Rewarding Learning

GCSE Mathematics Two – Tier Modular (Summer Series) 2007

Chief Examiner's Report

GCSE MATHEMATICS MODULAR TWO TIER SUMMER 2007

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Grade Boundaries: 2007 (GCSE)

Grade	A*	A	B	C	D	E	F	G	U
Mark Range	400-360	359-320	319-280	279-240	239-200	199-160	159-120	119-80	79-0

Module 1

These papers were suitable for all appropriately entered candidates and contained a good selection of questions catering for the full ability range. Candidates generally showed little working out and this contributed to them failing to gain method/part marks for some questions. The examiners felt that the language appeared to be at an appropriate level and the questions allowed candidates to respond positively. As many questions were common to the traditional linear suite of papers, the comments will be similar to those for their appropriate counterparts. As usual a remarkable number of candidates seem to attend the 'with calculator' paper 'without calculator', indeed without ruler, protractor, etc.

Paper 1 (non-calculator)

Q.1 (a) Part (a) was generally well answered, although the fraction was not always in lowest terms.

(b) Few candidates could convert the fraction to a percentage in part (b).

Q.2 This sequence question was very well answered overall.

Q.3 Although many realised they had to subtract the dates, a large number were unable to do so.

Q.4 Part (a), solving a simple equation, was well answered but few understood what was being asked in part (b).

Q.5 Recognition of different types of numbers proved a good differentiator, with most candidates attempting all parts.

Q.6 (a) This was fairly well answered, writing times in 12 hour form.

(b) Part (b) concerning the angle on the clock face was too difficult for most.

(c) Many attempted to calculate the number of seconds between the times.

Q.7 Well answered by most candidates who seemed confident in using negative numbers in a context.

Q.8 Semi-successful attempts were often made to find the cost of two and a half kilogrammes of potatoes, but only a minority could round a number to the nearest 100 and few could calculate with powers or roots.

Q.9 The real-life 'better value' problem was rather too complicated for many candidates, but proved a good opportunity for the thinking candidate.

Q.10 Reading the pie chart in part (a) was accessible to most, but without protractors or rulers, constructing the pie chart in part (b) was very difficult.

Q.11 Only the strongest candidates calculated the angle sizes correctly.

Q.12 The basic algebra of this question was beyond most of the entry, who could add $3x$ to $2x$ but not subtract $3y$ from $5y$.

Q.13 In part (a) very few candidates could calculate 40%, while in part (b) very few could complete all the details of the cheque correctly.

Paper 2 (with calculator)

Q.1 This should have provided a good start to the paper but some candidates had no idea about names of quadrilaterals and many only recognized the trapezium and rectangle.

Q.2 The pictogram questions were well answered by many candidates.

Q.3 Many candidates made a reasonable attempt at this question on compass directions

Q.4 What appeared to be a straightforward tabular calculation proved too difficult for the majority of candidates.

Q.5 Work on patterns and sequences was generally well done.

Q.6 There was a very mixed response in recognizing modal number and range.

Q.7 Not everyone recognized the parallelogram, many could not count squares and half squares for area, but the coordinate work was reasonably successful.

Q.8 Reasonable attempts to answer the 3D net question were common.

Q.9 In part (a) calculation of 5% was beyond most candidates and in part (b) confusion reigned.

Q.10 This use of calculator calculation was not well done.

Q.11 Without shown method, candidates generally achieved little, save the best who confidently solved this problem on charge per hour.

Q.12 Work on bearings was generally poor or non-existent, although again the best candidates produced perfect answers.

Q.13 This discriminator for the top grade proved to be beyond the comprehension of all but the best candidates who completed the necessary algebraic manipulation to find the answer.

Module 2

The general opinion of examiners was that the two M2 papers were very fair and appropriate for this level of ability. The majority of candidates attempted most questions and they appeared to have enough time to complete the papers. However most examiners thought that the standard of performance was very poor with a large percentage of candidates scoring below 20%. Very few candidates scored over 40 and some examiners felt that many candidates were entered at the wrong level. It was felt that candidates performed better on Paper 2. A number of candidates appeared not to have a ruler and protractor and some even appeared to do Paper 2 without a calculator.

Paper 1

Q.1 Many candidates had difficulty subtracting the two times but most knew to multiply by 60 to change minutes into seconds.

Q.2 Many candidates did not understand the terms 'cube' and 'cube root'. Most candidates thought that the square of 0.3 was 0.6 or 0.9.

Q.3 The addition of simple algebraic terms here was generally well done.

Q.4 Very few candidates filled in the cheque correctly. Most left out who the cheque was payable to ie Eastwood School. One good thing is that very few candidates are making errors with money notation.

Q.5 Some candidates did not have a ruler or protractor and very few showed any working out for the pie chart.

Q.6 Most candidates were able to substitute the number –4 into the function machine but not the letter n. They forgot to use brackets and wrote $4n + 6$ instead of $4(n + 6)$. Many even wrote $24n$.

