WELSH JOINT EDUCATION COMMITTEE
CYD-BWYLLGOR ADDYSG CYMRU

General Certificate of Secondary Education **Tystysgrif Gyffredinol Addysg Uwchradd**

EXAMINERS' REPORTS

SUMMER 2006

MATHEMATICS

WJEC
CBAC

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

General Certificate of Secondary Education 2006

Chief Examiners: D.A. Timbrell, R.W. Brice, L.S. Mason.

Foundation Tier

The overall performance was very similar to that of previous years. Most candidates found the first half of both papers accessible and performed well on many of these questions. Many of the questions towards the end of the papers caused the majority of candidate's great difficulty.

Questions that required calculations involving money continue to be well answered, but the ability of many candidates to evaluate simple arithmetical calculations is very poor. Many mistakes are made, on both papers, when candidates need to carry out calculations involving simple addition, subtraction, multiplication or division. Most candidates also experience great difficulty with questions involving fractions, but there is a slight improvement in answers to questions involving decimals and percentages.

Questions involving the solution of simple linear equations were often well answered; all other algebra questions caused great difficulty. There is a serious problem with candidates who when asked to draw a graph often plot all of the required points but do not join the points with either a line or a curve. This results in a loss of marks for the graph and also a loss of marks for any subsequent questions, which depend upon the graph.

Once again many candidates appeared to sit the examination without having access to the necessary geometrical instruments.

Paper 1

1. (a) Well answered.

   (b) (i) Usually correct.
   (ii) Well answered.
   (iii) A substantial number of incorrect answers. A large number of candidates gave answers such as,

$$\begin{array}{r} 245 \\ \underline{\ 79} \\ 234 \end{array} \qquad 245 - 79 = 66.$$

   (c) Many correct answers but $150 - 112 = 42$ was a frequent error.

   (d) There appeared to be a slight improvement in simple percentage question, however many candidates gave the answer $200 - 20 = 180$.

2. (a) Not well answered, many candidates did not have a compass and did not attempt this question or drew a freehand circle. A large number drew a circle of radius 8cm.

(b) (i) Often correct.
(ii) Few correct answers, CA was frequently given as the answer.
(iii) Well answered.

3. (a) The tally column was usually correct.

It was pleasing to see that most candidates were able to draw axes and use a uniform scale. Those using a scale of 2 cm to represent 1,2 or 5 children usually plotted the bars correctly, while the minority who used a scale of 2cm to represent 3 children usually failed to draw the bars a the correct height.

(b) Well answered.

4. (a) Most candidates shaded 16 squares. Those who did not usually shaded either 4 or 15 squares.

(b) Many candidates gave the answer ¼ rather than 25%.

(c) Well answered.

5. (a) Well answered.

(b) Fairly well answered. Many candidates reversed some or all of the coordinates.

6. (a) Many candidates found it difficult to write 35,000,000. Answers often given were 3500000 or 35000.

(b) Well answered.

(c) Well answered, many candidates gave 3 or 4 factors.

(d) Well answered.

(e) Often incorrect. The answer was often given as 8 x 8.

(f) Few correct answers, most candidates were unable to evaluate this simple fraction.

7. All parts of this question were well answered.

8. Many candidates confused area and perimeter, often carrying out the correct calculations but reversing the answers. Few were able to give the necessary units for both answers.

9. Candidates from a number of centres were very successful with this question because they had been taught a standard method for carrying out long multiplication and division. Most other candidates attempted a variety of methods based upon repeated addition of subtraction with often with limited success.

10. (a) Many candidates did not appear to have a protractor. Those who were able to measure the angles were usually successful with at least one of them.

(b) Well answered.

(c) Few correct answers. Many candidates calculate 360 – 73 – 136 – 110. Many of those who found the fourth angle of the quadrilateral, 70°, often gave this answer as the value of y.

11. Most candidates experienced great difficulty with all sections of this question

(a) The answer to 0.4 x 0.2 was usually 0.8. Another frequent incorrect answer was 0.6

(b) Subtraction was poor. The answer frequently given was 9.43 – 5.6 = 4.3.

(c) Not attempted by many candidates. When attempted the answer often given was 3^3.

12. Fairly well done.

13. (a) Well answered.

