OCR
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GCSE

Mathematics C

General Certificate of Secondary Education **J517**

Report on the Units

January 2009

J517/MS/R/09J

Oxford Cambridge and RSA Examinations

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GCSE Mathematics C (J517)

REPORT ON THE UNITS

Chief Examiner's Report

General Comments

This session was the last time that centres had to cope with two versions of the modules as J516, the previous coursework version of the specification, was examined for the last time in January. From March 2009, we can all enjoy a time of decreased administration for a while, as we have just one current version to teach and examine.

Centres trying to compare past performance need therefore to be aware that the candidates taking J517 this January included not only the bulk of year 10s who usually take modules at this time of year, but also year 11s taking this examination; last January, year 11s were taking J516 modules. In addition to these main cohorts there were others, including both older and younger candidates, as the flexibility of the specification is taken advantage of by centres in the ways they use it. In particular, there was an increase in the number of year 9s entering modules this January.

For most of the modules, Principal Examiners reported positively on performance from J517 candidates. There were, of course, the usual concerns, in particular about showing working – where there is no working and the answer is wrong, candidates usually earn no marks, so encouraging candidates to show working as their 'insurance policy' is important. Working also ensures that a correct method is being used, which is vital in teaching situations as well as in examinations. There are also continuing concerns from examiners that candidates do not always have or use the correct equipment, be it a ruler, another geometrical instrument or a calculator for section B.

Please note, if you have not done so already, that as from next January module test M10, unit B280, will be available in the January session in response to the varied ways in which centres now use the modules.

B271 Module Test M1

General Comments

The full range of scores was seen from candidates on both sections of this paper; the majority were able to complete each section in the available time.

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

Comments on Individual Questions

Section A

1 **(a)** The majority of candidates scored at least 1 mark. Of those who did not many had listed the even numbers.

(b) Generally correct.

(c) Generally correct.

(d) Generally correct.

2 **(a)** Generally correct.

(b) Weaker candidates appeared not to understand how to answer this question. Few candidates showed any working.

3 **(a)** Generally correct. Weaker candidates confused 25 to and 25 past the hour.

(b) The most common error was putting in zeros between the figures to denote thousands and hundreds.

(c) Generally correct, although a minority of candidates used 100 rather than 60.

(d)(i) Generally correct.

(ii) Generally correct.

(iii) Many correct. The most common error was “East-South” or just South.

(iv) Many correct. Common errors were to add on 10, or to give 240.

4 **(a)** Likely was the most common answer.

(b) More correct answers were given in this part.

5 **(a)** Generally correct.

(b) Many correct. Of those who did not give the correct answer, many had recognised the 'three', but failed to give the direction. A small number of candidates stated it was the three times table.

6 **(a)** Generally correct.

(b) The most common errors were to shade 1 or 4 rectangles.

(c) Many correct. $\frac{3}{4}$ was a common incorrect answer.

7 Rarely completely correct. Many candidates scored only 1 mark, often due to wrongly stating 500 mm was less than 5cm.

8 **(a)** Several correct answers were seen. The most common error was hexagon.

(b) Many correct. Many candidates appeared not to use a ruler. The most common error was to draw a pentagon.

Section B

9 **(a)** Generally correct.

(b) Generally correct.

(c) Generally correct.

10 **(a)** Many correct. Several candidates reversed the coordinates.

(b) Those who reversed the coordinates in both parts were awarded 1 mark. Several candidates had marked more than one point but not indicated which one was their final answer, and so could not receive credit.

(c) Many candidates scored at least 1 mark. There were however many answers below 30.

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

(b)(i) Generally correct.

(ii) Generally correct.

(c) Many scored both marks. 19 was a common incorrect answer. Very few candidates showed working, and of those that did several added rather than subtracted.

12 Many completely correct. Some candidates ignored the given line and produced a diagram using an incorrect scale factor. There were several freehand drawings, again indicating a lack of the use of rulers.

13 **(a)** Many completely correct answers were seen. Several gained part marks for evidence of multiplication, but many failed to show any working. Many weaker candidates just added all the numbers. Some candidates gave the correct digits but omitted the decimal point.

(b) Many correct answers were seen. There was evidence in both (a) and (b) that some candidates did not have access to a calculator.

14 **(a)** Many correct, but some gave the answer in millimetres.

(b) Rarely correct.

15 **(a)** Many correct, but very few showed evidence of division. The most common error was to multiply.

16 Generally correct. Of those who did not score 2 marks the majority scored 1 mark.

B272 Module Test M2

General Comments

Candidates all had sufficient time to complete this paper and a full range of scores was seen. A pleasing number of candidates performed well, demonstrating thorough preparation for the module and a good understanding of most topics.

Performance was particularly good on identifying solids, interpreting a street map and basic reading from a table, but many candidates had difficulty in dealing with fractions, decimals and percentages as well as metric units. Questions requiring several steps of working were found difficult and many candidates again lost marks by failing to show any working.

Comments on Individual Questions

Section A

1 (a) This was usually correctly answered, although common errors were 3, 3/5 and 8/3. Some candidates miscounted or made errors by cancelling the answer down to 1/3.

(b) This was poorly done with only the better candidates correctly shading 2 squares. Far more common was shading of either 6 squares or 1 square.

(c) Again, only the better candidates scored here, with more correctly getting 0·1, or more commonly, 0·10 than 3/4. Where 3/4 was seen, this was often with 0·25 as the decimal. As usual, answers of 1·0 and 7/5 were common. Some candidates gave the fraction as 75/100 which also scored.

2 (a) This was well answered, although all of the street names on the map were seen.

(b) Again, well answered.

(c) Well answered, with very few candidates failing to score at all here. Most candidates correctly identified Pembroke Street and then went on to get at least one of the turns correct.

3 This was well answered, although some candidates calculated the numbers rather than trying to follow the pattern, perhaps indicating that they had not met this type of number pattern before.

4 (a) A variety of methods were seen for multiplication with the better candidates performing well.

(b) Division was less successful than multiplication, with weaker candidates often attempting an operation other than division. Candidates who attempted formal division frequently struggled, getting the first digit 2 in the answer, but then not knowing how to continue. Counting methods were sometimes successful but, with 81 to deal with, slips often led to close, but inaccurate, answers.

5 (a) This was usually answered well, demonstrating that in an informal setting and with simpler numbers, candidates could divide and deal with the remainder. Some candidates misunderstood and gave the total number of tiles in (i) as 30 but then followed correctly with 3 in (ii). Candidates who failed to correctly interpret the question and gave the answer of 5 packs with 2 left over gained a consolation 1 mark. A few candidates multiplied 27 by 5 rather than dividing.

(b) The majority of candidates realised that they were required to multiply 65 by 4 here, and methods were shown, but there were frequent errors. Doubling and doubling again to multiply by 4 was a popular method, but needs more practice. Although units were asked for, many candidates failed to include them so lost the final mark.