Q.7 This question on interior angles was fairly well done.

Q.8 The majority of candidates only gained 1 mark for plotting one point of the line $y = 2x + 1$ correctly. Very few were able to draw the line $y = 3$ and most candidates did not label their lines.

Q.9 Many candidates gained one mark for finding the total of 65 and 135 but not as many were able to get 135/200 as a percentage.

Q.10 This question was very badly done. Candidates struggled to explain why the interior angle of a regular polygon is 120 degrees.

Q.11 Very few candidates were able to factorise correctly.

Q.12 Very few candidates gained full marks here. They either didn't understand index form or the word 'product'. However many gained 1 or 2 marks for dividing and getting the prime factors.

Q.13 Many candidates did not draw the polygon at the correct central values and some did not join up the points. Some struggled with the vertical scale and found difficulty plotting 8 and 32 at the correct height.

Q.14 Most candidates were unable to get the *n*th term of this sequence; many wrote $n + 3$.

Q.15 This fraction question was very badly done with only a handful of candidates getting any marks. Many candidates added instead of multiplying and got an answer of 25/24. Some candidates even managed to get the correct answer from a totally incorrect method ie $3/8 + 2/3 = 3/24 + 2/24 = 5/24$!

Q.16 This question was left out by many candidates and those who did attempt it rarely gained more than 2 of the 4 marks. Examiners felt that this question seemed too difficult for the weaker candidates and without a calculator they simply froze or gave up. Some examiners felt that this topic should have been tested with easier calculations.

Paper 2

The first two questions were very well done and therefore served as good opening questions.

Q.3 (a) In part (a) the majority of candidates failed to gain the marks for units of volume and some candidates added the lengths to get volume.

(b) In part (b) many candidates ignored the word 'different' and gave the same three lengths in a different order.

Q.4 This decision tree question was very well done.

Q.5 Candidates found this question challenging. Most made a good attempt at part (a) and were able to find the next two terms of the sequence but very few were able to find the first three terms in part (b) when given the *n*th term.

Q.6 Most candidates failed to get the last mark for the Bank Statement. They gave the answer 20^{th} and 23^{rd}.

Q.7 The scatter graph was well done.

Q.8 Many candidates had difficulty with these bearings and very few gained the full 7 marks.

Q.9 A few candidates tried doing these difficult calculations without a calculator and many made mistakes in the question. Many did not understand 'three significant figures' and many did not use brackets where necessary when feeding numbers into their calculator.

Q.10 Many candidates did not know the formula for the area of a circle and therefore gained no marks in part (a) and some used the formula for circumference. Only a handful of candidates were able to change cubic centimetres into cubic metres. Many worked out the cube of 8.5.

Q.11 This question was badly done. Most candidates simply subtracted the coordinates to find the mid-point.

Q.12 This question on percentages was badly done. Many candidates gained no marks even though they used the correct method and put in a lot of effort; some lost marks due to an arithmetical error and incorrect money notation. Many candidates lost marks because of the comma in the number. They mixed this up with the decimal point.

Q.13 This question was badly done. Very few candidates knew to use Pythagoras' Theorem. Many just added the sides and gave 4.6 as the answer.

Q.14 Very few candidates were able to expand these brackets. Some gained the first mark for eliminating the brackets in part (a). Only a handful were able to find the square of $(x - 3)$.

Module 3

The papers provided almost complete coverage of this module from the specification. The layout of each paper was sufficient in allowing the weaker candidate to complete many of the earlier questions. For the slightly better candidate, problems seemed to develop around Q.9 in Paper 1 and Q.11 in Paper 2. In Paper 2 most candidates attempted all questions while in Paper 1 some questions were not always attempted. There was no indication that candidates had any difficulty in completing either paper in the allocated time. However, there were a large number of scripts which would suggest the candidates had been entered for a module beyond their ability. At the other extreme there were many candidates fully prepared for this module and scored very highly on both papers. As in previous examination series, many candidates, including the very strong ones continue to lose marks on *Using and Applying Maths* questions in the strands of *Communication, Reasoning and Problem Solving* as exemplified in Q.3 (b) and Q.7 on Paper 1 and Q.14 (b) on Paper 2. The level of language used in the papers was fine throughout, with many key words highlighted and the need to 'show your working' regularly emphasised. This often enabled candidates to pick up part marks even if the final solution was not reached. It is important to emphasise to candidates in Paper 2 (calculator paper) the importance of writing down some method or working as often candidates lose all available marks in a question by simply doing a calculation on the calculator and writing down only their final solution. If this is incorrect then no part marks can be awarded without working.

Paper 1: (non-calculator)

Q.1 A lot of candidates were able to get the available 3 marks. For those who did not, many only picked up 1 mark for identifying the point (0,1) but were unable to deal with the gradient or identify a second point.

