RECOGNISING ACHIEVEMENT

GCSE

# Mathematics A

General Certificate of Secondary Education **GCSE J512**

# Report on the Components

# June 2008

**J512/MS/R/08**

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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## GCSE Mathematics A (J512)

## REPORTS ON THE COMPONENTS

# Chief Examiner's Report

### General Comments

This is the first year of the 2-tier J512 specification which has replaced the 3-tier 1962 specification. The 2-tier arrangement allows Foundation candidates to be awarded a grade C and Higher candidates a grade D. This new set up has encouraged centres to reconsider their entry policy and, in many cases, choose a more appropriate level of entry for each of their candidates.

Very pleasing work at both tiers of entry was seen this year. With the new system, more candidates were able to demonstrate what they knew and that they could apply that knowledge. In general, work was presented well and within the confines of the answer space. This is even more important now that marking is being carried out on screen. Candidates still find it very difficult to give a written explanation, to make a valid comparison or just to give a geometrical reason in support of their work. With the passing of coursework, there will be even fewer opportunities to practise this skill and centres will need to allow for more time to develop candidates' ability to cope with this style of question. Though algebra work is improving at both tiers, arithmetic is still a concern. This is even more of a problem on calculator papers where candidates are using traditional pencil and paper methods to answer questions when a calculator approach is needed and much more likely to lead to the correct answer.

Increasing the number of grades available at each tier consequently means that there is an increase in the amount of work that candidates need to cover. At both tiers, centres are advised to ensure that candidates practise work targeted at the bottom two grades (C and D grades at Higher Tier and F and G grades at Foundation Tier) since this forms a large part of each question paper. It was clear this year that better candidates at each tier have overlooked these and consequently lost marks unnecessarily.

In coursework there were many good scripts seen in both the AO1 and the AO4 tasks though few candidates managed to attain the top marks. Appropriate reasoning and formal algebraic proofs were more evident in AO1 and in AO4 than in previous years. Candidates explained why a particular statistical technique was used and then interpreted their results fully and in the context of the original question. The skills learnt by following through a coursework task are important to any candidates' mathematical education and these 'rich tasks' should be continued even after coursework is no longer a requirement at GCSE.

Centres should note that candidates are not required to complete coursework tasks for June 2009, or any subsequent session. However, coursework remains a requirement for the January 2009 session: new centre-marked coursework can be submitted or coursework can be carried forward from a previous session. The following entry options are available for January 2009:

- FA – Foundation tier with centre-marked coursework
- FC – Foundation tier with coursework carried forward
- HA – Higher tier with centre-marked coursework
- HC – Higher tier with coursework carried forward

Centres requiring further information about this specification and details of support materials should contact the Customer Contact Centre on 01223 553998.

# J512/01 Paper 1 (Foundation Tier)

### General Comments

Most candidates made a confident start to this paper with very few scoring less than 20 marks. However, the 'difficulty gradient' was steeper than that on Foundation papers on the old three-tier specification and there were many candidates who failed to score, or picked up only the odd mark, on the last five questions.

On the more complex questions, where more than one mark was available, there were many scripts where the working was not laid out clearly enough to be able to award method marks, or conversely there was no working at all. Candidates would benefit from writing down the calculations they have attempted and, if more than one approach is used, crossing out superfluous method.

Many candidates did not appear to have access to rulers and compasses, making the drawing and construction questions less accessible than intended.

### Comments on Individual Questions

**1** Part (a) was an accessible start to the paper with only a few candidates losing out by writing thirteen thirty five, thirteen thousand or using figures instead of words. Weaker candidates found part (b) difficult, writing too few zeros or 10080 and occasionally putting in erroneous decimal points. Part (c) proved most challenging as many of the weaker candidates misunderstood the question finding 1400 - 1335. Part (d) was usually correct with only a few of the weakest candidates misunderstanding the question.

**2** Most candidates could correctly measure the line, mark its midpoint and draw an acceptable circle. However, the terminology used in the other parts of the question proved confusing to a number of candidates: the majority thought 'perpendicular' meant either parallel or vertical and few understood both 'chord' and 'tangent'. Clearer labelling (as requested in the question) could have helped some candidates to pick up a few more marks here.

**3** This was well answered with most candidates scoring full marks. Only the weakest candidates miscounted in part (d) and unfortunately they rarely wrote down the numbers they were trying to count and so missed out on the method mark as well.