(b) Well answered but many candidates continue to use incorrect notation such as 14 out of 20 or 14 in 20.

14. (a) Well answered.

(b) (i) and (ii) well answered (iii) caused some difficulty, the answer often being given as 2.

(c) (i) was often correct but the answer to (ii) was frequently given as $8x + 11y$ or $8x – 3y$.

(d) Many candidates gave the answer 82 – 45, there were very few correct answers.

15. Very badly answered, few candidates were aware of a method for finding the required answer.

16. (a) Well answered.

(b) Often not attempted.

17. Many candidates knew that they needed to replace the given numbers by suitable values, e.g. 48 by 50 1577 by 1500 and 210 by 200. Few were then able to calculate the estimate for the answer.

A number of candidates replaced 48 by 50 and 1577 by 1500 but did nothing with 210.

Some wasted a substantial amount of time by attempting long multiplication and division.

18. (a) Some candidates gained a mark for n + 8 ÷3. Many candidates replaced n + 8 by 8n.

(b) Very few correct answers.

(c) Very badly answered, few candidates had any idea of the required method for solving this equation.

19. Attempts varied greatly from centre to centre. Often all candidates from a centre did not attempt this question. When attempted many candidates plotted the bearings but do not draw two intersecting lines.

20. Very disappointing, many candidates did not attempt this question or carried out a series of calculations leading to incorrect answers.

21. Not as well answered as in past years. Many candidates found it difficult to plot the given points. When the points were plotted many could not resist the temptation to join them either with a curve or line segments. Few identified the correlation as positive.

Paper 2

1. (a) Well answered, the main error was writing £534 as £53.04 or £5.34.

(b) Well answered, but a number of candidates left the answer as £822.25.

2. (a) Well answered.

(b) Well answered.

(c) Fairly well answered. The cube, parallelogram and cylinder were usually correct but the hexagon was often named as a pentagon.

3. Very well answered.

4. (a) Very well answered.

(b) Quite well answered. Frequent incorrect answers were 57, 57, and 1.78.

5. Both parts were well answered.

6. There is still some confusion between mode, median, range and mean but most candidates were able to make a very good attempt at answering this question. The attempts at calculating the mean were particularly good and were often completely correct.

7. All sections of this question were very well answered.

8. (a) Well answered.

(b) Substitution causes great difficulty. Many answers were of the form 23 + 54 = 77, and 2 – 22 – 6½.
Some candidates wrote down 6 + 20 and 2 – 8 – 3 but failed to complete the calculations.

9. (a) There were many correct attempts at drawing the triangle. The main difficulty was drawing the two given lines and including the angle of 65°.

(b) Both answers were often correct. The main problem was the reversal of coordinates. Many candidates used one set of coordinates correctly and reversed the other coordinates.

10. Many candidates gave a suitable estimate for the height of the man, although units were often omitted. A large number indicated that the height of the man was 2cm and the height of the church was 16cm but many were unable to use this information to estimate the height of the church.

11. (a) While there were many good attempts a large number of candidates having found 4 days correctly failed to add on the additional day. Many attempted a solution by repeated addition and were often successful. A significant number of candidates failed to show any working and lost all three marks unless they had the correct answer five.

(b) Percentages continue to cause problems. Candidates who used a correct method often failed to give the answer correct to one decimal place.

12. Many candidates understand that they have to multiply or divide by the exchange rate in order to obtain the required amount. Unfortunately they often multiply or divide in the wrong part of the question or attempt to reduce their loss by multiplying or dividing in both parts of the question.

13. Very badly answered, while some candidates obtained 9cm few multiplied by 80 and then gave the answer in metres. A common error was to multiply by 1.8 rather than 80.

14. The performance on this question varied greatly from centre to centre. Often no candidates from a centre were able to make a good attempt at answering the question while in other centres most candidates made a reasonable or very good attempt at the answer.

15. Other than part (a) this question was usually not attempted. The answer to part (a) was sometimes given as $6x$ or $6 \times x$. Many of those candidates who attempted the question only used numbers in their answers.

16. All sections of this question caused great difficulty.

(a) Very few wrote down $\frac{140 \times 100}{250}$.

(b) Some candidates obtained £63, but many did not add this to 180 to give the required answer.

(c) Very few correct solutions.