Q.2 The topic of percentages examined in this question was generally well known. Any errors made appeared to be through not reading the question carefully enough or through basic numerical errors in calculation. Some candidates gave the percentage for adults and for those who did work with teenagers many gave 67.1% as the incorrect answer.

Q.3 Whilst many correctly gave 60˚ in part (a) it was hard to distinguish in the latter two parts those who really understood polygons. In part (b) explanations were often vague or general, rather than specific to this question with many simply quoting facts related to any polygon. Their overall lack of understanding was further transmitted into part (c) with very few giving the correct answer here.

Q.4 Whilst many were successful in solving the equation in part (a), much fewer were successful in factorising in part (b). A large number of candidates seemed unfamiliar with this topic.

Q.5 This question was problematic for many candidates. The requirement for an equation was overlooked and for those who attempted to form an equation, few saw the connection that for the **overall** diagram to be a square the lengths of the two sides had to be equated. Too many took one single tile to be a square, thus equating $x = 3x - 10$ and simplifying the question greatly. In other cases candidates simply added sides and equated to either 90˚ or 360˚! For those who were successful in forming the correct equation in part (a) nearly all went on to solve it correctly in part (b) to achieve full marks.

Q.6 Most candidates were able to offer a reasonable attempt to this question by a variety of methods. For those who used the division by prime factors some made a numerical error at some point. For those who offered the factor tree approach some did not continue far enough to ensure all factors were prime. The idea of index notation was recognised by most. However, some candidates still persist in simply listing the prime factors or indeed including an addition symbol thus ignoring the request for a **product** of primes.

Q.7 This question proved problematic for nearly all candidates. Only a handful of candidates achieved the correct solution. Whilst part marks were available, often the layout of the candidates work and a selection of methods offered made it virtually impossible to award any of these marks. Too often candidates simply took the figures given and either added, subtracted, multiplied or divided rather than making any reasonable attempt to interpret what the question was actually asking. The quickest approach of identifying the required calculation 1/3 of 5/8 was rarely offered at his level.

Q.8 Many candidates were successful in choosing the correct class interval for the median in part (a) but in part (b) too many plotted the frequencies against the upper bounds rather than the midpoints. There was also a tendency for candidates to join the first and last points to form an enclosed polygon – not a requirement for a frequency polygon!

Q.9 Finding the *n*th term of a sequence caused problems for many. Whilst the difference of 3 was often recognised, most then proceeded to write the *n*th term as $n + 3$.

Q.10 This question differentiated between candidates. While nearly all identified the need for midpoints, some did not know how to proceed using the frequencies. For those who did many were successful in gaining full marks but in a large number of cases a numerical penalty was incurred at some point in the calculation; very often in latter part when dividing by 25.

Q.11 The best candidates were successful in answering this question. However, for the rest of the candidates the idea of finding 16% of £168 and adding it on was the incorrect solution which was generally offered.

Q.12 (a) In part (a) a minority were able to correctly identify where the required quartiles were located. Some then inadvertently subtracted these as opposed to the monetary values.

(b) Part (b) was generally well understood but many were not accurate in their readings.

Q.13 The incorrect answers of 0 or 8 were commonly seen in part (a). In part (b) few candidates knew how to deal with negative indices and for those who did many did not evaluate the final answer and left their solution as 1/16 × 16 rather than 1.

Q.14 Part (a) proved a real discriminator between those who simply knew how to manipulate brackets and those who fully understood the more detailed approach needed to solve a fractional equation question. Incorrect approaches included bringing the denominators up and expanding $3(2x + 1) + 2(6x – 5) = 7$ or forgetting to deal with the right hand side of the equation appropriately when removing the fractions leading to $2(2x + 1) + 3(6x - 5) = 7$. Others simply added the numerators and denominators to give $\frac{8x-4}{5} = 7$.

However for the best candidates the correct technique was often fully executed to achieve the 4 available marks with ease. It was rare to see a correct answer in (b) with many starting to expand the brackets on the numerator and denominator.

Paper 2: (with calculator)

Q.1 This question on the bank statement was either very poorly attempted or generally well answered. Some candidates simply had no idea what to do with such a document. For those who knew how to handle the payments in/payments out, few gave the correct dates in the final answer, with the majority of candidates writing down 20th to 23rd or 20th to 24th thus not understanding that until the payment in of £245.56 on 25th, the account was still below zero.

Q.2 On the whole this calculation was well done. Some candidates however keyed in the values as written with no regard given to order of operations or no attempt to show correct values for numerator and denominator and thus lost both marks. Occasionally attempts at estimation were given.

Q.3 This question proved a good discriminator. Many of the better candidates answered this question fully. For others there were many diagrams where candidates had drawn ship B from Tuskar Rock rather than from ship A and consequently incurred further penalty in part (b), as the values had already been stated in the question. In some cases there was no attempt made, probably due to lack of bringing the correct equipment into the examination.

