GENERAL CERTIFICATE OF SECONDARY EDUCATION
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EXAMINERS' REPORTS

MATHEMATICS
(2 TIER)

SUMMER 2008

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 2008

Chief Examiner: Mr. R.W. Brice

Foundation Tier

General Comments

Work was generally well presented, but some candidates clearly did not have geometrical instruments or a ruler. On Paper 1 simple calculations without a calculator often produced errors while on Paper 2 many candidates use a partitioning method for calculating percentages rather than using their calculator. Few were successful. Candidates should be encouraged to use calculator methods on this paper.
Many candidates did not appear to have covered some topics, particularly Pythagoras' Theorem.
Algebra continues to cause considerable difficulty for the majority of candidates.

Paper 1

Q.1 (a) All sections were very well answered.

(b) Usually correct. A popular incorrect answer was 70425.

(c) Most candidates obtained $^{16}/_{30}$. Many did not attempt simplification and those who did frequently obtained an incorrect answer

Q.2 The Rectangle was usually correct, but the Trapezium was frequently named as a Rhombus and the Pentagon as a Hexagon.

Q.3 The table was usually completed correctly.
Most candidates used suitable uniform scales and many produced completely correct bar charts. The most frequent error was the double labelling of the axes by using 'Number of pupils' on one axis and 'Frequency' on the other.

Q.4 (a) Most candidates substituted correctly and realised that 40 should be multiplied by 5 before 50 was added.
Many found it difficult to obtain 200 when multiplying 40 by 5. Answers such as 160 or 250 were regularly seen.

(b) Well answered, some candidates left the answer as 12, 15, 18.

Q.5 Very well answered.

Q.6 (a) $^{2}/_{8}$ was usually correct but many were unable to identify $^{7}/_{28}$ as an answer.

(b) Most candidates understood the question. The majority attempted to find $^{1}/_{5}$ of 500 and 25% of 500 with varying degrees of success.

(c) These simple equalities continue to cause serious problems. 0.5 was frequently given as 5% and ¼ was often 40%.
There was some confusion between ascending and descending order.

(d) Fairly well answered. There were many errors in evaluating 72 $\times$4 and in the subsequent subtraction.

Q.7 Many candidates continue to use imperial measures when estimating height.
Most candidates made a good attempt at answering the question.

Q.8 (a) (i) Many candidates ordered the numbers and correctly identified the median as 47.

(ii) The range caused some difficulty. Many candidates left the answer as 51 – 45.
For a number of candidates there was some confusion between Mean, Median and Range.

(b) Well answered. The position of R caused some difficulty.

Q.9 (a) Many candidates found the perimeter rather than the area.

(b) The majority of candidates used the correct method but many failed to evaluate 12×15 correctly.

Q.10 (a) Very well answered.

(b) Well answered. A number of candidates, however, appeared to believe that the angles of the isosceles triangle were 46°, 46° and 46°.

(c) Well answered but many candidates stopped when they had obtained 60° believing that this was the required answer.

(d) Well answered.

Q.11 (a) Most candidates were unable to obtain the required answer. The majority were unable to deal with place value correctly. Those who used alternative methods such as repeated addition or Napier's method usually made errors in the arithmetic.

(b) Many candidates thought that they had to move the decimal point 2 or 3 places.
Both sections were poorly answered.

(c) Many obtained either 8 or 9 or both 8 and 9 but then went on to add the numbers rather than multiply or failed to multiply 8 by 9 correctly.

(d) Very badly answered, there were few correct answers. The most popular answer was. $\frac{8}{9} - \frac{2}{3} = \frac{6}{6} = 1$.

(e) There were more correct answers for the prime number than for the cube.
The most popular answer for the cube number was 36.

(f) Many obtained the correct answer for 0.2×0.7. However, 2.1 was quite a popular incorrect answer.
A frequent answer for 4.7 – 3.52 was1.22.

Q.12 Well answered.

Q.13 (a) This very standard question was badly answered with many candidates having little idea of the required method. It appeared that this topic was not familiar to a large number of candidates.

(b) Well answered with many candidates realising that the sum needed to be 1 and giving a suitable explanation.

Q.14 (a) Very few candidates were able to form an equation and then find the value of *x*.

(b) Very badly answered with few candidates being able to find the various angle in the diagram and hence obtain values for *x* and *y*.

Q.15 Algebra continues to be a major problem for most candidates. All sections of this question were badly answered.