17. The formulae for the area and circumference of a circle are not known by the majority of candidates.

18. Often not attempted. When attempted most candidates were unable to remove the brackets correctly.

19. Often not attempted. When attempted very few candidates were able to make a reasonable attempt at forming the required equation.

20. Often not attempted. When attempted very few candidates used the formula given in the front of the answer book.

Intermediate Tier

General Comments

Candidates appeared to have had sufficient time to attempt all the questions in the time allowed. On the whole candidates continue to give an adequate and clear account of their work so that full credit can be given to those who get incorrect answers but have used a correct method.

More work needs to done in basic number to raise their confidence and improve their accuracy of calculating. For example, question 1(a), 0·4 × 0·2 and question 8, estimating a calculation, were very badly answered.

Candidates have a good level of competence in solving linear equations. Candidates continue not to make proper use of brackets leading to incorrect algebraic expressions.

Candidates are confident in dealing with probability. However they find difficulty in manipulating the fractions that arise in their work.

Comments on individual questions :

1. (a) Probably the worst answered question on the paper. The answer of 0.8 was by far the modal answer.

   (b) Many found the 125 and even more found the 8. Some candidates did then add the two numbers, but it was noticeable that many could not accurately multiply 125 by 8.

   (c) The incorrect answer of 4·23 was often given.

   (d) Many candidates wrote $3 \times 3 \times 3$ OR 3^3 rather than the required 3.

2. Very well answered.

3. Both parts very well answered with candidates realising that part (b) was a two stage solution.

4. Again both parts extremely well answered. It is pleasing to note that the use of incorrect notations for probability such as 14:20 and 14 in 20 are quite rare.

5. (a) The number pattern was recognised by most candidates and applied accurately. The negative value did not prove troublesome.

   (b) A significant number gave an embedded or implied answer such as $24 \div 4 = 6$.

   (c) Candidates are not confident in collecting $-7y - 4y$. It was often simplified to 3y, or more usually as $-3y$. This is a particular area that needs attention.

   (d) Several candidates left their answer as $16 - 20$ appearing to think that this was what was required. Many wrote $16a - 20b$, which got no marks.

6. Most candidates attempted to re-write the fractions as fifths in order to compare with the 3/5.

   An unprofitable strategy for most as getting from 13/20 to 3·25/5 gave rise to errors. Surprisingly, the handling of the ¾ was often not attempted.

7. Candidates gave an accurate enlargement of the given shape by a scale factor of 2, but very many did not use the point A as the centre of the enlargement.

8. Again this year nearly all candidates gained the method mark, but then failed to make the subsequent calculation. A very high percentage of candidates changed the calculation to $\frac{50 \times 1600}{200}$ it was extremely rare to see the calculation reduced to $\frac{1600}{4}$ or to 50×8. Most would write $\frac{80000}{200}$ and then get confused with so many 0s.

9. (a) Candidates continue to be unaware of brackets with the most popular error being $n + 8/3$.

   (b) There is some improvement, but candidates still finding it quite difficult.

   (c) Well answered. Candidates are confident in solving linear equations.

10. Quite well answered. A significant number of candidates show the correct bearings as dots, but do not draw the bearing lines to show the position of the buoy.

11. Quite well answered. A common error was to correctly find the angle of 78º inside the triangle, but then to assume that x and y were of equal magnitude, giving (180 – 78)/2 = 51º for both.

12. (a) Unfortunately many candidates worked with 150 minutes rather than 2·5 hours. Consequently they found the calculation difficult and did not answering in m.p.h. Calculating with time is a topic that needs extra attention.

    (b) Very few expanded the second bracket correctly. Most wrote $-9b$ instead of $+9b$.

    (c) Very many gave an answer of w^2 rather than the correct w^4.

13. Well answered by most candidates. Candidates' performance has improved with points being plotted and not joined; the line of best fit was fit for purpose and passed through the 'mean score'; and the line was used accurately to estimate the score on the science test.

14. (a) The method required to answer the question was well understood. Poor arithmetic however meant that many failed to reach a final correct answer. Not all candidates understood what was meant by 'in index form'.

    (b) Very few candidates were able to answer this part correctly.

15. (a) Generally correctly answered.

(b) Very well answered, but a significant number of candidates did not draw a curve or even straight lines to join their points.