**4** There were very few problems in part (a), only minor slips. Most candidates dealt well with the carrying of digits. Again, part (b) was well done by most candidates, but an answer of 524 (by subtracting the smaller from the larger digit each time) was a common error. The division in part (c) was poor, often with no structure. Problems included: lack of knowledge of tables; how to deal with the remainder; using the 'chunking' method incorrectly, or the answer not being clear (e.g. $10 \times 7 = 70$, $7 \times 7 = 49$, answer 119). Some candidates drew out 119 matchsticks and bundled them up in 7s – usually with slips, and attempts at 17 + 17 + … were usually unsuccessful. The long multiplication in part (d) showed some good solutions, but 830 ($20 \times 40 + 6 \times 5$) was very common. The grid method seemed to bring most success, but 20 x 40 = 80, 60 or 600 were common errors. The 'Chinese' method was not seen often and success was quite centre dependent. There were a few centres where nearly all candidates used this method successfully but others where its use was less consistent and errors made, often in the adding.

**5** Parts (a), (b) and (c) were well answered by all but the very weakest candidates. Errors seen were disjoint squares in part (a) (a few candidates missed out this part) and an answer of 32 in part (c). Part (d) proved more challenging to explain: the best candidates used an algebraic method and the *n*th term, and a few realised the terms were all 1 different to the three times table. The most common reason given was that '3 is being added' which was insufficient to get 2 marks.

**6** Many candidates scored well on this question but only the best achieved all 8 marks. Common errors included doubling or halving instead of squaring and similarly halving instead of giving the square root. It was also clear that a number of candidates were unfamiliar with the square root sign. In the percentage question many found the correct answer but then lost a mark by doing further calculation (eg subtracting 18 from 20). Also, there were a number of answers of 19 (presumably thinking 10% was £1. In part (d) weaker candidates simply multiplied 3 by 8. Cube root was unfamiliar to some and quite a few simply multiplied or divided by 3 or even cubed 27. Prime numbers were the least familiar and there were many answers of 25 or 27. No marks were awarded for the occasional answer of 31.

**7** In part (a) the obtuse angle was recognised by most of the candidates, the rest choosing mainly the reflex angle. 80º in part (b) was one of the most consistently correct questions on the paper. Most candidates knew what to do but there were a few arithmetical errors. Part (c) discriminated well. The word 'quadrilateral' was rarely used so only the strongest candidates scored 5 marks. Stating the fact about angles on a straight line was more familiar so 4 marks was common. Only a few candidates did not understand what was meant by 'reasons'. Weaker candidates stopped after finding the interior angle as 70, and some mistakenly used the top 80° and 'Z-angles' or the bottom left 80° in their "straight line" calculation.

**8** There was generally a good understanding of symmetry with most candidates scoring at least 3 marks and many achieving all 6. Generally, line symmetry was better understood than rotational symmetry. The OCR logo proved the most difficult part and maybe some candidates thought that each shape had to have the same value for both types of symmetry.

**9** There were many correct answers and very few without any working. Most correctly worked out the cost of 3 cans of drink but a number had great difficulty subtracting £1.90 from £5. Some then had trouble subtracting £1.50 from their answer. The same was true for those who subtracted the £1.50 first. Few divided their 1.60 by 0.40 but preferred to add 40's together until they arrived at their 1.60.

**10** Many candidates scored well here. The main errors were: not finally evaluating e.g. 18 + 16, 24 − 21; ignoring the sign 24 – 21 = 45, or –3; leaving the letters in eg 16*t* + 18*v* and for the weakest 82 + 36, 8 + 2, 6 + 3, etc. Most candidates could do the equation but the common wrong answer was 4 (from 10 – 6).

**11** The enlargement was well done with only very few candidates using the wrong scale factor and some making the horizontal leg too short. The construction in part (b) was centre dependent. In a few centres nearly all candidates used compasses with most scoring all three marks. However, in most centres use of compasses was seen sporadically with most candidates limited to gaining 2 marks and often only scoring 1 mark.

**12** This question was generally well answered. However, there were a few centres where none of the candidates appeared to have heard of stem and leaf diagrams. The errors seen tended to be spurious decimal points eg 0.7 in part (a), giving range as 7 – 44, and having difficulty with the two middle values with the median.

**13** There were few fully correct solutions here. 1.4 was the common answer in part (a) and in part (b) there was much confusion often involving cross-multiplying (leading to 10/27).