Q.16 This question caused great difficulty. Very few candidates were able to partition the diagram and calculate the required rectangular areas. Few used the formula πr^2 to calculate the area of the circle.

Q.17 Many replaced 601.9 with 600 and 19.94 with 20. A much smaller number replaced 0.305 with 0.3 or 0.5 or 0.2. Few, of the small number of candidates who did make the necessary substitutions, were then able to obtain a correct answer.

Paper 2

Q.1 (a) Well done.

(b) Fairly well done, although many candidates found the total cost after discount. A surprising number of candidates thought that 10% discount on 4 items meant 40% discount overall!

Q.2 (a) Most candidates tried to count the squares, but many failed to give an answer in the accepted range.

(b) Not well answered. Many candidates made errors in finding the perimeter.

Q.3 Very well done.

Q.4 The majority gained full marks.

Q.5 (a) Part (i) was well done, but many failed to give an odd number in part (ii). The usual incorrect answer was 7654.

(b) Well done.

(c) Many managed to find 2 factors, but 1 and/or 22 were frequently omitted.

(d) Rounding was fairly well understood with many candidates giving the required answers.

Q.6 Quite well done, but many candidates reversed either one pair or both pairs of coordinates.

Q.7 (a) E and F, B and H, G and H were frequent incorrect answers, confusing congruence with similarity.

(b) Few gained full marks. S and T were common errors.

Q.8 A number of candidates omitted this question, possibly because of lack of equipment. Of those who did attempt it, part (a) was fairly well done, but many did not use compasses in part (b) often resulting in inaccuracy with one of their lines.

Q.9 (a) Well done.

(b) A common error was to include one or both diagonals.

Q.10 (a) (i) Well done.

(ii) Many used a trial and improvement method quite successfully. Those who evaluated 20/ 0.89 often had difficulty working out how much money was left over.

(b) Many tried to use a partitioning method but made errors in the process. As this is a calculator paper candidates would be more successful if they attempted to evaluate $\frac{62 \text{ x } 12.5}{100}$

Q.11 (a) Well answered but many candidates confused the mean with the median.

(b) (i) Well done.

(ii) Some did not realise that a numerical solution was required. 'Unlikely' was a common answer.

Q.12 (a) Many did not understand what was meant by 'dimensions'.

(b) Fairly well done.

(c) Many found the difference in the areas of the rectangles rather than 'how many times bigger' they were.

Q.13 Algebra continues to cause most candidates serious problems.

(a) Fairly well done, but candidates should be encouraged to express their answers as $x = 3$ etc rather than 4 x 3.

(b) $7x$ -3 was a frequent error,

(c) Many evaluated the 30, but not the -12. Some failed to simplify 30 – 12.
Many gave the answer as 65 – 34 = 31.
A fairly frequent answer was 6 + 5 + 3 + 4 = 18!

(d) $10p - 8q$ and $4p - 2q$ were common incorrect answers.

(e) Poorly done. $2x + 1 \times 3x$ and $6x$ were common answers.

Q.14 Many recognised the characteristics of the cuboid and octagon, but not the other two.

Q.15 (a) Very few candidates gave a 3-figure bearing for their answer. It was encouraging to see less candidates using north, east etc… than in previous years.

(b) Many candidates did not attempt this question.

Q.16 Of those who attempted this question, many gained full marks. Some multiplied rather than divided by the exchange rates

Q.17 (a) Very poorly done. Many candidates were unable to label the axes with uniform scales. Many confused the positive and negative sections of the axes.
Very few of those who were able to label the axes correctly were able to draw the required line.

(b) Drawing y = -2 posed an equally difficult problem for most candidates. Many drew a line through (-2, 0) and (0, -2)

Q.18 Many candidates attempted this question, but frequently failed to calculate 17.5% of £330 correctly. Again partitioning methods used when calculating the percentage usually resulted in incorrect answers being obtained.
Many also tried to evaluate 17.5% of £ 408.

Q.19 Very few candidates recognised the need for Pythagoras' Theorem and even those who did often failed to implement it correctly.

Q.20 It appeared that many centres had not covered this topic. Some found the mid-points of the grouped data but simply added them and divided by 4.

Q.21 Very few candidates attempted this question. Of those who did, many did not proceed further than finding that the solution lay between 1.3 and 1.4. There were some excellent solutions from the more able candidates in a number of centres.

