GENERAL CERTIFICATE OF SECONDARY EDUCATION
TYSTYSGRIF GYFFREDINOL ADDYSG UWCHRADD

EXAMINERS' REPORTS

MATHEMATICS
(2 Tier)

SUMMER 2007

Statistical Information

GCSE

The Examiners' Report may refer in general terms to statistical outcomes. Statistical information on candidates' performances in all examination components (whether internally or externally assessed) is provided when results are issued. As well as the marks achieved by individual candidates, the following information can be obtained from these printouts:

For each component: the maximum mark, aggregation factor, mean mark and standard deviation of marks obtained by *all* candidates entered for the examination.

For the subject or option: the total entry and the lowest mark needed for the award of each grade.

Annual Statistical Report

Other information on a centre basis is provided when results are issued. The annual *Statistical Report* (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

MATHEMATICS
(2 Tier)

General Certificate of Secondary Education 2007

Chief Examiner: Mr. D.A. Timbrell

FOUNDATION TIER

Candidates of all abilities appeared to find that Paper 2 allowed them to demonstrate their knowledge of mathematics in a meaningful way. However, Paper 1 proved to be rather challenging for most candidates. The more able candidates found the questions towards the end of the papers quite demanding, particularly on Paper 1. The less able candidates were able to attempt many of the questions in the first half to two thirds of both papers.

Candidates at all levels of ability continue to find questions involving algebra very demanding. Questions involving money are usually well answered, but there is considerable room for improvement in the way that the majority of candidates handle simple arithmetical calculations. The majority of candidates experience great difficulty with questions involving simple fractions.

A large number of candidates appeared to have sat the examination without access to suitable geometrical instruments; as a result these candidates lost a considerable number of marks.

Paper 1

Q.1 Most candidates made good attempts at answering all sections of this question. The sections, which caused some difficulty, were,

(a) (ii) the word difference is not always understood,

(b) (ii) many gave the smallest four-digit number rather than the smallest odd number.

(c) There were a large number of incorrect answers. Many candidates did not know what was required and those who realised that they needed to divide 120 by 5 were often unable to obtain the correct answer.

Q.2 Many candidates did not have access to geometrical instruments and consequently lost several marks on this question.

(a) Often not attempted or drawn freehand.
Many drew circles of radius 3.

(b) Very disappointing. Many candidates were unable to measure the length of the line; those who did sometimes gave the answer to the nearest centimetre. A large number of candidates were unable to measure the size of the angles.

Q.3 Well answered.

Q.4 (a) Well answered by many candidates.

(b) While there were many correct answers this proved more difficult than (a). A fairly frequent answer was 75÷25 = 3.

Q.5 (a) Well answered.

(b) Well answered.

(c) Many correct answers but a large number of candidates thought that $^{12}/_{36}$ = ¼.

(d) A surprisingly large number of candidates failed to write 0.6 as 60%. A popular incorrect answer was 6%.

Many wrote ½, 0.6 and 54% in ascending order rather than descending order.

Q.6 Well answered.

Q.7 (a) Most candidates found this question difficult. Some realised that they needed to divide 42 by 6, sometimes obtaining the answer 7, but then often failed to multiply 7 by 5.

(b) Well answered. Most realised that they needed to multiply 16 by 6 and many obtained the correct answer.

(c) Fairly well answered. While many realised that they needed to divide 120 by 8, a large number of candidates were unable to obtain the answer 15.

Q.8 Candidates from some centres were more successful with this question than candidates from other centres. Many candidates were able to give the answer of ¼ for (a) but a smaller number obtained the required answer to (b).

Q.9 (a) Well answered.

(b) Well answered, but many candidates gave the answer 12 × 6 = 60.

(c) (i) and (ii) were well answered, (iii) caused some difficulty with many candidates giving the answer 7a + 7b.

(d) While many candidates obtained both 12 and –14, a large number of these candidates did not subtract to obtain –2.
A popular incorrect answer was 43 – 72 = –29.

(e) (i) Very badly answered; very few candidates obtained 15 – 2x.

(ii) Very badly answered.
Many candidates did not attempt this section; many of those who made an attempt found the perimeter rather than the area.

Candidates who gave the answer as 3y × 3y were often unable to obtain $9y^2$, usually giving the answer as 9y.

Q.10 Fairly well answered. Many candidates were able to obtain the correct answer. Others realised that they needed to measure the length of RS and AB but were then unable to use the information given to obtain the actual length of AB.

Q.11 (a) Well answered.

(b) Having used the fact that the angle sum of a triangle is 180° in (a) it was surprising to see some candidates using 360° in (b). Many candidates failed to use the properties of an isosceles triangle in their solution.