Q.4 This question on Pythagoras Theorem enabled the majority of candidates to score full marks. In a small number of cases candidates did not realise they were finding the hypotenuse and proceeded to subtract the two squares rather than add them.

Q.5 All candidates picked up some marks here but an alarming number plotted 1 point wrong thus losing 1 of the available 2 marks. Part (b) would indicate that many candidates were simply not familiar with 'zero' correlation and simply gave positive or negative.

Q.6 Part (a) finding the area of the circle was generally well attempted but a significant number of candidates failed to include the correct units for the final mark. Many candidates made the common mistake of finding circumference rather than area. It was very rare to see a correct solution in part (b). The vast majority of candidates simply multiplied by 100, converting metres to centimetres and did not see the requirement for a volume conversion. For those who perhaps recognised the necessity for a volume conversion several randomly multiplied by 10000 or 1000 not fully understanding the process required.

Q.7 A variety of methods were used for finding the midpoint. For those who knew the formula many answered this question correctly. For those who attempted to draw a diagram some were successful and some only scored 1 of the 2 marks due to inaccurate work. The most common wrong solution offered was by a method of subtraction such as $6 - 2 = 4$ for the x co-ordinate and $4 - -2 = 6$ (or 2) for the y co-ordinate. It was strange to see so many candidates offering this solution. Since this wrong solution lead to the correct x co-ordinate it was essential that working out was shown as requested in the question to ensure candidates were achieving the solution by the correct method.

Q.8 This question on percentages was well attempted. There were a few misreads of the words increased and fell. Unfortunately for many who approached the question correctly a penalty was incurred by not recording the answer correctly in monetary terms including the required 2 decimal places as £125237.50**.** A minority of candidates thought the percentages could be combined and simply found a 0.7% increase rather than dealing with the years separately.

Q.9 In part (a) many candidates achieved both marks. The usual error of expanding the second bracket as $8x + 4$ was still commonly seen. In part (b) very few gave the correct approach with the majority of candidates simply opting for $x^2 + 9$ or $x^2 - 9$.

Q.10 A disappointing response to what should have been a relatively straightforward question. Few candidates seemed to realise that the solutions could simply be read from the graph and as a result many tried to solve the equations algebraically.

Q.11 Only the very best answered this question correctly. Few were able to form the required equation in x. Several tried to introduce their own variables or in fact denoted x as a child's ticket. The requirement to form an equation was ignored by many and a purely numerical solution does not achieve any marks.

Q.12 (a) In this part on simultaneous equations, again the requirement to 'show your working' and the warning not to use trial and improvement were ignored by many. For those who did offer the correct approach most gained the 2 available marks.

(b) The quadratic equation in this part was only solved by a small number of candidates. The process of factorisation was seldom seen and for those who did attempt it, factors of 1 and 12 were often used. For candidates who offered the quadratic formula few were able to see it through to completion.

Q.13 (a) This question on trigonometry was generally well answered. For those who were unsuccessful in part (a) many were able to proceed correctly into part (b) and gain the remaining two marks.

(b) However in part (b) it was alarming to see the number of candidates using an invalid formula for the volume of a cone despite this formula being supplied in the exam paper!

Q.14 Most candidates were able to access the first mark for the angle at the circumference of a semicircle. Few were able to offer any reasonable explanation in part (b) with all sorts of circle language being used at random without any real regard to this specific question. On occasions candidates used the information in part (c) retrospectively to offer an explanation in part (b). This was obviously not an acceptable solution as it greatly simplified the question. In part (c) many were successful in finding the third angle of this triangle by a variety of methods but too many started by assuming triangle CGE was isosceles and so also marked angle CEG as 40°.

Module 4

This module appeared to be accessible to most of the candidates although there were indications that some of the entrants were not capable of the work at this level. Paper 1 was better answered than Paper 2 with only the very best candidates successfully attempting the latter questions in both papers.

Paper 1

Q.1 The candidates who began with the statement that £168 = 84% had little difficulty in finding 1% and hence 100%. Too many candidates did not appreciate that the word 'originally' naturally led to this method of solution.

Q.2 A straightforward question on cumulative frequency for which many correct solutions were seen. Virtually all candidates answered part (a) successfully. In part (b) marks were lost for poor readings of the horizontal scales and, surprisingly, in part (c) many candidates gave the answer 62.

Q.3 (a) Those candidates who correctly removed the fractions by the use of a common denominator had little difficulty in arriving at the correct solution. Many trivial errors were seen in expanding brackets, collecting terms and dividing to get the value for x. Working such as $22x = 55$ leading to $x = 22/55$ was unfortunately all too common.

(b) Considering that this question only attracted 1 mark it was disappointing to see many candidates expanding the brackets top and bottom and cancelling pieces of the resulting terms in the numerator and denominator. This topic was certainly not familiar to the majority of the candidature.