**14** This was the first of the questions common to Paper 3 (grades D and C material). There were many candidates who scored no marks from this point on, often making no attempt even to answer the questions. In part (a) poor cancelling skills meant that few candidates got down to the simplest form, most stopped at 2 to 8. In part (b) a lot of candidates got the idea of 100g of cereal gives 20g of fruit but then could not make the next steps or confused themselves. There were far more correct answers for part (c) than part (b), as the candidates seemed more at ease with percentages.

**15** Part (a) was poorly answered by even the stronger candidates. Many of those who understood the probability aspect of the question had difficulties with adding 0.6 and 0.15, and 0.79 was a common wrong answer. A number of candidates just added 0.6 and 0.15 and gave an answer of 0.75 or 0.21. Occasionally, an attempt was made to average 0.6 and 0.15 or even multiply them. There were very few answers that did not score in part (b). The vast majority of candidates mentioned an example or examples of other weather that it could be other than sunny. 'It only means that it is a 60% chance that it will not rain' was seen a few times. The few that did not score tended to make a comment about weather forecasting and its reliability.

**16** There were a variety of responses in part (a). Those candidates who had covered this work seemed to cope well, but many had no idea what it was about. This was evidenced by: totally omitting the question; an assortment of letters inserted into the answer space; often the $x$ coordinate of 3 being used. Part (b) was done with greater success, even after no marks were awarded in part (a).

**17** There were few answers of any merit seen here with the modal mark being 0. A few candidates calculated and even plotted 1 or two correct points but few went on and drew the line correctly. Some candidates used the numbers from the question plotting (-1, 3) and/or (1, 3).

**18** A few of the stronger candidates make attempts at part (a) but were foiled by errors such as $5x$, –5 or –8. After achieving a correct answer a number of candidates went on to ‘simplify’ or ‘solve’ their final expression. Sensible attempts at part (b) were seen by only a handful of candidates with the most common response being something like $6ac$.

**19** The wording of part (a) was clearly not understood by the majority of the candidates. Most of the candidates gave no response at all and of those that did most scored zero for their efforts. Some candidates wrote correct factor pairs using powers eg $100^2$ or $50^4$. A large number of candidates had a go at part (b) even if they had left out many of the other common questions. A small number managed a correct response to part (i) but the most common answer was $y^{15}$. Fewer candidates attempted part (ii) and answers were often incorrect.

# J512/02 Paper 2 (Foundation Tier)

**General Comments**

In general, candidates produced pleasing performances on this paper. Though most candidates had been prepared thoroughly, there were some who evidently had little understanding or knowledge of the harder topics covered in this paper. The latter often made little, or no, attempt at questions 15 to 19.

Answers were presented to a pleasing standard with working shown where required. A significant number of candidates were hampered by a lack of even the most basic equipment: compasses, calculators and rulers.

Though arithmetic at this level is of a satisfactory standard it is of concern to see pencil and paper methods being used where a calculator is allowed.

There was a lot of good work seen on questions involving money, probability and coordinates. However, confusion between the meaning of the words area and perimeter remains a problem for many candidates, as do the words factor and multiple.

All candidates had sufficient time to attempt every question on this paper.

**Comments on Individual Questions**

**1** This question was normally well answered, although quite a large number of candidates did not know what a square number was. Some candidates had difficulty with explanations, whilst others left the spaces blank showing that the words ‘multiple’ and ‘factor’ were either not known or not understood.

**2** Parts (a) and (b) were correctly calculated by many candidates. Very often area and perimeter were mixed up even though the units were stated on the answer lines. The area of the curved shape defeated many, although a lot of candidates managed to gain a method mark when evidence of counting squares could clearly be seen.

**3** This question was well answered by the majority of candidates and proved to be a high scoring question. Common errors were writing £7.1 instead of £7.10 and failing to deal with the 5.4m on the third line. Units for 62p were wrongly entered by weaker candidates.

**4** Part (a) was usually correct, although ‘Chinese’ was a common wrong answer. Part (b) was answered less well, with many candidates not giving their answer as a fraction. Part (c) was well answered by many candidates; some just earned the method mark for the sight of 310 degrees.

**5** Weaker candidates seemed unable to process the information in this tabular form so only the very good ones scored highly. In part (a), misreading led to errors. In part (ii) 44 was a common wrong answer. Many candidates achieved only part marks in part (iii); a common mistake here was to repeat one value eg 56 + 68 + 56. Part (b) was less well answered even though the formula was given; lots of candidates used 98 instead of 120 for the distance.