(c) This was very poorly answered with many candidates giving an answer, possibly a guess, with no working out shown. Almost no candidates scored full marks here. Those candidates who did score had usually added together the 1·45 and 0·48 correctly, but then often did not know how to progress. The 2·1m led to confusion: most candidates who attempted to find the difference counted on to 2·01 rather than 2·1, giving an answer of 8 or 0·8.

6 (a) This was well answered, with most identifying the cube and cuboid correctly. Weaker candidates were confused between cylinder and sphere or cone and pyramid.

(b)(i) This part was usually correct: if white was not given candidates usually gave red.

(ii) This caused a lot more difficulty, possibly because the number of whites had not been given, and candidates did not work it out. The better candidates got B correct, but then E was often given for white.

Section B

7 (a) Generally correct.

(b) Generally correct, although July was sometimes seen, or the number of hours rather than the month.

(c) Again, often correct.

(d) Candidates struggled a lot more with this, possibly having difficulty with the term ‘modal’. Answers of 10, the highest number in the row, or 60, the total of the row were common errors.

(e) This was fairly well answered. Common errors were 4, where they had missed November and December, or –10, where they just gave the lowest temperature.

(f) This was pleasingly well done, with a large proportion of candidates correctly finding the difference. Some candidates drew a number line to help work out the answer, which was usually successful.

8 (a) Candidates clearly understood reflection symmetry, as most correctly answered part (ii), but there were many errors in part (i) with very few candidates getting all four patterns correct. The diagonal line of symmetry in pattern 3 caused the most difficulty.

(b) The better candidates scored well here. Few method marks were scored as, in general, those who understood how to deal with the word formula got the correct answer. Incorrect answers of 5·4, 6·9 and 9·6 were common, often with no working out shown. Some difficulty with multiplying 0·6 by 10 was seen, perhaps indicating that these candidates did not have access to a calculator.

9 **(a)** Reasonably well done, although many chose the obtuse angle, B, rather than the reflex angle, D.

(b) Most candidates appeared to have access to an angle measurer, although a number read the wrong scale or gave an answer of 50 or 60 degrees, which was too inaccurate to score. Some gave a length of 7 cm, presumably because they had measured from D to E.

10 Candidates generally scored either 2 or 0 marks here. Those that had ordered the numbers usually got the correct median of 3. Answers of 8, the middle of the unordered list, or 4, from omitting one of the 2s in the list, and 2, the mode, were also common. Pleasingly few candidates attempted to calculate the mean.

11 **(a)(i)** Many candidates failed to read the question correctly and gave the answer of 25% rather than 1/4.

(ii) Again, many candidates failed to read the question and gave an answer of 50% or 1/2 so only scored 1 mark. Those that attempted to find half of 60 were usually correct.

(b) Candidates struggled to read the pie chart here, with wrong answers of 10% in (i) and around 75% or 98% common in (ii).

12 Very few candidates scored anything on this question and many did not attempt it. There was almost no working seen, even by those candidates who did get the right answer. If method marks were given, it was usually for seeing some attempt at adding multiples of 125 to get to 1·5 kg. Answers of 187·5 and 126·5 were not uncommon, suggesting that some candidates do not try to check the realism of their answer.

13 **(a)** Generally correct.

(b) Candidates found the pattern in a grid harder than a straightforward number sequence. Many concentrated on the missing numbers and gave an answer of +3 rather than +4. Those who explained that 3 numbers were missed out and the next shaded did score.

(c) Few candidates scored here, with common incorrect explanations involving the pattern finishing at 30, or using the 3 or 4 times table. Some candidates however did identify that the pattern only included odd numbers and gave a good explanation.

B273 Module Test M3

General Comments

The majority of candidates made a real effort to show what they could achieve. About ten per cent of candidates gained less than 25% of the available marks, and five per cent more than 75% of the available marks. The corresponding percentages for the previous January session were seventeen and three per cent respectively.

Overall performance on Section B was marginally better than that on Section A, but by less than about 0·5 marks.

The overall standard of presentation was generally satisfactory; both number work and handwriting were readable. However overwriting should be discouraged as marks can be lost through a lack of clarity and ambiguity resulting from this.

Candidates completed the paper within the time allowed. There were relatively few instances of questions not attempted. In terms of omissions Questions 2(c), 2(d), 3(c) and 10(b) were the worst with omission rates of round about one tenth. There were no obvious instances of candidates misinterpreting the rubric, with the possible exception of Q.3(c) which some candidates may not have interpreted as a real life-size estimation problem.

In common with previous years there appeared to be candidates without access to calculators. There were candidates who failed to write down working and as a consequence no doubt failed to gain any of the available method marks. A good example of this was Q.8(c) where "5" was sometimes the only number written in the working/answer space. This may have arrived as a result of premature rounding after application of a correct method – but without hard evidence no credit could be given.

Areas of content that proved particularly challenging included: simple percentages of quantities (Q.3(a)(i)), estimation of length (Q.3(c)), calculation of mean and range (Q8(c) and (e)) and interpretation of 3D shapes (3(f)). However it should be noted that the latter was a hard example of finding views and that the estimating problem (Q.3(c)) might have been found hard by some candidates.

Areas of content which were addressed well were: calculating simple fractions of quantities without a calculator (Q.3(a)), reading instrument scales (Q.3(d)), working with order of operations using brackets (Q.5(b)), solving simple linear equations (Q.7) and reading charts and tables (Q8(a)i and (b)i).

Comments on Individual Questions

Section A

1 **(a)** Common wrong answers were 7.50 and 6.45, the latter probably the result of omitting to read the initial part of the question. This part question was found challenging by some candidates. In some instances times after 7:20 were given.

(b) Almost half of candidates were successful. A follow through was available from part (a) and this was gained by a significant number of candidates.

(c) The majority of candidates gained full credit.

2 **(a)** This was found to be a difficulty for many candidates; only one third were successful. Some of the more common errors involved stopping the division half-way through and answers beginning with 3 were relatively common. However, the logic behind some other responses was impossible to comprehend.

(b) This was better answered than part (a), with over half of candidates gaining full credit. As might be expected a significant number of errors involved omission of the decimal point.

(c) About a quarter of candidates were successful. Common wrong responses were 5·1200, 5·1002 and the almost random insertion of zeroes, evidencing misconceptions regarding place value.

(d) A poorly answered question. Unsurprisingly the most popular wrong response was 14. It was clear that a large number of candidates had no recall of index notation in the context of squaring numbers.

3 **(a)(i)** One of the best answered questions on the paper. Few candidates experienced problems.

(ii) Too great a challenge for the majority of candidates. An overall poor understanding of percentages was revealed by answers based on “200 + 15” and “200 – 15”. Some partial credit was available, but few candidates were able to access this.

(b) About a quarter of candidates were completely successful. The majority of candidates gained at least partial credit. However a noticeable, albeit small, number of candidates had difficulty in the multiplication of the four numbers required.