(c) Drawing $y = -2$ was very well done. A common error was to write down the negative value for x as positive.

16. Most candidates drew the arc with centre X and radius equal to the length of the string. Many drew the complete circle and ignored the building completely. Only the better candidates managed to draw the arc with smaller radius for the case when the dog went round the corner of the building.

17. (a) Very well answered. Quite a few candidates gained a mark by getting one part of the translation correct.

(b) Quite well answered overall. There was a lot of tracing paper in evidence.

18. (a) Pleasing to note that the 'greatest value' is now answered correctly by far more candidates than hitherto. However there are still many who give the 'Greatest length' as 300·4 rather than 300·5.

(b) The second part of the problem is still poorly answered. Candidates on the whole do not focus on the crucial sizes, but rather apply their arithmetic to all the values they have written on the page, leaving either no final answer or a selection of answers.

Candidates frequently took the length of the passageway as 320cm rather than $301{\cdot}5 \leq \text{length} < 302.5$.

Some candidates found it difficult to distinguish between using 10 tiles and using the fact that 10mm = 1cm, thus giving muddled explanations.

19. (a) Having written $x^2 + 4x - 7x - 28$ many candidates failed to simplify this expression correctly.

(b) Candidates were well able to clear the bracket, but found the remaining work very challenging.

(c) Candidates find factorising very difficult. Most did not even manage to do some partial factorising correctly.

20. (a) To explain clearly requires that candidates find the remaining angles of the two triangles and state that the triangles are not similar because the angles of one triangle are not correspondingly equal to the angles of the other.

(b) Several candidates focused on the difference in lengths of corresponding sides as opposed to the ratios. Others did consider ratios but there is more and more evidence that candidates think that $18/12 = 1{\cdot}6$ due to it being 1 remainder 6, also, $12/9 = 1{\cdot}3$ and $8/6 = 1{\cdot}2$.

21. (a) Very well answered.

(b) Poorly answered. Those who had the correct method often made errors with handling the fractions (especially the addition). More success was evident for those candidates who had calculated the four different probabilities for the four permutations available to Kate, and had noted them at the end of the four 'routes' on the diagram in part (a).

23. A significant improvement in performance with far more candidates gaining marks than previously.

24. Hardly any correct answers were seen. The few candidates who did manage to clear the fractions by a valid method for all three terms usually failed to deal properly with the minus in front of the second term.

Paper 2

General Comments

Candidates appeared to have had sufficient time to attempt all the questions in the time allowed. On the whole candidates continue to give an adequate and clear account of their work so that some credit can be given to those who get incorrect answers but have used a correct method.

Candidates would be well advised to use their calculators in questions where it is expected and appropriate to do so, for example, question 1(b). Partition methods are extremely useful, but 84% of 67 should be found using a calculator.

The ability of candidates to correctly manipulate fractions is still very poor. Much more work needs to be done to remedy this.

Candidates were able to use Pythagoras' Theorem correctly and use trigonometric ratios appropriately.

Comments on individual questions :

1. (a) Generally well done although several forgot to add one for the initial day, making the number of days 4 instead of 5.

Many candidates approached the solution by repeated addition of £37·40 to the first day charge until the total of £204·20 was reached.

(b) Very well done. However many candidates left their answer as 56·28 rather than 56·3 (to 3 significant figures). Many wrote 56·30 which is not acceptable.

2. Both parts were very well answered. The common error was to divide in part (a) and multiply in part (b).

3. Very well answered.

4. Measuring AB as 9cm (±2 mm) did not cause too much difficulty, but knowing how to use the scale of 1:80 was more of a problem. Many multiplied by 1·80 or 180 rather than by 80. Changing 720cm to metres by division by 100 was also caused difficulty.

5. Candidates are very confident in drawing a pie chart.

6. Converting statements into algebraic form continues to prove very difficult for a significant number of candidates.

   (a) Very well answered.

   (b) $11 - x$ and $6x - 11$ were frequently seen incorrect answers.

   (c) Candidates continue not to use brackets with the usual consequential error of having $8x - 11$ instead of $8(x - 11)$.

   (d) Most did write down their (a) + (b) and added terms correctly.

7. (a) Very well answered.

   (b) Calculating 35% of £180 was done successfully by many, but some subtracted the £63 instead of adding it.