Q.4 For many these were three easy marks with correct use of the distance formula giving the answer immediately. Unfortunately too many incorrect formulae were seen and many sign errors were made even with the correct formula. Some candidates calculated gradient and others found a mid point.

Q.5 (a) Most candidates found the drawing of the required inequalities easy to accomplish. Many lost a mark for incorrect shading or failing to shade at all.

(b) This part-question attracted full marks from almost all the candidates.

(c) It was disappointing to see answers only appearing here. Testing some integer values from the required region attracted the first mark.

Q.6 Most of the candidates gained the first mark for noting that 2 was a common factor. Only the better candidates then realised that the resulting expression also contained the difference of two squares.

Q.7 A standard question on this topic which was correctly answered by the majority of the candidates. Errors occurred when the calculation of frequency density was attempted using incorrect class widths and occasionally dividing frequency into class width. Many candidates had difficulty setting out the time scale and too many of the weaker candidates produced bar charts.

Q.8 (a) The correct answer of 1/16 was seen in the vast majority of scripts.

(b) Here only the very best candidates correctly worked their way down to $1/8 \times 1/8 = 1/64$.

Far too many errors occurred in evaluating the indices with the negative index leading to a negative value such as $-1/8$. The weaker candidates made very poor attempts at this question.

Q.9 This question proved to be inaccessible to virtually all the candidates with only the very best successfully achieving the correct solution. Most incorrect attempts involved trying to substitute values into the given expression. Marks were obtained in some solutions for noting that OH = r – h and trying to use Pythagoras' theorem.

Q.10 Many correct solutions were produced here from those candidates who noted that one large square equalled 10 components or correctly identified the frequency density scale. Incorrect solutions involved not using areas or incorrectly reading the scales.

Q.11 (a) Most candidates gave correct solutions of $\sqrt{37} - \sqrt{48}$ or π, $3 + \pi$ or 2π etc.

(b) The answer 64 or 8 was accepted for full marks and was achieved by most candidates.

(c) The better candidates noted here that numbers such as 36 have factors such as 3 and 12 which fitted the necessary criteria.

Q.12 This question certainly differentiated between the candidates. The weakest responses saw product interpreted as sum with no marks gained. Many candidates correctly arrived at the quadratic equation $x^2 - 0.5x - 60 = 0$ but were unable to factorise. Those who multiplied by 2 could identify the required factors and proceeded to the correct solutions. Many incorrect uses of the quadratic formula lost easy marks.

Paper 2

Q.1 (a) This question on simultaneous equations was well answered by most of the candidates. Simple errors occurred with addition and subtraction. Candidates should be encouraged to check their solutions in **both** of the original equations.

(b) The fact that 13 is a prime number made obtaining the correct factors relatively easy for most candidates. Many poor responses involved using factors of 12 and incorrect use of the quadratic formula.

Q.2 (a) The use of trigonometry to find OB was spotted by virtually all candidates and completed correctly. Some used the Sine Rule successfully but others incorrectly found AB.

(b) The substitution of OB into the given formula proved accessible to virtually all candidates with many correct solutions ensuing. Some lost marks by rounding off their answer to OB prior to the substitution.

Q.3 A good question on box plots with many correct solutions seen. Some candidates had difficulty reading the scale given.

Q.4 Another question which yielded a large proportion of correct solutions. The straight line graph was easily identified leaving most errors to occur in choosing the correct formula for the first graph.

Q.5 (a) Almost every candidate correctly identified DFE as 90°.

(b) The necessity to explain the reason why DCG was a right angle gave most candidates considerable difficulty. DFG needed a simple explanation as to why it was 90° eg angles on a straight line and then opposite angles of a cyclic quadrilateral gave the reason for DCG to be 90°.

(c) Only the better candidates correctly identified CHG as 111°. Many candidates showed correct working for many angles which could have led to a correct solution but they failed to label them or show them on the diagram and consequently lost the marks.

Q.6 (a) Most candidates correctly used the Sine Rule to find QS.

(b) Here only the Cosine Rule was the correct method required to find PQ as only two lengths and an included angle were available.

(c) The use of ½ ab Sin c to find the area was correctly identified by most candidates but then marks were lost for not realising that the units of the answer were required.

Many poor responses were obtained from the weaker candidates with only basic trigonometry being used. Many marks were lost for early rounding to the answers in parts (a) and (b).

Q.7 Only the better candidates correctly calculated the perpendicular gradient required. Many incorrect solutions used the gradient of parallel lines.

Q.8 (a) Correct graphs were only seen from the better candidates. Many solutions had the graphs crossing the line $x = 90°$ and there were many drawings of Sin x and Cos x.

(b) Some very poor readings of the given horizontal scale were evident even when the correct curved pieces of tan x were drawn.