(c) A challenging question which was found too difficult by over half the candidates; less than one in ten was successful. Many candidates made an estimate of the distance on the drawing rather than the scaled distance required. The unit was often omitted or when units other than cm given they were usually incorrect. There were a small number of candidates who gained full credit with correct responses within the allowed range but using and clearly stating Imperial units.

(d) A very well answered question by all candidates. Most errors involved misreading the scale as a decimal scale, resulting in answers of 10·22, 10·5 or similar.

(e) About half of candidates failed to gain any credit. Many did not indicate the angles clearly and this ambiguity resulted in loss of credit.

(f) Found difficult by many candidates, with three quarters failing to gain any credit. Many attempted to produce 3D drawings. The view from B proved particularly challenging.

4 A well answered question, with almost half of the candidates gaining full credit. The use of “odds”, which gained no credit, appeared to be somewhat less frequent than in previous sessions. A familiar wrong response to part (a) was 7/15, originating from candidates merely counting the triangles.

5 **(a)** Found difficult by some candidates, who showed in many cases only a tentative recall of order of operations by giving answers of 20.

(b) Better answered than part (a), with over half of the candidates gaining full credit, possibly because of its more obvious structure.

Section B

6 A well answered question with the great majority of candidates gaining at least partial credit. Most errors appeared to be the result of misreads, although in some of these cases omission of the negative sign may well have been a coping strategy.

7 (a) Moderately well answered. Common wrong answers were 16 and 6, arising from fairly typical misconceptions.

(b) Better answered than part (a), with well over three quarters gaining full credit. The prevalent wrong responses were, predictably, 1 and 3.

8 (a) One of the better answered questions, with almost nine out of ten gaining full credit. The most common error was to misread Bude for Blackpool in (i). For (ii), '6 months' was seen, possibly as a result of missing March, as all the other months with the same rainfall in both places were consecutive.

(b)(i) Another very well answered part question. By far the most prevalent error noted was to calculate the total rainfall for all the Junes in the table.

(ii) Descriptive questions are always demanding and this was no exception, despite the prompt to "use numbers from the table". Nevertheless a quarter of candidates succeeded in gaining full credit.

(c) Marginally less than half of candidates gained any credit for this question. It is perhaps a good example of a situation where some credit might well have been awarded had candidates shown some working, rather than merely a number as the answer. A common response was 44, the volume of water in the measuring cylinder. This gained partial credit but there were also instances of 40·4, which did not. Very few candidates gained full credit and even fewer gained a method mark for evidence of division by 8, but '÷5' was quite common. The idea behind the question was to minimise the arithmetic, however there were instances where candidates obviously knew that mean involved addition, and proceeded to sum all the numbers on the graduations on the gauge.

(d) Many candidates failed to scale the height, giving answers of 3 cm.

(e) As is all too common, candidates became confused over mean, mode, median and range. Answers of 20 and '20 ÷ 5 = 4' (which was common) were produced, as well as "8 – 1".

(f) Less than half of candidates gained credit for this fairly straightforward part question. Some serious misconception over metric measures and place value were evidenced by answers of 200, 2000·000 and 2000.

9 A moderately well done question. Most candidates realised what was required of them. Drawings were usually of a reasonable quality and drawn with the aid of a ruler. Partial credit was available, including for those who drew an enlargement with scale factor 2.

10 (a) Another moderately well done question, found difficult by some. As might be expected, reversals and poor accuracy in reading the scales were the main sources of errors.

(b) This part question was found challenging by all apart from the most capable candidates. Few gained full credit and there was little evidence of the graph being used. 4·5 and 80 were common responses.

11 (a) The majority of candidates gained some credit and about a third full credit for this part question which involved word formulae and squares of whole numbers. A particularly common wrong answer was 40 – no doubt a result of "$4^2 \times 5$" being taken as "$8 \times 5 = 40$".

(b) Not as well answered as part (a), probably because of the square root required, nevertheless partial or full credit was gained by just less than half the candidates.

B274 Module Test M4

General Comments

A full range of scores was seen from candidates for this paper, and they were able to complete each section in the available time. The paper appeared to discriminate fairly across the ability range.

Working out was often lacking, haphazard or unclear, particularly on question 11.

Candidates appeared to find Section B more accessible than Section A.

Comments on Individual Questions

Section A

1 It was pleasing to see many completely correct answers to this question. However, many candidates found part or all of this difficult. Many local generalisations were seen with fractions given as 6/5 and 0/8. Some candidates frequently failed to attempt any part of the question, or responded to only parts (a) and (c) or (b) and (d). Most candidates gave answers as vulgar fractions but some gave mixtures of decimals and percentages. The first occurrence of wrong forms was penalised.

2 Candidates usually answered the first two parts of this question well. Errors in writing the decimals in the final sequence such as 0·95, 0·9 and 0·85 or writing one wrong term, e.g. 10.5, 9, 8.5, were the usual reason for losing one mark.

3 **(a)** Many correct answers were seen but candidates often misread the scales and gave incorrect answers such as 6010 or 6001 for the first value. Some candidates misread the question and answered 2004. Many candidates were not able to correctly calculate the difference between the number of crimes in 1999 and the number on 2004. Even where working was seen, which was rare, it often contained subtraction errors.

(b) Many candidates gave inadequate or imprecise responses to the question, in some cases restating the statement, “Yes, it’s begun to fall” or “Yes, the graph shows it is falling”, without saying **how** this could be seen from the graph or **where** it was seen on the graph.

4 **(a)** Many correct factors were seen, e.g. 4 and 10, but far fewer correct pairs, e.g. 4 and 5.

(b) Many answered this correctly but the confusion between factor and multiple was evident.

(c) This was frequently well answered.

(d) Correct answers were rarely seen here. Many candidates gained 1 mark for meeting two for the criteria, usually ‘even’ and ‘factor of 36’ or ‘even’ and ‘square’. 6 was a common wrong answer.

5 One or two marks were common. Candidates should be encouraged to completely cross out a wrong answer and rewrite it rather than try to amend it.

6 This question was often well answered and it is pleasing to see the success (and general use) of the grid method. Candidates using this method seemed to be successful more often than candidates using the traditional layout.

7 **(a)** Candidates seemed to find the choice of reasons helpful and often chose the fourth option. Candidates who did not score this mark gave multiple responses or chose unwisely.

(b) Many candidates gave the correct answer of 95° and, for the reason, gave angles adding up to 180° but failed to mention angles **in a triangle**. A frequent wrong answer was 85°, "because I added them together." Many times, where a wrong reason was given, candidates reverted to the reason in part (a). Pleasingly, very few candidates thought the angle sum was 360°

Section B

8 **(a)** Candidates rarely scored full marks. Many wrote 5x or $x + x + x + x + x$ but forgot to write 'T ='. Some candidates attempted to find the size of each angle, almost always unsuccessfully.

(b) Many correct answers were seen and embedded answers (4 × 90 = 360) were condoned.

9 **(a)** There was an almost even split between the correct answer and the perimeter.

(b) This was well answered though too many candidates lost marks by drawing diagonals. Regrettably, few candidates used a ruler or could use it effectively.