   (c) This was difficult for very many candidates, particularly writing both answers correct to 4 decimal places. The answer to part (ii) on some calculators was $4.174\ldots \times 10^{-3}$ and to correct this to 4 decimal places proved too difficult for some. In part (ii) 83·80.. was also frequently seen

8. Very many correct answers, though some interchanged the area and circumference formulae. Several forgot to give the answers either to the nearest whole number or to 1 decimal place, that is, 'to an appropriate degree of accuracy'.

   Many candidates wrote 254º and 56·6º in response to 'degree of accuracy'.

9. Very well answered, but there were some errors in multiplying out the brackets, particularly in remembering to multiply the 4 by the –3, and in handling the –12.

10. (a) Difficulty still exists in setting up an equation. Many added the angles, but did not equate their expression to 360.

    (b) Many were able to calculate the correct answer of 46° using a numerical method rather than solve the equation.

11. (a) Very many candidates still label axes with inequalities (the middle of each bar marked with $60 \leq x \leq 65$ etc) rather than a single number at regular intervals on the axis.

    Very many candidates drew a frequency polygon rather than the bars of a grouped frequency diagram. Others superimposed a polygon on the rectangles and lost a mark.

(b) Even though the class mid-points were given, many candidates failed to use them to find the mean waist measurement. Frequently, candidates divided by the number of class intervals, 6, rather than by 80, the total number of people in the survey.

12. Very many applied the correct formula for the area of a trapezium, which is given on page 2 of the examination paper, and managed to do the calculation correctly. Attempts at dividing the shape into a rectangle and triangles were less successful.

13. Very well answered. A few candidates incorrectly divided £6000 by 3, 4, and 8 in turn.

14. Answered well on the whole, although there were still a number of students who thought that the interest remained the same each year.

15. (a) Most managed to find DF = 3.2cm by subtracting AD from AF. Not so many were able to apply Pythagoras' theorem successfully to find CF. Some added 3.2^2 to 8.4^2 rather than subtracting it.

(b) Despite the lead in from part (a) very many did not use the correct formula for the area of a parallelogram and did not use CF. Instead they multiplied the lengths of adjacent sides rather than a base and the corresponding perpendicular height. Some subtracted the areas of triangles ABE and CDF from the rectangle AECF with mixed success. Most were successful in giving the units as cm^2.

16. Many multiplied the cross-section area and the length together correctly to find the volume of the prism, although some squared the area of 405.7 as they did the calculation. Then a significant number incorrectly divided by the density 5.42 rather than multiplying by it. This created difficulties in finding the mass in kg rather than g.

17. Quite well done with most candidates gaining some marks. It is essential that candidates realise that they need to prove that the root is 4·23. They do this by finding two values of x, such as 4·23 and 4·235, so that f(4.23) = –0·073 and f(4·235) = 0·135, where $f(x) = x^3 - 12x - 25$. This gives 2 values of x for which $f(x)$ has opposite sign and show that $x = 4·23$ is the solution, correct to 2 decimal places.

18. Very badly answered. Candidates need a lot more practice at 'reverse percentages'. Most found 38% of £899 and subtracted it, rather than finding 62% of £899.

19. Initial setting up of appropriate equations was well done, but subsequent work to evaluate one of the variables was relatively poor. The substitution of this value to find the second variable was also started well, but then their algebraic manipulation was often not good enough.

20. Not very well answered. Incorrect notation and confusion with positive and negative powers were common errors.

21. It is clear that many candidates are unprepared for trigonometry and cannot make any progress in this question. Others who were prepared answered the question quite well and saw the link between the two parts of the question by noting that BD = BE – 1·2.

22. Many students knew the method for tackling both parts of the question, but interpreted the scales on one or both axes incorrectly.

23. Many candidates drew more than one vertical (and horizontal) line without labelling them. They should clearly mark their lines $x = 3$ and $y = -1$. The line $y = 3x - 2$ proved too difficult for most.

Higher Tier

Paper 1

1. Although part (a) was correctly answered by many candidates other candidates made repeated errors with the negative terms. Part (b) was correctly answered by many candidates, although other candidates incorrectly stated that the simplification was w^2, found by dividing the indices rather than subtracting them.