Q.12 (a) Fairly well answered. Simple percentages continue to cause problems. Many candidates attempted to calculate 10% of 45 and then double their answer, but some had difficulty in finding one tenth of £45.

(b) (i) Badly answered. Answers frequently seen were 10^5 and $6 \times 10 = 60$.

Some candidates having obtained 8 and 25 were unable to multiply the numbers to obtain 200.

(ii) Fairly well answered.

(iii) Answers frequently given were 1.5 and 0.015.

(iv) Often incorrect with –12 being a popular answer.

(c) Fairly well answered.

Q.13 Well answered by candidates from some centres.

Q.14 Few candidates used the method $\frac{140 \times 100}{200}$ and $\frac{48 \times 100}{60}$.

Most preferred to find 10% of 200 or 10% of 60 and then with varying degrees of success attempt to find the required answers.

Q.15 The attempts at this question were extremely disappointing. Most candidates were unable to use the appropriate formula for the area or perimeter of a circle and very few used the correct formula for the area of a trapezium although this is given on the formula page at the front of the question paper. The few who used the correct formula were often unable to deal correctly with the very simple calculations involved to obtain the required answers.

Q.16 (a) Well answered.

(b) Very badly answered. Very few candidates had any idea of the required method. Many simply added 15, 13,10, 8, 2 and 2 and divided their answer by 6.

Q.17 Many candidates replaced 202 with 200 and 60.3 with 60. Fewer candidates were able to deal with 0.191 and those who did replace 0.91 with 0.2 were rarely able to calculate $\frac{200 \times 60}{0.2}$ correctly.

Q.18 Very badly answered. A small number of candidates drew an arc of a circle of radius 7cm and centre A. But very few attempted to draw the angle bisector of angle ADC or the perpendicular bisector of DC.

Q.19 Very badly answered.

(a) Many candidates were unable to evaluate $5 - (-1)^2$.

(b) Most candidates attempted to use completely unsuitable non-uniform scales on the y-axis.

The minority of candidates who tried to use a uniform were unable to insert a suitable uniform scale on the y-axis.

(c) As most candidates were unable to use suitable scales and draw the required curve they were unable to attempt this section.

Paper 2

Q.1 Well answered.

A number of candidates did not appear to have a calculator available for use in the examination.

A number of candidates inappropriately rounded their answers either to the nearest 10p or in some cases to the nearest pound, resulting in the loss of all of the marks for this question.

Q.2 (a) Well answered.

(b) Most candidates used metric units for (i) and (ii) but the answer to (iii) was often given as miles.

Q.3 Other than the usual arithmetic errors all sections of this question were well answered.

Q.4 Well answered. Most of the candidates used a suitable uniform scale for the frequency. Those using a scale of 2cm to represent either 4 or 10 pets usually completed the diagram correctly. Candidates using a scale of 2cm to represent 5 pets often misread the scale and plotted one or more incorrect bars.

Q.5 All parts were well answered.

Q.6 (a) Pentagon and parallelogram were popular incorrect answers.

(b) Well answered.

Q.7 Well answered but a substantial number of candidates reversed one or both of the coordinates.

Q.8 (a) and (b) were well answered. Part (c) caused a little difficulty with some candidates leaving the answer as 12 + 24 or giving the answer as 43 + 64 = 107.

Q.9 Well answered.

Q.10 (a) Well answered**,** but a fairly large number of candidates gave the answer 8 for the number of screws left over.

(b) Fairly well answered. Many candidates calculated 4 × (25.55 + 5.75) rather than 25.55 + 4 × 5.75.

(c) Few candidates used a calculator to evaluate either 0.7 × 24,500 or 7 × 24,500 / 100 preferring to attempt to find 10% of 24,500, 1% of 24,500, 4% of 24,500 and then adding their answers for 10 % and 4%. Many using this method found 10% and then simply guessed the answer for 4%.

(d) (i) 8.2 was a popular incorrect answer.

(ii) Fairly well answered.

(e) Both parts were badly answered with decimal points being inserted in a variety of places. In (ii) many candidates used multiple decimal points.

(f) A small number of candidates obtained 4.64, a few of these gave the answer correct to 1 decimal place.

Q.11 (a) A large number of candidates added the lengths of the sides giving the answer as 55. However, there was an increase in the number giving the required answer of 20 × 10 × 25.

The correct required units were rarely given in the answer.

(b) Few correct answers. Most candidates appeared to guess the depth with many giving an answer greater than 25cm.