(c)(i) Most candidates gained this mark but reversing the coordinates was a common cause of loss of marks.

(ii) Many candidates gained one mark. Reversing one or both pairs of coordinates was a common cause of loss of marks. Where candidates reversed coordinates consistently they gained follow through marks.

(iii) Most candidates gained this mark for completing the expected rectangle or a rectangle from their mis-plots.

10 **(a)** Many candidates answered by giving 25/50 or another, non-simplified version and lost one mark.

(b) This was frequently correctly answered.

(c) Candidates rarely provided working for this question, so it was not possible to award follow through credit from a wrong answer to part (b).

11 This question was clearly very challenging for many candidates, yet questions of this type are likely to be more common in the September 2010 specifications.

Completely correct solutions were rare but many candidates did gain a significant number of the marks. Few candidates showed working to find the number of litres required to paint $100m^2$ and appeared to prefer a multiplication process for each size of tub. Many candidates worked out combinations of tub sizes that would supply sufficient paint but that were not the cheapest. Many candidates worked out numbers of individual sized tubs of paint required for $100m^2$ of coverage and chose the cheapest option. However, they rarely showed that this was what they were doing and left it to be deduced. The lack of annotation made it a difficult task to credit some candidates. Some candidates gave enormous combinations of tubs that could have painted a large building. Candidates must be encouraged to organise and annotate their solutions, and make their choices clear.

12 **(a)** This was often correctly answered but misreading the scales was a common error.

(b) 145 was often seen but so too was the wrong answer of 149.

(c) This was poorly answered with many candidates thinking that C was a part of the journey (when it should have been C-D or **from** C) or giving the ambiguous response, “The second part”. Few could articulate the response, “because it was the steepest” and many talked of going up hills and gave lengthy discussions of time without mentioning speed.

(d) This was often well answered. Many converted to 6:30, without penalty.

B275 Module Test M5

General Comments

A full spread of marks was evident on this paper, and most candidates appeared adequately prepared.

Most candidates attempted all questions, the only significant omissions being naming the trapezium, drawing the graph and solving the first equation. Candidates were reticent to show any methods and appeared not to realise that a question worth 3 marks was unlikely to be able to be answered in one step. The skills with percentages needed to answer questions 7 and 14(c) were well within the capability of this target group but the majority of candidates appeared unable to apply the skills to solve problems.

Comments on Individual Questions

Section A

1 (a) The majority of candidates recognised the need to round and then multiply but errors such as 30 × 20 = 60 or 500 were evident. Some candidates were confused by m² and calculated 30 × 30 × 20. Some attempted written calculations such as 28 × 19, or 28 × 18·75, and so did not score.

(b) Most realised that their estimate was bigger and generally gained the mark as they explained that they had rounded up. Some just referred to rounding to the nearest whole number and so scored 0.

2 Most candidates completed the 6/8 but only the most able 15/20. The most common answer was 15/16, presumably from doubling 8.

3 (a) About half of the candidates identified the centre of rotation correctly. Some candidates clearly thought that the centre had to be a corner of the given shape.

(b) This was the most successful part of this question with the majority answering 180°. A few responded 'clockwise' but the most common incorrect answer was 90°.

(c) Just over a quarter of candidates recognised the trapezium. Other common responses were 'rhombus' and 'parallelogram'.

4 (a) The majority of candidates were able to take the reading from the graph.

(b)(i) The table was usually completed correctly.

(ii) Having completed the table correctly many students failed to draw the graph or even plot the points. A few attempted a graph but drew a line through the origin.

(iii) About a third gave the correct answer, 30 visits, sometimes without having drawn the graph. A very common incorrect answer was 1, presumably from 1 intersection.

5 **(a)** About two thirds of candidates answered this successfully and, surprisingly, candidates with lower overall marks outperformed stronger candidates.

(b) About half the candidates answered this part correctly.
The common error was -3 × -2.

(c) This was the most testing part of this question and only the stronger candidates tended to gain the mark.

6 Most candidates scored the mark for $7x$ but few scored for $-3y$. The most common incorrect answer was $7x + 3y$ but $7x + y$ and $7x – y$ were also evident.

7 **(a)** Over half of the candidates identified the correct pair of coins, 5p and 20p. Some weaker candidates introduced new coins such as 2p and 8p.

(b) Candidates were less successful in this part and generally only the more able candidates were successful. Of the two possible correct answers the pair 20p and 50p was seen more often than 2p and 5p.

8 **(a)** Only about a third of candidates correctly solved this equation. An answer of 5·5 was common.

(b) Candidates were more successful in this part although some gave their solution embedded in the equation.

Section B

9 Many better candidates gained full marks in this question some weaker candidates appeared not to understand the instruction to construct the triangle and simply measured lines and/or angles in the given triangle. Candidates tended to make more errors with the angle of 53° than 64°.

10 **(a)** The majority of candidates completed the table correctly but some omitted 1 │ 1, 2 │ 2 and 3 │ 3. Some weaker candidates did not tackle the task in a systematic manner and so repeated some results.

(b) Less than a half of candidates found the correct probability. The common errors were 6/18 (from number of 3s / 18 numbers) and 1/3.

11 **(a)(i)** A high proportion of candidates correctly identified B as the face opposite D.

(ii) Conversely relatively few were able to give the correct number of edges. Answers of 8 (from counting vertices), 14 and 19 (from counting edges/lines on the net) were common.

(b) This part was poorly answered. 48 was seen more frequently than 64. Units were often omitted and, where present, cm^2 was more common than cm^3.

12 Relatively few candidates scored full marks but a large number scored 1. Most candidates answered the first two statements correctly.

13 **(a)** About half of the candidates answered this correctly. Some used a non-calculator method but often having reached 10% = £18 they then made errors with 5% or adding the amounts.

(b) Many candidates failed to appreciate that they needed to subtract their answer for (a) from 180. A significant number merely repeated their answer to (a).

14 **(a)** The majority of candidates gave the correct scale.

(b) Only about a quarter of candidates found the correct area. Some found the perimeter and others found an area but did not use the scale, for example 7·5 × 12.

(c) Many candidates appeared to simply guess the percentage by eye. Answers of 25%, 35% and 40% were common. Only the stronger candidates had some success with this part.

15 Just over half the candidates scored any marks in this question. Most realised they needed to divide the circle into three sectors but were unable to calculate the angle or percentage. A reasonable number of candidates scored 1 mark for the 'Yes' sector.

B276 Module Test M6

General Comments

Candidates appeared to be well prepared for this paper. Most attempted all the questions.

The weakness appeared to be in shape and space, particularly finding angles with parallel lines and in regular polygons. Another problem was division without a calculator, which many candidates could not do. Many did not have the correct equipment; in particular a ruler and a calculator were necessary for this paper.

Comments on Individual Questions

Section A

1 **(a)(i)** A common error was to work out ((3 × 25) + 4) × 5 getting 395. Powers such as 5^2 were often written as 5 × 2.