**6** This question was generally well answered. In part (a) a few candidates reversed the *x* and *y* coordinates. In part (b), although the answers were usually correct, E was sometimes plotted at (-4, -5) and G at (-3, 0).

**7** This question was mainly well answered. Freehand drawing was condoned. Explanations in part (b)(i) were better than anticipated. Part (ii) had many correct answers, although 40 was a common error.

**8** Part (a)(i) was usually correct, and 8 was a common incorrect answer for part (ii). Only the better candidates answered part (iii) correctly; many gave 5 as the answer. In part (b) only the better candidates were able to deal with the substitution, with weaker ones seemingly not understanding what 3*t* meant. The order of operations was a further problem for all but the best candidates. In part (ii) a common error was to add 12 + 4 + (–2) to arrive at 14.

**9** Working out 3/5 of 135 proved to be a good discriminator. Powers were only done well by the better candidates, despite this being a calculator paper.

**10** In part (a) there were plenty of fully correct answers. Part (b) was probably the best answered question on the whole paper.

**11** Most candidates correctly attempted to double £2.75 and subtract from £7.70. Many obtained £2.20 though they then were not sure what to do with it. Most knew to divide by 0.5 but actually multiplied.

**12** Approximately half of all candidates scored three marks in part (a). A very common error was to work out the total surface area of the six faces of the cuboid. In part (b), the better candidates scored all three marks, with many others scoring one mark for drawing one face correctly. A common error was to draw edges that went ‘diagonally’ across the printed grid.

**13** Most candidates were successful in part (a), with just a few trying to find the charge per hour. In part (b) many candidates achieved the correct answer; others had “near misses” as they tried to visualise extending the line to find the reading at 5 hours. A rare few did a calculation using the gradient. Approximately half of the candidates gained one mark for the constant, but few got the formula completely correct. A number of candidates got this completely wrong by using letters to describe the fixed fee and rate.

**14** Correct answers to part (a) were rarely seen as most candidates had little idea what was meant by a two-way table. The usual answer was some form of table in two columns, which scored no marks. In part (b) fully correct answers were also rare. Usually, candidates found $\frac{\sum f}{7} = 4$ . Some found $\sum xf$ = 104 correctly but did not know how to proceed. Others totalled the cumulative frequency values or found the mode or median.

**15** Nearly all candidates scored some marks on this question. Most candidates did a reflection in part (a), but few gave the correct one – a correct answer here was a good indicator of better candidates. The most frequent mirror line used was the *y*-axis, with another popular one being $y = 1$. In part (b), most candidates got at least two marks as they managed at least two of the required three elements of the transformation. A few drew more L shapes than the required answer, or used a wrong centre of rotation. Some got the rotation displaced one unit downwards.

**16** Weak candidates had no idea what to do. Others tried to draw arcs by joining dots, rather than using compasses. Quite a few candidates gave a perfect drawing, but did not indicate where the fox could go.

**17** Very few correct answers were seen. Some candidates scored one mark for 1258 − 680. A few got 1.85 but many did percentages of 1258, hence scoring zero. Answers involving percentages of 680 were rare, but some candidates were successful using this method.

**18** Weak candidates did not attempt this question at all, but others achieved some success. Fully correct answers were rarely seen, and even those who had all the correct trials often wrote down the wrong answer. A few candidates misread the question and tried to solve $x^3 + 1 = 8$ or something similar.

**19** The most common answers were 9.7 or 7. Those candidates who showed working often had incorrect calculations. It was disappointing to see answers for the length which were smaller than the given sides of the triangle.

# J512/03 Paper 3 (Higher Tier)

**General Comments**

Candidates were well prepared for this exam and, in general, performed to a pleasing standard. Very few seem to have been entered at the wrong tier. There were many high scores from candidates who displayed a good knowledge of the topics covered.

Presentation of work was, on the whole, very good with clear working shown so that credit could be awarded even when the final answer was incorrect. Working stayed within the confines of each question part; this is essential now that scripts are being marked on-line. Drawing was neat and accurate, with ruler and pencil used appropriately.

Work on algebra continues to show improvement though there are still those who solve equations by trial and improvement. It should be noted that only formal algebraic methods will score full marks. Some candidates had trouble with the order of operations when solving the more advanced equations. Unfortunately, there are still those who are making errors when completing basic arithmetic. At this level, candidates should be checking their work and considering their answers more thoroughly to identify where errors have been made.