Q.12 Most candidates were able to use the given scale to draw at least one correct line and often two correct lines. Many were unable to complete the triangle correctly because they did not use or did not have suitable geometrical instruments.

Q.13 Well answered.

Q.14 (a) Most candidates subtracted the sum of 65, 102 and 98 from 360 but many then either forgot or did not know that they had to subtract the resulting answer from 180.

(b) Well answered.

Q.15 (a) Well answered.

(b) Many candidates did not know, or did not use, the term ‘positive’ correlation.

Q.16 (a) (i) and (ii) were well answered and were usually correct, (iii) was badly answered with many candidates failing to collect terms correctly.

(b) Very few correct answers. The most popular incorrect answer was 28a.

Q.17 All sections of this question were very well answered with many candidates obtaining all of the marks.

Q.18 Most candidates failed to realise that they needed to use Pythagoras's theorem to obtain the answer. Many found the difference between 28 and 21 but were unable to use the answer in a suitable way. A number of candidates calculated the area of a triangle or the area of the trapezium.

Candidates who did use Pythagoras to find the solution usually obtained the required answer, although some did not give the answer to an appropriate degree of accuracy.

Q.19 There were good solutions from able candidates in a number of centres. Most candidates were unable to attempt this question.

MATHEMATICS
(2 Tier)

General Certificate of Secondary Education 2007

Chief Examiner: Ms. L. Mason

HIGHER TIER

Specific comments about individual questions are as follows:

Paper 1

Q.1 Although this question was generally well answered, a common incorrect response was an answer for white paint of 200ml.

Q.2 The question was quite well answered. Common errors included incorrect multiplication of the brackets, forgetting to multiply the -3y by 5, and collecting the terms in y incorrectly.

Q.3 The majority of candidates were able to gain marks through the follow through of their incorrect answer to x or y. However in general this question was fairly well answered.

Q.4 Responses in this question were disappointing, with many candidates not having a strategy to find the area of a triangle. Much doubling and halving again! The majority of candidates stated the correct units for their answer.

Q.5 There was some evidence of candidates not having the correct equipment in order to answer this question. Others used protractors marked angles, but joined incorrectly. For many other candidates this question was straight forward to answer.

Q.6 The majority of candidates answered at least one part of this question correctly.

Q.7 Many candidates confused circumference and area, and many did not know how to find the area of a trapezium. A number of candidates considered a rectangle and the removal of triangles to find the area of the trapezium correctly, but others struggled with the triangle aspect. The majority of candidates knew that in order to find the area shaded they needed to subtract the area of the circle from the trapezium.

Q.8 Although a number of candidates added both columns and attempted to divide these sums, many knew and understood how to find the mean number of pets from the information provided.

Q.9 The majority of candidates started their estimate work by correctly working with 200 and 60. The denominator caused more of a problem, in deciding to round and then carrying out the calculation required. Division by a decimal proved to be quite a demanding problem for many candidates.

Q.10 Although many candidates correctly showed understanding of at least one of the conditions, few interpreted all three and indicated the correct region. The bisector of the angle was often interpreted incorrectly as a diagonal, and the perpendicular bisector was often at right angles to DC but not at its mid point. The construction of the arc was generally the one condition that the majority of the candidates did correctly.

Q.11 Some candidates had great difficulty deciding on a suitable scale to fit the graph paper provided, others did not produce a uniform scale on which to plot points. The most demanding part of the question seemed to be the creation of a scale.

Q.12 (a) A number of candidates did not draw a ½ enlargement, instead they doubled all lengths. This part of the question was answered correctly by many candidates, both in considering position and size.

(b) Generally this part was well answered, with evidence that the use of tracing paper works well. Few candidates selected an incorrect centre for the rotation, or rotated anticlockwise in error.

(c) Some amusing answers, amongst which the correct answer of translation was sometimes given!

Q.13 The expansion of the second bracket caused the greatest difficulty in this question, with the final term incorrectly stated as -6. However, the majority of candidates continued with correct algebra to solve from their expansion of the brackets.

Q.14 The majority of candidates seemed aware of how to find the median, and had some idea about the interquartile range, although some were not sure about the need for subtraction and what exactly to subtract. There were some difficulties in reading the scale.

Q.15 The majority of candidates have a sound strategy for solving simultaneous equations, the errors are usually numerical rather than algebraic understanding.

Q.16 A common incorrect response was 10cm, found by incorrectly deducing 6 + 3 gave 9, so 7 + 3 must give a length of 10 cm. A number of candidates with a correct strategy were not able to cope with the arithmetic involved.