(ii) Sometimes neither fraction was inverted, getting 21/40, or both were inverted, reaching 40/21. Those who attempted $\frac{24}{40} \div \frac{35}{40}$ did not know what to do next. A number attempted to change the fractions into decimals and then divide.

(b) Common responses were 0·9, 0·2 or 0·45. Some attempted $4 \times \frac{1}{5}$ and then wrote 1/5 incorrectly, sometimes as 0·5.

2 Many stated the reason as the parallel lines, opposite angles or angles on a straight line. Some put the correct reasons the wrong way round. There was confusion over the term opposite. Many used it in conjunction with the correct terms of alternate and corresponding. There were still many candidates who used 'Z' and 'F' angles rather than the correct terminology.

3 **(a)** Most candidates seemed familiar with scatter diagrams and scored well on this question. Most plotted these points correctly but a few plotted the second point as (600, 20).

(b) A few said it was positive correlation.

(c) The lines were drawn well. A few had a positive gradient and some were not straight or ruled.

(d) The estimates were usually done well, but some misunderstood the scale.

4 **(a)** This was answered well only by the higher scoring candidates. A common answer was $3x - 5$. Some tried to write an equation and solve it. There were others who wrote the correct answer and then tried to simplify it further.

(b)(i) A lot of candidates tried to solve these equations by trial and improvement. The main trouble was calculating 10 ÷ 4, after $4x = 10$, which was often written as 2·2.

(ii) Although terms were added or subtracted, errors were made in the sign. The main problem being 4 – 10, which was usually written as 10 − 4 leading to the answer of 3. On the left hand side a common expression was $5x + 3x$. It was also common to see relevant expressions written down but not in an equation, such as $2x + 6$.

5 (a) It was usual to see 600 ÷ 4 or incorrect division from those who did attempt 600 ÷ 5. A common answer was 125.

(b) A few did not read the question carefully and worked out 2 or 3 tonnes rather than 2·5 tonnes. There were a number of interesting methods used. Some multiplied by 5 and halved, or multiplied by 10 and divided by 4. Errors were made in finding half of 32·30 and surprisingly in adding 64·60 and 16·15. Some tried to find out 5 multiplied by 3·40 rather than 10 multiplied by 3·40. Multiplying by 10 was a problem for many and a common answer to this was 30·40.

Section B

6 (a) This was usually answered correctly. Some reflected the flag in the x-axis.

(b) The usual error was to count one square too few or one square too many either in one direction or both directions. Occasionally the flagstick was on the wrong side.

7 (a) The main problem was those who tried to follow a pattern and wrote the sequence 1 [3] 5 in that order. They did not appear to understand the equation.

(b) It is puzzling that there are still a large number of candidates who plot the points and then do not join them with a ruled straight line. The point (4, 1) was often plotted at (4, 0·5).

(c) The line $y = 4$ was often drawn as $x + y = 4$ or $x = 4$. Many who drew the correct line only drew the segment from $x = 0$ to $x = 1$.

(d) Many candidates did not have two lines or they had two parallel lines, and so they did not have a point of intersection. There were some who wrote the correct answer even when they had the wrong lines, which suggests that they solved the two equations.

8 (a) The most common responses were 5 × 6·4 (without dividing by 2) or 5 + 6·4. Numerous attempts at Pythagoras' Theorem suggested confusion between area and perimeter.

(b) Few candidates used the correct formula. Incorrect formulae used included 4^2, π × 4, 2 × π × 4 and $(\pi \times 4)^2$.

9 There were many good responses, but some candidates did not evaluate the given expressions. Common errors were in evaluating expressions A and C. Some candidates worked out $(3x)^2$ and $(4x)^3$. This question evidenced a lack of understanding of the order of operations for some candidates

10 (a) This was found to be difficult. Many candidates thought the triangle containing the angle a was equilateral and gave 60° as their answer. Others did divide 360 by 5 and either got 75° as an answer or 72°. Another incorrect answer was 108°, usually from 180 – 72.

(b) Common answers were 120°, probably from 180 – 60 or 72°, from 360 ÷ 5.

11 This was not answered well. Many candidates chose D and B, while some did give A as the answer to the first part.

12 **(a)(i)** Many candidates failed to interpret the stem and leaf diagram correctly. Some answers reflected the lack of understanding of the words 'median' and 'range'. Median was generally understood, though finding the middle correctly was beyond many. A lot of the candidates lost credit here by giving the answer as 4.

(ii) It was not uncommon for the answer for the range to be correct when the answer to the median was wrong. A common answer was 202 – 243, or to calculate 243 – 208 = 35.

(b) This part was answered well. Some answered without providing any evidence to support their statement. Some calculated the mean which was unnecessary. Some misunderstood the use of the range.

(c) This was well answered. Sometimes 0·9 was written as the answer, or a miscalculation would lead to an answer of 0·11.

B277 Module Test M7

General Comments

Overall candidates scored better on section A than on section B, although examiners felt that candidates' attempts at the reasoning questions on the latter showed an improvement from previous papers.

The algebraic techniques demonstrated by these candidates were perhaps stronger than their arithmetic skills in many cases. Knowledge of tables and basic arithmetic skills were often poor. In particular, division was often attempted via repeated subtraction or addition. Decimals were generally weak.

Time was not a problem and, except for questions 5(c) and 13(b)(ii), only a few of the weaker candidates omitted questions.

The vast majority of candidates took the B277 version of M7. Just a small cohort of about 400 candidates took the B247 version, on the last occasion when the J516 specification was offered. Their performance on average was markedly worse than the cohort taking B277. For instance, the arithmetic weaknesses referred to above were even more prevalent on B247.

Comments on Individual Questions

Section A

1 **(a)** This ratio question was answered well, with the majority getting the right answers. Just a few could not divide by 3 (often 24 ÷ 3 = 7, leading to an answer of 14), or did not multiply by 2. A few gave 16 : 8 as the answer instead of 16.

(b) There were many correct answers to this aspect of ratio, but this time by far the most common error was to assume that there were 20 grapes in total. Thus, 20 ÷ 10 was the starting point for many candidates, giving an answer of 4.

2 **(a)** Candidates are expected to know the squares of integers up to 15^2, and their corresponding square roots. Some did, but many did not. Some knew that the answer when squared, had to equal 169, but poor arithmetic meant that their attempts at trying to find the answer by multiplication trials, often failed. A small number gave their answer as either 13^2 or 13 × 13.

(b) Most candidates could not cope with changing 2/9 to a recurring decimal. Even if they knew what to do, their division skills were not up to the task, with many not knowing how to cope with either the decimal point in their answer or the remainder 2 at each stage of division. 4·5 was a common wrong answer, from calculating 9/2. Only about 20% of the candidates gave the correct answer.