Candidates clearly had sufficient time to complete the paper as the majority of questions were attempted.

**Comments on Individual Questions**

**1** Most candidates found little difficulty in gaining full marks on this question. Very few failed to reduce the ratio to its simplest form and even fewer gave the ratio in the reverse order. In part (b), the 'breakdown' method of 100g = 20, 200g = 40, 50g = 10 was often incorrectly followed by 20 + 40 + 10 = 70g. Most used a 2-stage method to increase by the given percentage.

**2** Mistakes and misunderstandings were quite rare in this question. It was realised that the sum of the probabilities had to be subtracted from 1, though poor addition of decimals at times led to an answer of 0.79. In part (b), all candidates were aware that other weather conditions were possible and those with a fuller understanding referred to the fact that sun and rain were not mutually exclusive.

**3** Very few errors were made in any part of this question. A small number of candidates had not come across 3-D coordinates before but even then were able to pick up some marks. Weaker candidates had 3 as the $x$-coordinate in part (a).

**4** Some pleasing algebra, clearly set out and correctly used, appeared in a good number of scripts. Though many candidates arrived at the correct answers, this was not always by using algebra. Trial and improvement was seen frequently, indicating that the question was either not properly read or not fully understood. A common misunderstanding was to say that AC was 10 more than BC ($2x + 10$) rather than AB ($x + 10$). Less frequently, but a little more worrying, was to see BC given as $x^2$ instead of $2x$.

**5** Though a large number of candidates were able to give the correct vector notation for the translation, or its equivalent in words, there were those who had difficulty in describing it. Some incorrectly used coordinate notation and others used imprecise language such as '3 across'. A few candidates misread the instruction and gave the translation which mapped B onto A. There were very few instances of an incorrect reflection in part (b). Part (c) was also answered well with a small number rotating clockwise or about the wrong centre of rotation.

**6** Many candidates did not use the table but were still able to draw the line successfully. When the table was used, it was surprising to see some candidates using $x$ values outside the range given on the diagram; this did not stop them completing the graph correctly. There were many correct answers to part (a)(ii) though some candidates gave where the line crossed the $y$-axis rather than the $x$-axis. Rearranging the formula was less successful. Candidates seem to forget the proper order of operations, which they successfully use in solving equations, when they are faced with a rearrangement.

**7** Incorrect responses to part (a) were rare. Partial factorisation was the main fault in part (b) though weaker candidates showed no understanding of what was expected.

**8** It was common to see an attempt at a factor tree but poor arithmetic let a lot of candidates down. Even when a completely correct tree was found some did not know how to write the answer; $2^3 + 5^2$, for example, appeared regularly. The first two parts of (b) were invariably correct but part (iii) caused problems. A large number of candidates only got one of the two parts of the answer correct. Answers of $2y^{15}$, $8y^8$ and $6y^{15}$ were common.

**9** There were a lot of correct answers to part (a) but $n + 5$, the term-to-term rule, and $2n + 5$, misplacing the 2 and the 5, occurred where knowledge of this topic was not secure. Answers to part (b)(i) were sometimes spoilt by poor arithmetic. Factorising was more of a challenge to many, and only the better candidates succeeded. A strange factorisation, $n(n + 3) + 2$, seemed to satisfy a number of candidates who were unaware that two sets of brackets were required.

**10** Most solutions started with the correct volume. Better candidates divided 36 by 24 but did not always reach 1.5 as the answer. Some multiplied 36 and 24, others subtracted 36 and 24 and there were those who divided 36 by 9 (the sum of the given sides). Part (b) was well done although many candidates still feel uncomfortable taking 36.5 as the upper bound.

**11** Many candidates were far too vague with their statements. More often than not they implied that two adjacent frequencies were being added rather than making reference to a 'running total'. The requirements of part (b) were well known, though the misreading of scales, and in part (ii) failure to subtract from 80, lost marks for some.

**12** Standard form is well understood. Even when errors were made in either the power of 5 or the number of zeros, it was evident that the process was known. Many of those who knew to divide 2 by 9 had little idea of how to perform the operation without a calculator. Where that was thought to be too hard, candidates divided 9 by 2 or multiplied 9 by 2 and then made some appropriate adjustment to arrive at a decimal answer.