MATHEMATICS
(2 Tier)

General Certificate of Secondary Education 2008

Chief Examiner: Ms. L. Mason

Higher Tier

General Comments

There was evidence that indicated that a number of centres had not given candidates the opportunity to access all questions on the paper.
Candidates were not short of time to attempt all the questions.
Questions that required thinking and development of strategies caused difficulties for a number of candidates.

Specific comments about individual questions are as follows:

Paper 1

1 Although the majority of candidates were able to estimate all the values given individually, generally to values correct to one significant figure, many did not have the skills to process the calculation.

2 Part (a) of this question proved to be the more demanding question, with a number of candidates showing no strategy in working towards the expression of a percentage.
Part (b) was generally well answered, with the majority of candidates working with ideas of multiplying the recipe by two and a half for each of the individual ingredients. The quantity of flour caused the greatest difficulty in terms of the calculation required.

3 This question was generally well answered, showing that candidates have a clear understanding of reflection in a vertical line. Where errors occurred, they were generally in the determination of the actual line of reflection, with some candidates showing a reflection in y=1 or the y-axis.

4 This question required thinking to decide on the appropriate calculations. Part (a) was more demanding than part (b) for many candidates. In part (a) a number of candidates left their answer as a fraction, where the question asked for the number of people. In part (b) there was some confusion with the units of money, with the requirement to use information given in pence as well as in pounds.

5 Although many candidates were able to form and solve an equation in part (a), others had difficulty either with the idea of an equation or the sum of the angles in a quadrilateral. It is important for candidates to appreciate that if a question requests the formation of an equation that marks are allocated for this process, consequently full marks are not credited for a answer only.
In part (b), although many candidates correctly answered the question, others made errors with the choice of the incorrect pair of lines to be parallel. There were numerous numerical errors in adding or subtracting angles, but not generally with the knowledge of totals for angles in a triangle or on a straight line.

6 This question was well answered by many candidates. Common errors included 7x=4 incorrectly solved as 7/4 in part (a)(i), and the final term in the expansion of the bracket in part (b)(ii).

7 The calculation of the area of the circle was not the most demanding part of the question for candidates. The most demanding part of the question for the candidates was deciding upon the dimensions of their rectangles for the composite shape. The majority of candidates had a strategy to find the area required, but many lost marks for not stating the units of their answer as requested in the question.

8 Many candidates are able to round values to one significant figure, but are unable to divide by a decimal value.

9 This question was well answered, with many correct answers expressed using correct notation. Only a few candidates incorrectly wrote "+" between their factors!

10 Part (a) was generally well answered, with "+4" being the expected common error. In part (b) a number of candidates lost confidence in their correct strategies from part (a) and seemed lost in working with the distinct factors for the nth term. Many candidates did not use brackets to correctly express their nth term.

11 Part (a) was well answered. Errors included the reflection in the x-axis or the line y=-x.
Part (b) was well answered, with evidence that candidates correctly use tracing paper to aid their placement of the image.

12 Candidates showed that they have a clear strategy for the solution of simultaneous equations. Where errors occur they are with arithmetic, and often include the manipulation of negative numbers.

13 Part (a) was generally well answered, with more errors in calculating 4 x 3 than index notation!
Part (b) was more demanding for candidates than part (a). A number of candidates seemed unfamiliar with the idea of extracting a common factor, or due to later work with factorising using a pair of brackets had forgotten previously learnt techniques through not understanding the process of factorising.

14 Many candidates were unable to correctly match the statements with the formulae. This question causes difficulties for many less able candidates.

15 Unfortunately a number of centres appear to teach the solution of inequalities as being identical to the solution of equations. Which is incorrect! Many candidates use equal signs and do not answer the question. Other candidates do not realise the implications of negative terms when division is involved. For many candidates gaining these marks is straight forward, but for others, methods of teaching and techniques used disadvantages them.

16 In part (a) many candidates had an idea about equal angles, but did not fully explain that equal angles would show the triangles to be similar. Although not common, an error that did occur was to state that angles D and A were equal! It is important that candidate realise that when asked to show that triangles are similar that they state what they are working towards in terms of the relationship or knowledge they are employing.
Part (b) was well answered, with many correct answers.

17 Many candidates realise the need to look at the upper quartile and the lower quartile, but less able candidates do not always demonstrate their intention to find the difference between their readings. Care must be taken in reading scales, particularly in the case, as in this question, where the scales on the vertical and horizontal axes are different.
The majority of candidates showed some understanding of the graph and interpretation of the question in part (b).