Q.9 Most correct solutions identified the need to find the length of BE or AE. The angle required, BEA, was then easily found using basic trigonometry. Many candidates identified the wrong angle showing clearly little knowledge of this type of question.

Q.10 (a) Only the best candidates could derive the given equation with some reasoned argument. Many simply rewrote it.

(b) This type of equation was only really accessible to the best candidates. Removing the fractions and simplifying to produce the required quadratic equation proved too difficult for most candidates. Many incorrect attempted removal of the fractions were seen and in many others simple algebraic errors occurred.

Q.11 Most candidates realised that 3 was a common factor of the given expression but then couldn't continue to pair off the four remaining terms to produce the required two terms. Only the top candidates managed to recombine the two factors $(y^2 - 4b)$ and $(x + 3a)$

Module 5

Principal Moderator's Report

While this was the last time that centres will be required to submit coursework for this specification, the teachers' preparation and support for candidates continued at a high standard. As a result the candidates continued to maintain the standard set last year.

Observations on the Use of the Given Data

The few centres that entered candidates for Application of Number used all the given data so as to enable candidates to generate the required evidence to support either Level 1 or Level 2. There was also evidence of centres just using some of the given data (usually time and length) without collecting any further data so that candidates had access to the criteria up to the 3-4 mark band thus providing a positive coursework experience for weaker candidates. Most of the remaining centres used selected data sets as a stimulus for the candidates' own tasks

Observations on Collecting the Data

In most cases, for ease of managing the task, additional data was collected under the supervision of the candidates' teachers and shared by candidates. Although this is acceptable practice, frequently it was clear that candidates did not have sufficient ownership of the planning for the collection of data. Many candidates described how the data was collected but did not explain why identified data was being collected or why the selected method was being used. The sampling method should have been inherent in the data collection process but it was not uncommon for candidates to take a sample from the data collected. This led to redundancy in their strategy.

There was some good practice observed when candidates identified the features (age, type of measurement, size of measurement, gender, conditions under which estimation is to be made) of the data which they could take into account. They then selected 3 of the identified features and planned data collection accordingly; stratifying the sample using a feature or features that may have an impact on the feature initially to be investigated. Stratified sampling was used incorrectly on a number of occasions eg stratifying by gender when investigating the significance of gender.

Observations on Using Statistical Techniques

Candidates mostly selected appropriate techniques to use and demonstrated that they were competent in executing these techniques eg finding means, drawing scatter diagrams, drawing box and whisker diagrams. It should, however, be pointed out that when awarding marks to a candidate for executing a statistical technique (manually or using ICT) the mark awarded is contingent on the candidate demonstrating an appropriate level of understanding through a meaningful application of the outcome to the task. Again it was good to see many candidates using absolute percentage errors in estimations and it was even better to see candidates explain **why** they did this.

Observations on Reflecting and Evaluating

This again was an area in which candidates were weakest, with many focusing on the 'doing' of the task and not taking time to reflect on their results from processing and representing their data. This needs to at least happen following the testing of each hypothesis so that the link to the next hypothesis is clearly established.

Module 6

Foundation Tier

Paper 1

There was a wide range of responses from candidates, and even within centres, some gained single digit scores and others gained 50 or more out of the possible 63 marks. It would appear that certain topics had not been covered in some centres and the weaker candidates often gained few marks beyond Q.6. In general, candidates found this paper more difficult than Paper 2, with very few obtaining over 50 marks.

Q.1 Generally well answered, however many candidates confused the 'pyramid' for a 'triangular prism'.

Q.2 (a) In part (a) many candidates failed to calculate both hour and minutes correctly.

(b) In part (b) only the better candidates answered this question correctly and in many cases candidates converted the 'half hour' to 30 minutes which lead to the common answer such as 3 or 30. Very few candidates answered part (c) correctly and failed to be familiar with the conversion '8km ≈ 5 miles.

Q.3 Many candidates failed to use BODMAS.

Q.4 Quite a few candidates failed to plot points and read from their graph accurately. In some cases lines were not drawn and in some cases a ruler was not used. When explaining their answer in part (c) candidates failed to use their graph to back up their explanation.

Q.5 In general this question on line and notational symmetry and enlargement was well answered.

Q.6 This was generally quite well done with only minor arithmetic errors. Weaker candidates tended to count 'time blocks' rather than 'hours worked'. In part (b) many were able to take 'Answer (a) – 94' but in some cases failed to find 11% correctly. Some candidates believed finding 11% was the equivalent of dividing by 11.

Q.7 This question on estimation was generally well done by the better candidates. However, some candidates failed to realise what 'estimate' means and attempted to *calculate* answers.

Q.8 This question on angle sum was generally either left out or poorly attempted. Even the better candidates failed to explain clearly or concisely in both parts.

Q.9 This question in most cases was well answered. The most common error was forgetting to subtract '25' from work distance which lead to the common answer of 25 in part (b).