**13** There were plenty of neat, concise and accurate solutions to the equation. However, many candidates failed to be aware that the first step had to be to deal with the 2 on the left hand side. There was much 'collecting' of number and $x$ terms first. Others multiplied both $7x – 3$ and $2x + 9$ by 2. Weaker candidates, with less knowledge of algebra, used trial and improvement to obtain their solution.

**14** In general, the angles were found correctly showing that candidates knew the geometry required by the questions. Few could give the reasons in the desired terminology. In part (a) candidates wrote about an isosceles triangle without referring to equal tangents and in part (b) they knew that angle OBT was a right angle but referred to a line from the centre or origin, or a chord, instead of the radius. Occasionally, poor arithmetic lost marks unnecessarily.

**15** Most candidates knew the correct method but were let down either by their arithmetic or their ability to process the calculation correctly. Others did not simplify their answer appropriately. A large number of candidates forgot to include the units with their answer. Some still confuse the area and the circumference formulae. Only the better candidates coped with part (b); the vast majority of candidates just divided by 2.

**16** Very few candidates started with a correct statement for inverse proportion. Invariably candidates formed a linear equation, usually $y = 2x + 1$ or $y = 2.25x$. Of those who established a correct equation, there was a significant number who could not divide 36 by ½. The final part of the question eluded all but the most able candidates.

**17** Part (a) was surprisingly poorly done. Though there were a number of correct answers, a great many candidates began by attempting a division by 4000 or 40, floundered with the arithmetic and gave up. Weaker candidates used a variety of trial and improvement methods, usually unsuccessfully. There was more success with part (b). Most candidates drew appropriate tree diagrams and knew when to multiply and when to add. Unfortunately, poor work with fractions often meant that full marks were not achieved. A common error was for candidates to assume that sampling with replacement was needed.

**18** There were few good attempts at this question and even fewer correct answers. Many candidates presented working that was difficult to follow. Better candidates made a reasonable attempt but most of them could not compare the coefficients of **a** and **b** to find $p$ and $q$.

**19** It was surprising how many candidates reached $\sqrt{100}$ but did not go on to give an answer of 10. A considerable number added the 20 and the 5 instead of multiplying them. Those unfamiliar with surds estimated the numerical equivalents and tried to multiply the two decimals. It appeared that more of the candidates knew how to rationalise the denominator in part (a)(ii). However, the arithmetic involved was too much for many. Quite a number of candidates were able to write down the answer to part (b) without any working. Some candidates knew that the recurring decimal could be simplified by multiplying and subtracting but rarely reached a denominator of 999. Many responses involved a denominator of 1000.

**20** The lower bound for the length of the cue, 142.55 cm, was seen often. The upper bound for the length of the case was much more problematical. Most thought it was 145cm and hence reached the wrong conclusion.

# J512/04 Paper 4 (Higher Tier)

### General Comments

Overall the standard was mixed; some candidates had been well prepared, some candidates gave no response to questions in the latter half of the paper and a significant few candidates appeared to have been entered for the incorrect tier. There were many high scores from candidates who displayed an excellent knowledge of the topics, showing full and accurate working throughout. There was no evidence that candidates were short of time on this paper.

Presentation of work was, on the whole, very good with clear working shown so that marks could be awarded even when the final answer was incorrect. However, there were instances where candidates had presented working on different pages to the question, a practice which should be discouraged.

### Comments on Individual Questions

**1** Almost all candidates achieved full marks in part (a). Part (b) highlighted candidates' difficulties in using their calculator, with a common error of -14.65 seen. Some candidates showed confusion between significant figures and decimal places.

**2** Generally, this was very well attempted, but a significant number of candidates did not appreciate the context of the question and did not give their answer to a suitable degree of accuracy.

**3** Part (a) was generally correct. Candidates demonstrated several different methods in part (b) with varying success. In part (c) a surprising number of candidates gave a literal formula while others gave a fully correct answer following an incorrect answer in part (b), unaware that there was a connection between the two question parts.

**4** In part (a) candidates occasionally lost one or two marks for not giving headings or numbers, but in general either full marks or no marks were scored. Part (b) was answered well by many candidates with the common error 28/7 seen. Other errors included using cumulative frequencies and attempting midpoints.

**5** The formula for area of a trapezium is not given on the formulae sheet and many candidates were unable to recall it. However, full credit was given to the various correct methods adopted by candidates in finding the area.

