joining (20, 0) and (0, 12) or (20, 12) to the origin. Most of those that knew what to draw did so with an acceptable degree of accuracy; rarely did one penalise sloppy drawing but, when it happened, this was usually at (36, 0). Many of the lower scoring candidates drew rectangles of various sizes, particularly for $x + y = 50$.

(ii) Few correct regions were shown owing to the dependency on 3 correct or nearly correct lines.

17 **(a)** Only about a third of candidates realised that they needed to find the circumference of a circle. The majority of answers showed $n \times 365$ and $n/365$. Some candidates realised that π was needed, but all too often picked the wrong formula and calculated an area. Even when the correct formula was used marks were lost because candidates had failed to read the question and did not give their answer in both standard form and to 3 significant figures: a few did one but not the other.

(b) Those obtaining 939…. were often successful in scoring 3 marks here. Many others were able to score method marks by dividing their answer to part (a) by (365×24) or by one of these values. A significant number made no link between parts (a) and (b) and used values such as $1{\cdot}495 \times 10^8$ for their division.

18 **(a)** About a third of candidates scored full marks and a further third one mark. More were successful is giving $p = 2$ than in saying that q was less than 5.

Common errors were to give descriptions such as p is the gradient and q is the intercept.

(b) In this part few gave the gradient correctly. Many knew that it should be negative and often stated this as their answer or gave their solution as -2. Other common errors were to give ½, $1/2x$, $-2x$. More candidates were successful in saying s was 5 but there were still vague non-numeric responses.

19 **(a)** About half the candidates scored full marks for this part and a significant number scored part marks. The most common method was to use Pythagoras' theorem in two steps (often obtaining FH first) and candidates generally gained 3 marks. Fewer candidates used the 3D formula but when seen it invariably led to the correct solution. Some candidates realised that they needed to use Pythagoras but were unsure of how to apply it to a 3D situation – most of these candidates managed to score M1 for a 2D statement. Occasionally candidates tried to use trig to solve part a.

(b) Just over a quarter of candidates scored full marks in this part and a further quarter scored part marks. Most candidates recognised that they needed to use trigonometry but many gave an incorrect trig statement but then gained a mark for using the inverse trig function. Some candidates used trig with numbers that were not given in the diagram and had not been calculated so failed to get any marks. Some candidates evaluated angle FBH as the angle BH made with the horizontal and scored part marks. Use of grads or rads was extremely rare. Lower scoring candidates tended to simply give an answer of 45°.

20 Most candidates scored in this question with over a quarter gaining full marks. Working was generally evident but some presentation was very disorganised.

Common errors included using an incorrect method for the upper triangle eg ½ × base × height. Many found the diagonal length, sometimes from the right-angled triangle but also from the upper triangle using the cosine rule or, incorrectly, from Pythagoras' theorem. This diagonal length was then generally used incorrectly to find the area. Many were able to convert one of their areas to hectares and then multiply by £16200 to earn the last 2 method marks. A mark of 3 or 4 was common on the question.

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

OCR Customer Contact Centre

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

www.ocr.org.uk

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

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

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