2. This question was well answered.

3. Although a number of candidates made arithmetical errors, in the main this question was well answered. Very few candidates inserted addition signs between the factors, which is the usual common error in expressing a number as a product of primes.

4. This question was well answered. The most common error was to misread the scale for the x-axis in part (c) after drawing the graphs correctly.

5. In general the majority of candidates drew the initial arc correctly, but then a number of candidates did not shorten the radius as the string ran alongside the building. A small number of candidates incorrectly showed the dog walking through the wall of the building!

6. This question was extremely well answered.

7. A number of candidates did not consider the bounds of the passageway, even though they demonstrated in part (a) that they knew how to ascertain greatest and least values.

8. This question was well answered. Common errors included the collection of terms in part (a) and not considering the *highest* common factor in part (c).

9. Unfortunately a number of candidates do not explain their reasoning clearly. It is important that candidates realise the need to evaluate angles or state ratios in their explanations.

10. This question was well answered.

11. Generally, either candidates gave correct responses, or they showed no appreciation of dimensions at all giving seemingly ad hoc answers including numbers greater than 3.

12. It is surprising how many candidates make numerical errors in multiplying by either the lowest common multiple, or by 3 and then by 6, or in working with subtraction. However, many candidates were able to solve the equation by using a correct and accurate strategy.

13. Although many candidates understood a scale factor ½ enlargement in terms of size, they did not always appreciate the centre of enlargement or the implication of the location of a negative enlargement.

14. Although the candidates were given the expressions for the consecutive whole numbers, clearly many candidates did not understand the term "product". It was not the order of subtraction that confused many candidates it was the need to write the product as $x(x + 1)$. Candidates who did correctly establish an equation and solved it did not always relate the answers back to the initial problem.

15. Circle theorems prove to be difficult for a number of candidates, with many different responses. Many candidates do not describe or give reasons for their responses. A number of candidates confuse alternate angles with the alternate segment theorem.

16. This question was well answered by many candidates, although some candidates did not consider the inverse relationship in their response, instead incorrectly simplifying the problem to a linear relationship.

17. The first step was the most demanding for many candidates, other stages seemed to be relatively sound in algebraic understanding.

18. A number of candidates clearly did not have a strategy for working with a coefficient of the x^2 term other than if it was unitary.

19. Part (a) was generally well answered. Candidates found part (b) more demanding than part (a). They had difficulty in deciding on the possible outcomes.

20. Candidates with fluent algebraic skills and understanding of fractions were able to answer this question correctly. Other candidates showed no understanding of the need to find a common denominator in order to make progress.

21. Candidates found part (a) less demanding than part (b). Errors with direction were common, although candidates did show good understanding of ratio.

22. The majority of candidates did consider the gradient in part (a), although some candidates incorrectly made the sketch steeper. In part (b) the majority of candidates did consider a horizontal translation, although some translated in the incorrect x direction.

23. A number of candidates did not attempt to answer this question. Others seem to find their own strategy in working through the logic of the expression. Very mixed responses to this question.

Paper 2

1. The majority of candidates used the mid-points correctly with the frequency to find an estimate of the mean. Only a few candidates incorrectly ignored the frequency in finding a total and then divided by six.

2. This question was well answered by the vast majority of candidates.

3. The majority of candidates considered depreciation annually by 24% rather than incorrectly finding 24% then deducting this three times. Many candidates used the method of $(1 – 0.24)^3$.

4. Part (a) was well answered. In part (b) the majority of candidates did not find the area of the parallelogram by using perpendicular height multiplied by length. Instead they found the area of the outer rectangle and subtracted the areas of the two right angled triangles. The vast majority of candidates stated the units correctly.

5. Although most candidates started by finding the volume correctly, a number of candidates were then unsure how to find the mass - divide or multiply? Most candidates did attempt to change the units from g to kg.

6. Many candidates gave a full solution using trial and improvement with essential checking to three decimal places. Other candidates seem unaware of the need to check using three decimal places and consequently limited themselves to 2 marks only.

7. Candidates either gave a correct response in this question, or they misunderstood the nature of percentage change.

8. In general, candidates are fully aware of the strategy required in order to solve simultaneous equations. Usually errors are numerical, in either adding or subtracting pairs of equations.

9. The notation used was generally correct, although a number of candidates did not express their response in part (b) in standard form.