**6** Candidates generally scored full marks in part (a). In part (b) marks were lost by candidates stating sum of interior angles of a hexagon and not showing any supporting mathematics. In part (ii) candidates generally scored full marks although a common error here was to ignore the angle 120 stated for a regular hexagon in part (i).

**7** Many good accurate responses were seen with candidates clearly using compasses.

**8** Generally, this was very well answered with many candidates gaining full marks. However, some candidates, having shown sufficient method to justify an answer to one decimal place, continued working towards an answer of greater accuracy.

**9** Full marks were usually gained by candidates. However, some lost marks for rounding their final answer inaccurately.

**10** Part (a) was generally attempted well with some giving a single value as their answer. Candidates who gave their answer as an inequality were usually able to represent this on a number line. Part (b)(ii) was often answered better than part (i) with candidates able to multiply brackets with greater accuracy than subtracting them.

**11** Candidates had clearly been prepared to answer questions on percentages. However, the reverse percentage in part (b) was answered better than percentage increase in part (a). A common error in part (a) was dividing by 1258 and in part (b) the error was to calculate 12% and subtract.

**12** The majority of candidates gained full marks in part (a) with a very small minority plotting points at the upper class bound or drawing bar charts. In part (b) many gained a mark for the similarity, even when no reference to modal class was made. Most candidates did not appreciate that this question was a comparison of statistical data and there was a requirement to give valid statistical similarities and differences.

**13** Candidates seem confused between multiple and factor and often gave a number lower than either 72 or 42 for part (a). Part (b) was answered better, but the common error of 7 was seen often. Part (c)(ii) scored better than part (i) where candidates did not always take account of place value when adding numbers given in standard form.

**14** The most common method used was to multiply to give equal coefficients and subtract. However, despite having a calculator, arithmetic errors then occurred leading to inaccurate solutions.

**15** Some candidates clearly did not know to use trigonometry. Those candidates who did generally used the most efficient method to arrive at a correct answer. Some candidates rounded prematurely when using their answer from part (a) in part (b) and centres should remind candidates to work using the answer given on their calculator where possible. Candidates using longer methods involving sine rule and/or Pythagoras often lost final accuracy marks.

**16** A surprising number of candidates who had not scored marks since question 12 were able to gain some, or all, marks on this question. In part (a) 18 was more often correct than 14 and in part (b) the second bar was more frequently correct than the first. The scale presented some difficulties and candidates should be aware that if they give an area scale it should be on or next to the diagram with an indication of size of square referred to.

**17** Many candidates omitted this question or attempted to draw a parallelogram with varying degrees of success. There was a mixed response from candidates who did recognise that the cosine rule was needed as some were unable to rearrange the equation from the form given in the paper to the form required to calculate an angle.

**18** It was pleasing to see fully correct answers to this question. Candidates generally made an attempt at part (b) even where they did not attempt part (a). Candidates who attempted trial and error in part (b) did not then give an exact final answer as required.

**19** A number of candidates did give fully correct answers to both parts of this question. However, the demand in part (a) to give answers to two decimal places should have indicated to candidates that the method of completing the square or use of the quadratic formula would have been more appropriate than factorising. Some candidates who did use the formula either did not substitute correctly or made arithmetic errors. In part (b) some candidates chose to multiply out the right-hand side of the question, but were then unable to make further progress.

**20** Candidates generally scored no marks or full marks for this question. Many different variations of cancelling terms were seen by candidates who did not attempt to factorise first. Some candidates made the expression equal to 7, substituted 7 or gave the answer as 7.

**21** A significant number of candidates who had not attempted any questions since question 16 attempted this and gained some marks. Candidates realised that they needed to find the volume of two cones and subtract and were able to correctly use the formula given. The most common error was in finding the height of the small cone which was more often given as 2.4 with the height of the larger cone as 14.4 or just 12.

# J512/05 Internal Assessment (Centre marked)

### General Comments

This, the last summer examination session where internal assessment is a component, has seen an increase in the number of problems faced by moderators in either obtaining scripts, mark sheets or information about candidates from centres.

### Quality of work

The quality of work has remained substantially the same compared with the equivalent examination sessions over the last two or three years. It must be said, perhaps almost by way of conclusion, that there has been an increasing trend for centres to offer the same tasks year on year and there has been less evidence of choice for, and creativity by, candidates than would have been evident 5 years or so ago.