3 The correct answer of 25 was seen often, but candidates had various strategies to arrive at this and their working was often muddled. For instance, many used 10 × 0·4 = 4 without saying it was 10 jugs = 4 litres. Having reached this, they got to 10 litres by another lot of 10 jugs then half this. Some gave the answer 2·5, which received partial credit; again it was not always clear whether the candidate had realised that 2·5 jugs were a litre, or had used a wrong conversion to millilitres or had gone wrong in dividing 10 by 0·4. Some resorted to lists of multiples of 0·4 to achieve their answer.

4 **(a)** There were many successful attempts at writing a formula here. A few candidates did omit the 'C =' but most candidates earned a mark for using 120n. Occasionally, 180n + 120 was seen instead of 120n + 180. Although not penalised, £ symbols were often written in one or more parts of the formula.

(b) Most candidates used an arithmetic approach rather than starting with an equation and there were many good solutions. The arithmetic, however, let many down. Many added repeated 90s, often making mistakes. 1200 – 480 = 820 and 720 ÷ 90 = 80 were common.

5 **(a)** Many candidates calculated the value correctly. However, a variety of wrong answers (often −6 or −7) came from lower-scoring candidates.

(b) Most could plot their point but many failed to join up the points. Some good curves were seen, but also many poorly-drawn attempts, with tramlines and feathering etc. Some curves stopped short of the top points, perhaps not going above the x-axis. A few candidates joined the points with straight-line segments.

(c) Some candidates tried to solve the equation by trial and improvement. Many who did know what they were doing only gave one solution. Many who had not joined their curves left the answer space blank.

6 There were some excellent solutions, mostly from those correctly and efficiently using the formula for the area of a trapezium to obtain the cross-section as 24 cm^2, then multiplying this by the length 15 cm. Those splitting up the cross-section were often less successful, with some forgetting to divide by 2 for the triangle. Some split into a cuboid and triangular prism, with correct results for cuboids being much more common than for the triangular prism. As well as these good attempts, which were in the minority, there were many poor solutions, with common errors being to multiply or add all four of the lengths given. There were also many errors in arithmetic. Some quoted the formula for the area of a trapezium, which is given on the formula page, but had no idea how to use it.

7 **(a)** Nearly 70% of the candidates expanded the bracket correctly. Common wrong answers were 6x + 15 and 6x − 5, whilst some spoilt their answer by further work.

(b) The best candidates solved the inequality competently. Some candidates got as far as 4 by trials or by solving an equation. Some who attempted to solve the inequality made errors such as obtaining 5x > 12 or 4 > x + 3 as their first step from the given 4x > x + 12.

(c) Having realised that the sequence went down in 3s, by far the most common answer was n – 3. Almost 40% of the candidates did better than this and got as far as using 3n, but the correct answer of 100 – 3n was generally seen from only the strong candidates.

Section B

8 (a) Only about a third of the candidates found the circumference successfully. Many candidates found the area; others omitted π or used π × *r*.

(b) There were quite a few correct responses, but also combinations of circumferences, multiples of circumferences and $\pi \times 1{\cdot}5^2$. Some found the perimeter of the 3 m circle and multiplied that by 1·5.

9 Over half the candidates gained both marks here. Poor arithmetic meant that candidates using the correct method were not always successful. Some candidates did not know how to proceed. Others made good use of the diagram and used the technique of halving the difference and then a step method to get to the midpoint. Subtraction of the coordinates and halving was a common error; unfortunately, the *y*-coordinate of 4 could also be obtained using this wrong method.

10 The majority of candidates recognised positive and negative correlation but did not always use correct terminology for the strength of the correlation. Some candidates wrongly thought that the right-hand diagram showed no correlation.

11 (a) About half the candidates scored the mark here, often for stating 'corresponding' angles. It was good to see more candidates using this terminology rather than 'F' angles. A few tried alternate angles but usually did not earn the mark as they did not also refer to the (vertically) opposite angles as was necessary. Explanations via allied angles (or co-interior angles) were extremely rare. Weaker attempts often just referred to the angles being equal because the lines are parallel.

(b) Many candidates calculated the angle correctly; a few had the correct method but made an arithmetical error. The common error was to treat the triangle as isosceles. A few candidates used 160° or 360° as the sum of the angles in a triangle.

12 (a) This was a well-answered question. The majority of candidates recognised the required method and successfully used midpoints and frequencies to arrive at the correct answer. Some did not gain the final mark as they wrongly rounded to 118 and did not show the more accurate answer in the working. A few calculated the sum of *fx* and then divided by 5 instead of 23. Some divided the sum of the frequencies by 5. Very few candidates used end points or forgot to use the frequencies.

(b) This was a very poorly-answered question with only a few candidates showing a clear correct calculation of percentage. A few managed to get the correct answer using trials but this method mostly led to answers of 7 or 7·5. The most common wrong answers were just 6·8 or 92·7/6·8 =13·6 or 92·7/85·9 = 1·079. It seemed as if candidates, having learnt non-calculator methods, had no knowledge that the percentage decrease is the fraction '$\frac{\text{decrease}}{\text{original}}$' converted to a percentage and were unable to apply it in a situation where a calculator was definitely needed.

13 (a) There was much confusion about relative frequency. There were some correct answers of 0·16, and a few gained a mark for a correct fractional answer, but many candidates gave 6·25 as their answer, having calculated 500/80 instead of 80/500. Another common error was to calculate 500/6, giving 83·3.

(b) (i) Candidates very rarely compared 1/6 and 0·16 but many were able to gain the mark with a comparison of 80 and 83·3 or 6 and 6·25. Many candidates struggled to express themselves clearly.

(ii) Fewer candidates knew what was required here and this question was not attempted by 20% of the candidates. There were many answers of the 'it wasn't exactly right so it wasn't fair' type. However, a reasonable proportion of candidates suggested the other numbers should also be tested or recorded. Some realised that the dice might not have 6 faces. Few candidates recommended that more trials should be carried out.

14 About 35% of the candidates rearranged the formula successfully and gained both marks. Some other candidates showed a clear enough method to gain a mark for a correct first step or gave an answer with the correct order of operations used but one sign error. It was pleasing to see a clear division line used by the great majority of the candidates who got that far.

B278 Module Test M8

General Comments

A good proportion of candidates coped well producing some excellent results.

However, many other candidates were out of their depth, often with scores in single figures. In general, the better work was characterised by the presence of working and the good use of formal algebra. Some weaker responses to questions involving interpretation or reasoning were very poor. Algebra is clearly an area where many candidates struggled. Those who adopted reverse flow chart methods to solve the equation in question 4 and to rearrange the formula in question 6b rarely gained any marks. At this level candidates should be encouraged to use formal algebra.

Overall there was a balanced range of scores for the paper with slightly fewer scoring under 10 than over forty.

Comments on Individual Questions

Section A

1 **(a)** Those starting with improper fractions were more successful than those who dealt with the whole numbers first. Those who used mixed numbers could not deal with the fact that $\frac{2}{3}$ was greater than $\frac{1}{12}$. This often led to a final answer of $2\frac{7}{12}$. Sadly, $\frac{37}{12}-\frac{5}{3}$ often led to $\frac{32}{9}$ but did at least gain the first mark. A surprising number slipped up by writing $3\frac{1}{12}$ as $\frac{36}{12}$. On the whole, however, the better candidates gained 3 marks.