10. The majority of candidates applied their knowledge of Pythagoras' Theorem and trigonometry correctly in answering this question.

11. The difficulty in this question was more with reading and interpreting the scale than understanding inter-quartile range and interpretation of a cumulative frequency diagram..

12. A number of candidates confused $x = 3$ with $y = 3$, and $y = -1$ with $x = -1$, and some were not sure how to draw $y = 3x - 2$, however many candidates indicated the correct region.

13. Very mixed responses in this question, with many candidates having difficulty with some parts. A common incorrect answer in part (a) was 0. In part (c) coping with addition of fractions proved demanding! In part (d) simplifying the $7x + y$ factors actually proved to be easier for candidates than simplifying the x factors.

14. A number of candidates used the cosine rule to find the length of the chord instead of finding the length of the arc as required in the question.

15. This question was well answered by candidates who used the Sine Rule accurately. Some candidates seemed only to have right-angled triangle trigonometry skills, and consequently they were unable to succeed.

16. This question was well answered.

17. A number of candidates seem not to have any appreciation of volume scale factors. Other candidates clearly understand the impact of dimensions in terms of scale.

18. Many candidates attempted to apply Pythagoras' Theorem, having the correct idea, but many were not able to cope with the idea that $x + 6.2$ should be squared - $(x + 6.2)^2$ rather than $x^2 + 6.2^2$. The difficulty for candidates in using the quadratic formula seems to be in not treating the numerator as having a common denominator of $2a$.

19. In part (a) a number of candidates did not interpret the recurring notation correctly, incorrectly treating all digits as recurring. In part (b) a number of candidates did not apply their product of prime factor knowledge correctly, others attempted to use calculators. Part (c) was well answered by many candidates who showed an appreciation of surds, while others simply wrote an incorrect response of 0.

20. It is difficult to highlight errors in this question as many candidates show no working. One initial error was not to select the correct mid-points and failure to recognise the unequal intervals.

21. A number of candidates realised that they needed to look for speed/time, so simply, but incorrectly, read values from the graph rather than consider differences in distance and time by drawing a tangent.

22. Candidates with fluent algebra skills were able to solve the equation by starting with a common denominator or multiplying throughout by the lowest common multiple. Other candidates showed that they algebraic skills were over stretched by now!

23. Although many candidates drew a "wave", many did not label key values on the axes. Finding inverse *cosine* seemed to be a mystery to many candidates who had previously, earlier in the paper, answered questions involving trigonometry correctly.

Coursework

The majority of centres completed all documentation and sent coursework to moderators by 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 strands.

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 strands. However, a small number of centres try, usually unsuccessfully, to extend some of the original foundation tier tasks to access 8 marks on each strand. Often a task aimed at less able candidates does not have the complexity to extend realistically to the highest marks.

Many centres use tasks developed for the intermediate tier with foundation tier candidates or higher with intermediate tier candidates. This works well particularly as coursework marks are not capped in the tiers.

The improvement in the justification of generalisations through a diagrammatic spatial approach to explanation has made the third assessment strand 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.

Handling Data (AO4)

There were many different projects titles submitted for AO4 projects. Providing secondary data has benefits for the majority of candidates in focussing attention on planning and interpretation. Many centres involve candidates in some collection of data and then provide supplementary data to broaden or allow complexity to develop in the project. A number of centres now have there own databases developed over time from data collected by pupils in a number of year groups. This works well as candidates relate to the data and find it easier to reflect on the strategies of data collection and manipulation, finding conclusions which relate back to a real situation.

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! The stress needs to remain on the issue that a graph should have a purpose and it needs to be interpreted.

A number of projects are submitted as containing comparison, yet moderators find distinct sections which are not drawn together in a comparative way, the aspects not being developed side-by-side. This is certainly true when cumulative frequency graphs are in different sections of the project, perhaps the median is read and the interquartile range found but no comparison is offered. For the award of 5 marks in the Specify and Plan strand a substantial problem needs to be considered. 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.

Calculations, diagrams and graphs, need to be interpreted. This can influence the marking in both the second and the third strand, affecting 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 strand, Interpret & Discussion, has a requirement to evaluate running through it from an attempt at 4 marks through to extensive review of limitation for 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 and then develop to consider what might affect results and could have been carried out differently for example.

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