18 The less able candidates showed little understanding of factorising expressions. The more able candidates found part (b) more demanding than the application of difference of two squares or zero p term in part (a).

19 The most common error in this question was in the loss of the negative with the term 7k in working, the –7k from one line to the next incorrectly appearing as 7k, strange considering that this term for many candidates remained on the right hand side of the formula throughout!

20 Many candidates had no idea of a strategy to follow to answer this question, others realised that the application of Pythagoras' Theorem would lead them towards an expression for perimeters of the patterns but were unable to express the square root of $1^2 + 1^2$ as $\sqrt{2}$. It was not always the candidates who had had the greatest success early on in the paper that had a creative strategy to tackle solving this particular problem, sometimes they had the idea but not the confidence in their understanding of the techniques required. This question differentiated thinking strategies in the application of mathematical techniques.

21 Part (a) was generally well answered but the same cannot be said for part (b). Part (b) required candidates to think about the data presented and where the median of a group of 200 eighteen year-olds might be, with thought the conclusion was quite straight forward. The thinking element to solve the problem was the main demand.

22 Many candidates were able to write expressions for the volumes, while others did not have the algebraic skills to apply. Many errors occurred with the simplification of the quotient, in incorrect cancelling terms from the numerator and denominator which were not factors.

23 Part (a) required some thinking to understand the index, looking for square numbers, candidates found this demanding.

Part (b) was less demanding, with many candidates knowing a strategy to use, but not always using it accurately.

24 The most straight forward strategy of looking for 1 – P(no cherry) was not a popular method of solution. Many candidates listed a variety of ways of meeting the criteria, but not an exhaustive list. A number of candidates seemed out of their depth in working towards a choice of three yogurts, seemingly wanting to work with only two yogurts.

25 Although many candidates were able to work with parts (a) and (b), few candidates were able to interpret their answers and the diagram to answer part (c) correctly.

Paper 2

1 This question was generally well answered.

2 The majority of the candidates worked correctly with the exchange rates, and chose to convert the prices into pounds.

3 A number of candidates worked correctly, it seemed, with the information but did not label the axes with values! Otherwise, the question was generally well answered. Where the line y=2x-3 was drawn incorrectly, it still intersected the y-axis at -3.

4 This question was well answered.

5 The majority of candidates applied Pythagoras' Theorem correctly, although some candidates did not give their answer to an appropriate degree of accuracy.

6 This question was generally well answered, with mid-points of the the intervals used correctly.

7 The majority of candidates have a strategy to find the solution, however a number of centres do not teach that in order to find an answer correct to one decimal place it has to be confirmed by looking at two decimal places.

8 Parts (a) and (b) were generally well answered. In part (c) a number of candidates did not give an answer as a whole number of tins.

9 This question was well answered.

10 This question was well answered. However, very few candidates used the form 800 x 1.05^3 to find their answer, instead adding an individual 5% each year, not even looking at 105%.

11 The majority of candidates are able to calculate the volume of a cylinder. Where errors occurred it was often in incorrectly stating that the area of the uniform cross section was $2\Pi r$.
In part (b) the majority of candidates correctly divided the mass by the volume and converted the units correctly.

12 There are many candidates who are insecure on with the understanding of the indices of ten, with many giving negative indices for large numbers and positive indices for very small numbers.

13 Part (a) was well answered, the main error was in collecting the terms in x.

Part (b) was well answered, although a number of candidates collected the terms in t incorrectly.
Very few candidates completely factorised part (c).

14 There are difficulties with quotients in equations. This question was not well answered.

15 This question was well answered by candidates with secure skills in the application of trigonometry. The lack of a diagram in part (b) did not cause a problem of interpretation for candidates.

16 Candidates answered this question well, with clear workings showing their strategy.

17 Unfortunately many candidates were not able to interpret the information given in the question. Responses were disappointing.

18 Although a number of candidates were able to draw one line correctly, only the more able were able to draw all three and select the correct region.

19 Part (a) was not well answered, with a number of candidates seemingly without techniques of factorising given a term in x^2 with a coefficient other than one.

Quite a few candidates misquote the formula, which is printed on the inside cover of the examination paper. The quotient does not always remain written or manipulated as all over a denominator of 2a.