(b) Not as well done as part (a). Weaker candidates often worked with mixed numbers leading to the answer $3\frac{1}{6}$. The correct approach was often spoiled by careless mistakes in converting to improper fractions. There were also many careless errors in multiplication. For example, $\frac{7}{2}\times\frac{4}{3}=\frac{28}{5}$ or $\frac{21}{6}\times\frac{8}{6}=\frac{168}{6}$. Others inverted $\frac{4}{3}$ before multiplying.

2 Just over a half of all candidates scored both marks. Many worked through the question as an equality and obtained $x = 2{\cdot}5$. Others obtained $4x \leq 10$ but then gave $x \leq 2{\cdot}2$ or $x \leq 0{\cdot}4$. Some candidates, however, started with $4x \leq 16$ as the first step.

3 Just over a half of all candidates scored full marks. However over a quarter scored no marks. Other candidates drew enlargements with other scale factors, notably $\frac{2}{3}$ or $\frac{1}{2}$. Others picked up marks for a correctly sized image in the wrong position.

4 Roughly equal numbers scored full marks or none at all. The stronger candidates coped well showing well laid out algebraic solutions. The majority struggled to deal with the fraction term, often forgetting to multiply one of the terms in $x - 1$ by 2 whilst others multiplied $4x - 7$ by 2. Many attempted to rearrange the equation without removing the fraction, almost always without any success. The most successful candidates started with $2x - 3{\cdot}5 = x - 1$, but even then some went on to make errors in rearranging these terms. There were a few attempts at trial and improvement with only the occasional success seen. Those using the reverse flow diagram method rarely gained any marks. It was extremely rare to see any candidates check their solution.

5 (a) Most knew where to find the median and approximately 75% of candidates gave the correct answer. The most common error was 13.

(b) Only slightly fewer were successful on this part. A small number of candidates picked up a mark for 44, forgetting to subtract from 50. A common incorrect answer was 5.

(c) Some candidates had been clearly prepared to look for one comment about the medians and another about spread but many achieved one mark after combining their two statements. Some candidates said that both gardens had the same frequency at 12 but failed to mention medians. Some concentrated on long worms or short worms but rarely both.

6 (a)(i) Many candidates picked up both marks whilst others earned one mark for factors involving 10 and 2 with incorrect signs. Other factors of 20 were very rarely seen.

(ii) Many candidates did not see the connection with part (i) so started again – often giving just one answer. Weaker candidates got the signs wrong when solving from quadratic factors. Overall, about a half earned the mark in this part.

(b) Many good responses were seen, earning all three marks. A significant number failed to cope with removing the brackets and $3xy$ and $3x + y$ were both common errors. Some attempted to rearrange without removing the bracket first. A surprising number got to $2y = 3x - 4$ and then either stopped or went on to square or root the right-hand side of the equation. Many simply divided the right-hand side by five or after some rearranging gave an answer which had y on both sides. Those using the flow chart method scored zero.

Section B

7 (a) Very few were able to substitute $^{-}1$ into the equation successfully with $^{-}2$, $^{-}1$, 2, 1 or $^{-}4$ common with the occasional $^{-}6$. The negative value of x and the minus signs in the equation were too much for almost 70% of candidates.

(b)(i) Most were able to plot the points successfully though errors were made with $(^{-}3, 18)$ whilst using the vertical scale. Very few appeared to know to expect a parabola and many strange 'curves' did not seem to alert candidates to the wrong answer. Many joined their points with ruled lines and a small number did not even attempt to join the points.

(ii) All but the weakest attempted to read off values at $y = 10$ but many only gave one of the two values. Some read off $2{\cdot}8$ then tried to improve on the solution using trial and improvement.

8 (a) Almost all candidates completed the diagram correctly.

(b) About a third of candidates earned all three marks. The majority of candidates knew that they needed to multiply probabilities, usually reaching $\frac{21}{100}$. Better candidates realised that there were two ways of selecting a marble of each colour but a significant number failed to reach full marks after writing $\frac{21}{100} + \frac{21}{100} = \frac{42}{200}$. A small number evaluated the probability of picking two marbles of the same colour. Weaker candidates often added the fractions.

9 **(a)** This was answered well by almost all candidates.

(b) More able candidates coped well and earned all three marks. There were the usual expected mistakes, of course, of multiplying by 0·64 or by 0·36, even of multiplying by 1·64. Some lost the final mark for not writing the answer in standard form.

10 **(a)** Very few candidates scored any marks on this part. Most candidates attempted to explain similarity in only very general terms, e.g. 'enlargement', or 'the angles are the same (because of parallel lines)'. Some even said sides were in proportion. Very few, however, said which angles were equal.

(b)(i) At least half of the candidates obtained the correct answer of 18. Many of those with the wrong answer had divided by 3 instead of 4 leading to the common wrong answers of 16 and to a lesser extent 8.

(ii) Fewer candidates achieved success in this part. Common wrong answers included 36, usually following an answer of 16 in part (i), and 30, working on the basis that the triangles were isosceles and that QS = RT.

11 Good candidates scored well with working that was clearly laid out. Many of these candidates used Pythagoras' theorem in triangle ABC and trigonometry in triangle ACD. Those who attempted to use trigonometry throughout were far less successful. If full marks were not earned some picked up method marks either for finding AC or using their AC × tan 65°. A significant number assumed either angle BAD was 90° or that AC was 12·5 cm. Others used the wrong sign in Pythagoras. There were many candidates who had little or no idea of Pythagoras or trigonometry and merely played around with the figures on the diagram

B279 Module Test M9

General Comments

There were many high scoring candidates on this module and although a few found the content challenging in parts, they were generally correctly entered at this level.

The questions on indices, expanding brackets and factorising, rearranging formulae and volume were generally well answered. The more challenging topics on this paper appeared to be problem solving with bounds, gradients of lines and perpendicular lines, inverse proportion and histograms with estimates of mean values.

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

Comments on Individual Questions

Section A

1 (a) There were mixed responses to this part. Although some candidates were able to understand the context and add together the two correct upper bounds of the values given, many were uncomfortable with this topic. Some errors were arithmetic where 60·5 and 50·5 were incorrectly added. Others used incorrect upper bounds such as 55 and 65. Weaker candidates used combinations of upper and lower bounds or more commonly added 50 to 60 and then increased the total by 0·5.

(b) Those that were successful in part (a) generally answered this part well although many did not consider the value 112 as having an upper and lower bound for this problem. Some completely restarted and did not consider their answer to part (a) at all.

2 (a) This part was well answered. The only common errors were to give answers of 0 or 49.

(b) Answers were very mixed. Some understood the negative power and wrote a fraction but then did not evaluate it. Others showed 1/25 in working but then gave an alternate answer on the answer line such as 0·05 or 25. Other common errors included -25, 0·05 or $\sqrt{5}$.