Q.10 This distance time/question was generally well done by most candidates.

Q.11 This question was poorly attempted, even with the better candidates failing to gain full marks. Many candidates failed to be familiar with the correct terminology involved in transformations. 'Rotation' and 'Reflection' were commonly replaced with terms such as 'turn left' and 'mirror symmetry/image' etc. Those candidates who used the correct terms failed to describe the transformation in full. Candidates should be aware that if the question reads 'single transformation' then combination transformations will achieve no marks.

Q.12 (a) This calculation was poorly answered.

(b) However in the estimation part, many candidates gained 2 out of the possible 3 marks. These candidates failed to divide 3000 by 0.2 correctly.

Q.13 This probability question was generally well answered by most. A common error was to take '0.2' to be '0.02' which lead to the common answer of part (a) to be 0.58. In part (c) some candidates '÷0.25' instead of '× 0.25' when calculating expected outcomes.

Q.14 Only the better candidates seemed to be aware of the properties of indices. Many candidates in part (a) gave the answer c^{24} (ie multiplying powers instead of adding) and in part (b) m^4 (ie dividing powers instead of subtracting).

Q.15 Many candidates failed to realise that 'getting a 4' and 'tossing a tail' are independent events and many candidates attempted to add probabilities rather than multiply. Those candidates who used a two-way table generally gained full marks for this question.

In some cases candidates are still using ratio to express probabilities. Some weaker candidates were using terms such as 'likely', 'even chance' etc as an answer to this question.

Paper 2

All candidates tended to score higher in this paper than in the non-calculator one although still with a varying degree of success.

As expected, questions at the beginning of the paper were answered better than those set at the end. Those that appeared particularly problematic tested topics within Algebra namely calculating with a formula, changing the subject of a formula and solving an inequality. Other questions that clearly differentiated between candidates included finding the area of a trapezium and the financial questions on how to calculate a mortgage repayment, the income tax due on earnings and interpreting a credit card statement.

There was no indication of ambiguity or misinterpretation of the questions asked and no obvious sign of shortage of time to complete this paper.

Q.1 This question was generally well done with only part (b) causing difficulty with the weaker candidates.

Q.2 All candidates gained marks here with the addition of the correct postage and packing leading to full marks for the better candidates.

Q.3 It is concerning that not all candidates recognise the difference between metric and imperial units. This made an 'appropriate' choice in the question impossible.

Q.4 Nearly all candidates scored well here with the weaker candidates just translating the shape in part (a) rather than reflecting it. The other parts tended to receive full marks.

Q.5 The majority of candidates in this question on reading scales, achieved full marks. Only part (c) caused any problems.

Q.6 Most candidates gained marks in part (a) of this probability question but only the best gave the required 'explanation' answer to part (b).

Q.7 Part (a) of this question on substituting into formula was generally well done, though in part (b) a number of candidates miscalculated 2×0 as 2 leading to an incorrect answer of 29. Part (c) was a good discriminator with the best candidates achieving full marks.

Q.8 Most were awarded part marks with candidates losing out because they did not interpret correctly the calculator value of 12938.7 as £12938.70 or because they failed to take account of the initial payment of £455.

Q.9 Some marks were gained by the majority of candidates for currency conversion with the best receiving full marks for the price difference calculated correctly.

Q.10 There was a very good response to this question on even/odd numbers.

Q.11 Too many disappointing answers were given with candidates unable to complete correctly the table of possible outcomes. Part (b) was designed to be a follow on from part (a) and not necessarily a probability calculation, which some candidates tried to do with little success.

Q.12 Candidates found this question difficult with many failing to identify the correct values to use in the 'area of a trapezium' formula. Only the best used their answer in part (a) to gain full marks in part (b).

Q.13 A number of candidates did not read correctly 'repayments per month' but generally this question on mortgages was well done.

Q.14 Only the most able candidates received full marks here with many unable to interpret properly the idea of 'credit CR' in the balance statement.

Q.15 This ratio question was well done by the majority of candidates working at a higher level.

Q.16 Many candidates were unable to utilise the information given in this question on income tax to produce the correct answer although a number picked up part marks.

Q.17 (a) In part (a), as in Summer 2006, rearranging a formula proved to be beyond the scope of the majority with very few candidates gaining any marks

(b) In part (b) solving the inequality and showing the solution on the number line was poorly done by all. The word 'integer' may have caused problems.

Higher Tier

This suite of papers appeared to give all candidates an opportunity to display their mathematical skills whilst there was sufficient testing material to bring out the best in the very able candidates. There was some evidence to suggest that, in some centres, candidates were entered at the wrong tier but in general those who performed reasonably well, even in Module 3, were capable of coping with the standard throughout this paper.

All candidates generally performed quite well in the earlier part of the paper and there appeared to be sufficient scope to pick up marks in the latter stages. There was no evidence to suggest that the papers were too long as virtually all the candidates attempted all of the questions. The language of the paper seemed to be appropriate as there was little misunderstanding in candidates' approaches.