20 Many candidates showed no knowledge of non-right angled trigonometry. Others candidates were able to work accurately to find the length and area required.

21 Although many candidates used their calculators to find a value for $\sin^{-1}(-0.454)$ only the more able were able to interpret this result in terms of the graph and the range given in the question.

22 Many candidates who had left out or answered the previous few questions incorrectly were able to initiate an answer to this final question. A number of candidates stopped after expressing the left hand side as a single fraction. This was the most common approach. Many candidates incorrectly cancelled a quotient by looking at addition of terms.

MATHEMATICS
(2 Tier)

General Certificate of Secondary Education 2008

Chief Moderator: Ms. L. Mason

Coursework Report

General Comments

The majority of centres completed all documentation and sent coursework to moderators by, or soon after, the deadline. A number of centres needed a reminder to provide signatures on forms, in particular requesting candidates to sign the declaration cover sheet.
The annotation of work and on the M/1a, M/1b, M/2a, M/2b, M/3a, M/3b forms is most helpful to moderators verifying marks in all assessment areas. Some centres did not provide any guidance notes or annotation with their sample of coursework.

Using & Applying Mathematics (AO1)

Centres submit a variety of investigative tasks and generally the task allows candidates to access the full range of marks in the assessment areas. The tasks are not tier specific for marks, as the full range of marks are available to all candidates irrespective of the tier of entry. However, a small number of centres try, usually unsuccessfully, to extend some of the original foundation tier tasks to access 8 marks for each assessment area. Often a task aimed at less able candidates does not have the complexity to extend realistically to the highest marks, rather the task is designed to allow less able candidates to access the problem and demonstrate the mathematics they understand.

The improvement in the justification of generalisations through a diagrammatic spatial approach to explanation has made the third assessment area more accessible to many candidates. The exception is probably still in some “Stacking” coursework, where candidates have not developed a three dimensional generalisation or show an insight into the nature or development of a particular stack. The focus remains solely on the algebra for many candidates in their “Stacking” project, without consideration of where the terms come from related to the spatial arrangement.

Handling Data (AO4)

There were many different projects titles submitted for AO4 projects. The provision of secondary data has benefits for the majority of candidates, in focussing attention on planning and interpretation. This allows more time to be spent on analysis rather than time consuming collection, particularly for the more able candidates who are able to associate the given data with their hypothesis. However, it still remains useful to allow the less able candidate an opportunity to collect and record data in order to aid their understanding of the nature of the task before providing any secondary data. Many centres involve candidates in some collection of data and then provide supplementary data to broaden or allow complexity to develop in the project, this works well as candidates are then more likely to evaluate their strategy and develop conclusions linked to the process.

Good use of ICT is seen, both for graphical work and in calculation, but this can be let down by lack of interpretation and has quite often not been mentioned in planning. The principle disadvantage remains the inappropriate selection of graphs and pages of graphs without purpose or interpretation.
A number of projects are submitted as containing comparison, yet moderators find distinct sections which are not drawn together in a comparative way, often a range of possible hypotheses at the start of the project, worked on alongside each other, but no linking to develop a fuller or more informed conclusion. When candidates offer two or three hypotheses at the outset of the project they often create two or three mini projects, which do not satisfy the requirement for a substantial problem, which is a requirement for the award of five or more marks in the first assessment area of Specify and Plan.

When cumulative frequency graphs are in different sections of the project, the median is usually given and the interquartile range found but no interpretation or comparison is offered. Quite often candidates state the median and interquartile range and go no further with the measure of average or spread.

Calculations, diagrams and graphs, need to be interpreted. This can influence the marking in both the second and the third assessment areas, impacting on Collect, Process & Represent marks as well as Interpret & Discuss marks. Candidates should be encouraged to label all graphs, taking care in particular when working with grouped data and deciding on the scale and labels for the horizontal axis.

The third assessment area, Interpret & Discussion, has a requirement to evaluate the overall strategy, from an attempt at 4 marks through to extensive review of limitations at 8 marks. The evaluation is not merely a conclusion of their findings; it is an “evaluation of strategy”. The word “strategy” is important. Candidates need to reflect on their strategy in carrying out the investigation, this can be positive, writing the considerations they made in planning and developing the task, and then develop to consider what might affect results and could have been carried out differently. The idea that the evaluation is related to the strategy of developing the task is sometimes misunderstand in the marking of AO4 tasks, a number of centres will have received particular advice on this matter through the individual moderators reports.

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