(c) Answers were very mixed again. Most were unsuccessful and common errors included answers such as 4.5, 81 and -81. Some left the evaluation incomplete as $\sqrt{9}$.

3 (a) Many candidates were very well prepared for this question and used the correct terminology of cyclic quadrilateral within their reason. Others critically missed out the word ‘cyclic’ and did not score the mark.

(b) There were many excellent answers using correct geometric reasons with the correct terminology. The key reasons required were that the angle between a tangent and a radius is 90° and also to refer to pairs of angles being equal because of the isosceles triangle BOC or BEC. Those that did not give appropriate written reasons scored marks for finding the correct angle BEC as 70° or showing an intermediate value for one of the key angles within the working. Many candidates scored partial marks by giving these figures; marks were lost through, surprisingly, arithmetic errors within some calculations, or more commonly by giving angle BEC as 55° having found angle BOC as 110°. The justification 'angle between tangent and radius = 90°' was the one most often omitted or had the key words missing.

4 (a) This was very well answered and most candidates were well prepared for the bracket expansion. Most showed clear working. Common errors were in processing the directed numbers in the multiplication or in collecting the x terms in the final answer. A few had problems in multiplying the terms $2x$ and x.

(b) This was well answered by many who recognised the highest common factor of the two terms as $2x$. A few, having recognised the factor, made errors in dividing the terms to create the bracket. Others factorised by a partial factor such as x or 2 and achieved partial marks as a consequence.

(c) Fewer were successful in this part but it was pleasing to see the number of good attempts at factorising the quadratic. Many scored 2 marks for the factorisation but then either neglected to give the solutions or were unable to obtain them correctly from the factors. Some tried to convert the solution 9/5 to a decimal and made an error and this was unnecessary. Weaker students were unable to factorise correctly and attempted a balance type method suitable for linear equations that usually led to the attempt being abandoned.

5 (a) There were a full range of answers to this question. The more successful candidates showed clear working for the gradient, making no errors in obtaining the value 3. Others, having found the gradient, went on to give an answer of $3x$, or an equation $y = 3x + 1$. They scored partial marks but not both marks unless it was absolutely made clear that the gradient was 3. For those that struggled with this question, it appeared that lack of recall on the method for finding the gradient was the problem. This question as a whole was left out by candidates more frequently than any other on this paper

(b) The best candidates had some knowledge of the properties of the gradients of perpendicular lines, but did not always show that the gradient of CD was -1/3. It was often simply stated that this was the case without any supporting evidence. The majority of candidates had little idea on this part.

6 The majority of candidates were able to score one mark by referring to the time or location of the survey being flawed because the population profile of people in the sample would be restricted by these factors. It was crucial for candidates to link the population profile to their reason and some did not go far enough, giving answers such as 'He should try different places' or 'Do the survey on other days of the week.' The second reason was only occasionally awarded as candidates were expected to clearly link systematic sampling to possible problems in the population profile such as gender or age or some other practical issue.

Section B

7 There were many excellent answers showing clearly the method of using the tree diagram and knowing that the second probabilities were dependent on the first set. A large number of candidates lost unnecessary marks, however, by converting the fractional probabilities to decimals and then rounding or truncating the decimals. Final answers as a result were inaccurate. Some did not recognise the dependency of the second sweet's probability and gave incorrect solutions such as $\frac{5}{12} \times \frac{5}{12} = \frac{25}{144}$. Almost all candidates recognised the fact that the answer came from the product of two probabilities.

8 **(a)** There were many good answers with clear methods showing the two required steps. The cube root was occasionally ambiguous and needed to clearly cover the entire fraction. The most common error was to either show a square root at the final stage or to do the two operations in the incorrect order – cube rooting first before dividing by 6.

(b) This was generally well recognised as the difference of two squares. Some went on to give 'solutions' and these were ignored.

9 **(a)** This was answered poorly. Those that recognised the form of equation for the proportional relationship as $F = \frac{k}{d^2}$ were usually successful in completing this part, although there were issues for some in resolving the fraction to find the correct value of k. For many the problem was converting the proportional relationship, given in words, into symbolic form. Most common errors were to look for an $F = \frac{k}{d}$ or $F = kd^2$ type equation.

(b) Those answering part (a) well almost always gave a correct value here. The problem for most, however, was using a completely incorrect equation from part (a). Some credit was given for those that used an incorrect $F = \frac{k}{d^2}$ type equation in this part.

10 **(a)** There were many very good solutions for the volume of the hemisphere with most finding the volume of a sphere first before halving. Some neglected to halve the volume and others used an incorrect formula for the volume of the sphere, with $\frac{4}{3}\pi r^2$ being the common error, despite the correct formula appearing on the formulae sheet.

(b) Most were able to find the volume of the cone correctly and then add it to their answer to part (a). Some did not consider the hemisphere at all in this part, however, and gave the volume of the cone only as the volume of the spinning top.

11 **(a)** Answers were very mixed. Many did try a $\frac{\sum fx}{\sum f}$ type calculation but using incorrect mid-values for the groups, or the widths of the groups, was a very common error.
Others mistakenly summed the mid-values then divided by 4.

(b) There were some excellent histograms drawn with candidates showing the correct frequency densities before attempting the graphs. A common error was to draw the first bar on the histogram from 0 to 40 instead of from 20 to 40. Many candidates were unable to calculate correct frequency densities, however, and some did not even consider them at all. This topic remains a variable one for candidates.

12 This was very well answered by many candidates who generally used Pythagoras' Theorem to calculate the length of AC before halving this to find OC. Most then used the tangent ratio to calculate the required angle. Some candidates using this method did make a premature approximation for OC leading to an inaccurate final answer. Others used AC within the trigonometric method in the final part rather than OC. The most common error among weaker candidates was to consider the length of AC as 30 without calculation, and then to attempt a trigonometric method with this incorrect value.

Grade Thresholds

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

Unit Threshold Marks (Module Tests)

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
B271	Raw	50								30	15	0
	UMS	59								40	20	0
B272	Raw	50							36	23	14	0
	UMS	70							60	40	30	0
B273	Raw	50							27	14		0
	UMS	79							60	40		0
B274	Raw	50						37	22	14		0
	UMS	90						80	60	50		0
B275	Raw	50						28	14			0
	UMS	99						80	60			0
B276	Raw	50					30	15				0
	UMS	119					100	80				0
B277	Raw	50				26	13					0
	UMS	139				120	100					0
B278	Raw	50			28	14						0
	UMS	159			140	120						0
B279	Raw	50		28	14							0
	UMS	179		160	140							0

Notes
The table above shows the raw mark thresholds and the corresponding key uniform scores for each unit entered in the January 2009 session. Raw marks in between grade boundaries are converted to uniform marks by a linear map. For example, 21 raw marks on unit B278 would score 130 UMS in this series.

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

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

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

Statistics are correct at the time of publication.

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