Paper 1 (without calculator)

The questions in this paper were structured in level of difficulty and were effective in discriminating between candidates of differing abilities. The earlier questions allowed the weaker candidates to acquire marks whilst the latter questions in the paper were sufficiently demanding to test the better candidates. Algebraic manipulation and surd evaluation proved testing even for the better candidates whilst there were many good responses to questions on probability and transformations.

Q.1 Well answered in general with only the weaker candidates failing to explain that 4 times any integer produced an even number and one less than this resulted in an odd number. Many weak responses purely cited numerical examples.

Q.2 Generally many good responses to this basic question on money calculations, with a variety of methods used.

Q.3 (a) Many candidates failed to come to terms with dividing 25km by 20 minutes to convert speed into km/hr.

(c) Similarly, in part (c), only the better candidates were able to calculate the journey time as 18 minutes giving the correct solution at 15km.

Q.4 Many good responses to estimation though some candidates seemed ill prepared to round to the nearest 10, preferring instead to calculate manually with cumbersome figures. The straightforward reciprocal was handled reasonably well in most centres.

Q.5 This question on transformations was a good discriminator between candidates with virtually all candidates receiving some merit and the better candidates getting full marks.

Q.6 & Q.7 There were many good responses to these questions on probability and relative frequency.

Q.8 Many good responses to direct proportion involving the square of speed but on the other hand, many candidates did not seem to have any strategy for dealing with this problem.

Q.9 Only the better candidates were able to identify expressions for length, area and volume.

Q.10 Many positive responses to the earlier parts of this question with only the better prepared candidates getting part (c) correct.

Q.11 The tree diagram was almost universally well completed with the better prepared candidates getting the solution in part (b).

Q.12 Only the better candidates completed this testing question on the subject of the formula successfully.

Q.13 Most centres were well prepared for converting the non terminating decimal into a fraction with many good and partially correct solutions.

Q.14 Very few candidates seemed to be able to cope with surds.

Q.15 Many disappointing attempts at this question involving algebraic manipulation and volume. It was disappointing to note that most candidates could not square or cube ($\frac{1}{2}\,d$) properly. There was also some confusion between volume and surface area.

Paper 2 (with calculator)

There were many good responses to this paper although it must be somewhat alarming that even the best candidates struggled with the credit card bill and the calculation of income tax. On the other hand, the vast majority of candidates coped well with the foreign currency transactions, ratio, standard form and graphs, both quadratic and cubic. The principle of 'proving' as opposed to demonstrating or illustrating a proof was sadly lacking in the vast majority of centres and even the best candidates seemed unable to embark on an acceptable proof for congruency. Some very able candidates took a circuitous (or scenic) route to the area of the trapezium and triangle in Q.4 – perhaps proving Francis Bacon's old axiom that 'a little knowledge is a dangerous thing'

Q.1 There were many very poor responses to part (a) of this question on credit card bills although many candidates followed through to produce a correct response to part (b).

Q.2 The majority of candidates dealt successfully with this problem on relative frequency.

Q.3 There were good responses to this question on currency conversion. Only the weaker candidates failed to produce the correct result.

Q.4 There were many amazing responses to this question. A surprising number of candidates found the area of triangle BCE using ½ ab sinC. This was done by finding the lengths of BE and CE by Pythagoras and angle BEC after trigonometric computations of angles AEB and DEC.

Q.5 There were good responses to this standard ratio problem.

Q.6 This was generally well done by all but the very weak candidates who failed to identify the U shape of the parabola which could have retrospectively led to a correct solution in part (a).

Q.7 There were many good solutions to the subject of the formula in part (a) but many failed to identify the integer solutions in part (b).

Q.8 It was disappointing to note that only the better candidates were capable of dealing with the tax thresholds to produce a correct solution.

Q.9 The majority of candidates responded well to parts (a) and (b) but many of these struggled to derive a correct solution in part (c).

Q.10 Candidates in general dealt with the solution by Pythagoras in part (a) but only the better candidates dealt with the trigonometry in part (b) to find angle AYD and fewer still found the length of the arc in part (c).

Q.11 Many candidates failed to identify the correct *n*th term and in many cases, those who did failed to expand their expressions and simplify to get the correct result.

Q.12 It seemed that the vast majority of candidates were ill prepared for a congruency proof with many stating angles and sides equal without justification. The ASA proof for congruency appeared in only the very best scripts.

Q.13 There were many good solutions to the vector problem but few justified why the vectors DC and BF were parallel.

Q.14 It was pleasing to see a good number of correct and partially correct solutions to the graphical question. Only the very weak candidates failed to gain marks in this question mainly through lack of accuracy.

Q.15 The very best candidates scored well in this question while the remaining candidates identified a pair of correct probabilities to gain some merit.