Q.17 (a) 85 and 0 were the common incorrect responses in (i), and 49 in (ii). Generally, however, the majority of candidates answered at least one of these two correctly.

(b) A number of candidates showed no strategy for converting fractions to decimals. A number of candidates do not know how to express a recurring decimal.

(c) 1/9 was a common incorrect response, showing that more candidates understood reciprocal notation than use of indices to represent repeated multiplication of the value.

(d) Very disappointing to see that a number of candidates did not attempt to answer this part of the question.

(e) The majority of candidates gave a correct response for the HCF.

Q.18 (a) The most common error was 8y + 3y instead of 8y – 5y. The candidates generally understood the need to take the square root to find x.

(b) This part was not well answered. Many candidates did not demonstrate a strategy for factorising, and attempted to treat the question as a "solve a linear equation" question.

Q.19 Many candidates found this question straight forward, while others didn't seem to recognise how to start writing the information given using mathematical notation.

Q.20 The error in the frequency density column was generally for the 70 to 90 mm group, incorrectly deciding to divide by 10 rather than 20. The drawing of the histogram from the information was generally straight forward for most candidates answering this question.

Q.21 Responses to this question were a little disappointing, with a number of candidates only giving single selection responses. In part (b) a number of candidates did not consider the need for "yellow, green" as well as "green, yellow" and equally "yellow, red" as well as "red, yellow".

Q.22 (a) The simplification of $3\sqrt{2}x3\sqrt{2}$ caused the greatest difficulty, although some candidates also did not know how to express other terms involving roots.

(b) Many candidates have a sound strategy for working with recurring decimals in order to express them as fractions.

Q.23 Part (a) was generally answered correctly. Part (b) usually involved a horizontal translation, but sometimes by an incorrect amount and sometimes in the wrong direction. Responses in part (c) sometimes included, incorrectly, a horizontal and a vertical translation.

Q.24 Those candidates with good algebraic skills were able to answer this question without too much of a challenge to their thinking. However others did not have the skills to start correctly.

Paper 2

Q.1 There does seem to be some confusion between area and perimeter, clearly shown in responses to parts (a) and (b). A small number of candidates found some difficulty in finding the non-specified lengths.

In part (c) it is clear that the vast majority of candidates have little understanding of units of area. A common incorrect response was 640 cm^2.

Q.2 This question was generally well answered, although commonly brackets were omitted in the final part of part (b). A number of candidates did not demonstrate that they could form an equation in part (c), giving sometimes just the value of x. Part (c) was assessing the formation of an equation, not simply finding the value of x by trial and improvement or other methods. It is important for candidates to realise that when a question requests an equation to be formed that there are marks assigned for this process.

Q.3 This question was well answered. The majority of candidates stated that the correlation was positive.

Q.4 This question was generally well answered, although there were some errors with change of signs in part (b).

Q.5 Many candidates were awarded all the marks available for this question. Where this was not the case, it was part (a) that caused the greatest difficulty, often with the calculation of percentages rather than the requirements to solve the problem.

Q.6 This question was well answered, with most candidates correctly using 7cm and applying Pythagoras' Theorem to find the correct answer. Very few candidates used Pythagoras' Theorem incorrectly.

Q.7 It is important for candidates to realise the need to verify their suggested answer by looking to three decimal places between the two decimal place possibilities, where the result changes sign either side of zero.

Q.8 This question was generally well answered, with few candidates treating the interest as simple.

Q.9 There were mixed responses to this question. A common error in part (a) was an incorrect response of n+4. In part (b) many candidates had their own strategy, and there were many correct answers. However a number of candidates did not use brackets correctly.

Q.10 This question was well answered.

Q.11 There were many correct responses to this question, with many candidates demonstrating a good understanding of the inaccuracy of measure, particularly in part (b). Equally, there were many candidates who did not give correct responses in part (a) and ignored the idea of least or greatest lengths in part (b).

Q.12 Some candidates have difficulty in deciding which axis lines run parallel to, that is knowing if y=5 is parallel to the y-axis or the x-axis, so sometimes doing both! Candidates did mark their regions clearly, showing if they were shading in or out with annotation of the diagram.

Q.13 This question was generally well answered, with few cases of incorrect notation. A small number of candidates are unclear whether indices are negative or positive. A number of candidates gave their answer in part (b) as 1 620 000 000 but did not express this in standard form.

Q.14 This question was generally well answered with candidates selecting and applying appropriate trigonometric ratios.

Q.15 It is always difficult to find correct stages of working in calculating standard deviation if a candidate gives an incorrect response, as quite often very few workings are shown. A number of candidates did not progress further in this question than finding the mean of the values given.

Q.16 Many candidates find circle theorems difficult to apply. Responses to this question were very mixed.

Q.17 Many candidates find forming algebraic expressions or equations very demanding, with many not knowing how to start to answer the question. As a result part (a) was not well answered. In part (b) a number of candidates made errors with the substitution, in particular for the value of c and with the denominator, not always treating it as a common denominator.

Q.18 This question was generally well answered, with few candidates without a strategy to solve the problem.

Q.19 Candidates tend to find vector questions demanding, particularly when negative direction is to be considered. This question did not involve a change of direction, yet many candidates were not able to write out an unsimplified form for **JM**. In recent years a number of candidates have answered in response to a part of a question that a geometric relationship is that lines are parallel, even when early parts of the question have been omitted or incorrect. The relationship here required the explanation that the points lie on the same straight line, thus being collinear, so spurious answers were not rewarded.

Q.20 It was pleasing to see that many candidates had a correct overall strategy. There were some difficulties in manipulating the formula for the area of this non right angled triangle, given the area and needing to find the length of a side.

MATHEMATICS
(2 Tier)

General Certificate of Secondary Education 2007

Chief Moderator: Linda Mason

Coursework

As in previous years centres have generally selected appropriate tasks, allowing access to the full range of marks in each assessment strand. However, where there is good practice in allowing the mid ability candidate access a task or investigation originally aimed at the Higher Tier candidate, there is also some evidence of Higher Tier candidates accessing original Intermediate Tier problems. When this happens, it can be difficult to extend a task that is not substantial or complex in its nature to progress beyond 6 marks in an assessment area without very creative development. Progress to 7 marks in an assessment area does imply that there is a need to develop complexity.

Centres generally complete all summative documentation correctly, and the main coursework cover sheets are signed by the candidates. Although there was still a need this year to return a small number of cover sheets to request candidate signatures for validation that the work is that of the candidate.

The marking of coursework usually shows that Performance Indicators and the General Assessment Criteria are applied consistently. However, where there are differences between centre and moderation judgements, we generally find that the centre marking has been a little generous, or had a slightly lower expectation than the moderator. Rarely do we find evidence of under marking. In AO4, Handling Data tasks, a number of centres do not appreciate the need to meet **all** the bullet points within a minimum requirement list in order to be able to award that mark.

The annotation on the cover sheets helps considerably in agreeing judgements and marks given. This aids the moderation process, as the moderator is able to understand the centre interpretation of aspects of the work and the assessment criteria. Some annotation is seen on the work, this again is helpful in highlighting key developments or explanations.

Specific task comments remain similar to previous reports, when the same issues are seen repeatedly, these are commented upon in individual centre reports from moderators to aid teaching and learning as well as marking for the following year. There is an issue of guidance given to candidates, this often presents a greater problem for the more able candidate in not accessing the highest marks in each assessment area due to lack of individual creativity within investigating and thinking about implications.

AO1 Using and Applying Mathematics

In the Isoperimetric Quotients investigation, quite a number of candidates should not be awarded the highest marks in the strands, in contradiction to the centre based marking. This relates to the need to develop the task, in tackling an investigation that considers many options in a natural progression, for example

- Consider the change in the IQ from types of non regular to a regular polygon?
- How can this be described?
- Does this development continue?
- Why dismiss non regular polygons?
- How does looking at regular polygon alone aid the investigation?
- How can the concept of compactness be seen to develop?
- Is there any consideration of a limit?

In Gradient Functions many candidates appear to complete separate mini tasks rather than develop an investigation that is based on improvements of methods towards greater accuracy. The fundamental process of moving from chords to tangents is key to understanding the idea behind the algebraic method. This often does not come through in the work of many candidates, yet some centres incorrectly accredit very high marks for work not demonstrating this understanding.

AO4 Handling Data

The importance of minimum requirement bullet points is fundamental to the assessment of Handling Data projects. All statements need to be met in order to award the mark linked with the minimum requirements.

The complexity of the problem is a consideration in the progress towards awarding higher marks, the task needs to be substantial and not a non-linked collection of simple problems, this does impact on the first and third assessment areas in particular.

In the second assessment area it is always worth reminding candidates of the need to interpret all data collection tables, calculations and diagrams, otherwise these aspects cannot be credited within the project. Equally a reminder is needed for the need to evaluate a strategy for the third assessment area. Without evaluation of a strategy only 3 or 4 marks can be awarded in the third strand. It is worth noting that this entails an evaluation of a strategy rather than a simple evaluation of any results or findings, it requires more depth than a conclusion of results.

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk/exams.html