### Administration

While many centres submitted documentation and scripts to their moderators on time, and/or on request, there were serious difficulties with a very substantial minority. These centres were slow to provide mark sheets, submit the work requested and respond to requests for mark adjustments and, frequently, Centre Authentication Forms. This made it extremely difficult for moderators to meet the timescale for the completion of their work and the submission of their reports. Indeed it seemed to be not uncommon for some centres to send the mark sheets to moderators between 4 to 6 weeks after the deadline date and in many instances the mark sheets contained errors which caused further delays to the process.

### Tasks

**AO1**:
Few centres offered any choice of task and a uniformity of approach by candidates was very much in evidence. Commonly seen tasks were T-Totals, Opposite Corners and Magic E. Able students appeared to spend too long on low-level work and marks awarded tended to reflect the speed at which they could work – thus a quicker candidate moved onto broader generalisations whereas a slower candidate did not. Consequently there were, as noticed last year, fewer candidates demonstrating the higher level algebraic skills that one would hope to see from the able candidates.

**AO4**:
Generally speaking, the improvements in the quality of both the work seen and the appropriateness of the marks awarded, noted last summer, have been maintained. Candidates were seen to be using their statistical knowledge rather than their skills in applying techniques although the amount and depth of interpretation was, though improving, still rather low.

Many of the tasks seen were of the “Average Student”, (frequently using the Mayfield High database), or the “Compare two newspapers” genres. Candidates whose task was based purely on an analysis of, for example, height and shoe size or height and weight for different ages were unlikely to score many marks and frequently their work was over marked.

**Assessment**

The standard of assessment by most centres was satisfactory. Where this was not the case, a common pattern seemed to be that the weaker candidates tended to be marked harshly, often with 1 mark being awarded in a strand where a more appropriate mark would have been 2 or 3, and the higher candidates marked generously with 7 or 8 marks being awarded for work only worth 6 marks. In a few cases major adjustments to marks were made and for a very few centres these adjustments were in double figures. Where this was the case, it was clear that the assessment criteria, either the generic criteria or task specific criteria, had not been used appropriately or at all in making the assessment.

# J512/06 Internal Assessment (OCR marked)

It was pleasing to see that, in this final year, there has been a continuation of the quality of work submitted by centres for this component.

Many centres opted to use the new tasks for AO1: Mirrors and AO4: Reaction Timer. Most candidates found the new tasks accessible.

## AO1 Mirrors

The task provided ample scope for candidates to achieve marks of S5, C4 and R4 (total 13) by drawing successive square mirrors, with their borders, tabulating the results and providing an algebraic, *n*th term formula. The work was linked by a commentary and the result tested on a mirror not included in the previous results. Changing a criterion, often going to a rectangle, and gathering some further results gave S5.

It was pleasing to see some candidates justify the result, and achieve R5, by showing that:

> The number of tiles along each side of the mirror was equal to the length of the mirror (often $n$).
> That there were four sides and, hence, $4n$ tiles.
> There were four unfilled corners which required four extra tiles, hence + 4.
> $T_n = 4n + 4$.

A similar argument was also applied in cases where there were two or three rows. Strangely, however, candidates who had produced this once frequently reverted to drawing and counting rather than the more efficient (and more mark-worthy) technique of analysing the numbers of tiles in mirrors with different depths of borders, to produce an overall formula.
This said, there were some pleasing cases where clear analysis had been undertaken, though candidates found it difficult to justify formulae in which three or four variables were involved and often produced results, by using difference methods to find coefficients in sequences of formulae, for different cases of mirrors.

Foundation candidates sometimes developed solutions into rectangles, which represented the peak of their achievement. Some Higher candidates looked at multiple layers of tiles on square mirrors using an algebraic approach very early in the development. Manipulation of formula leading to the C6 mark was less apparent in this task.

Work on other tasks, Magic E, Anyone for T? and How Many? allowed similar access to marks and was blessed with all the same strengths and weaknesses of previous years.

## AO4 Reaction Timer

Many centres seem to have used on-line sites to gather data and test hypotheses and engage candidates in their work on this task.

The task gave ready access to marks of:

> S5 – two or more subtasks with their aims, in general terms, contained within a structured plan.
> C5 – choosing techniques of up to grade D that are fit for the purpose of testing the aims of the task and applying the results.
> I4 – summarising results and relating these back to the aims of the task.

Many candidates went on to state aims in statistical terms and use these to plan their work (their methodology and techniques) carefully to score S6 and, where there were three related tasks, S7.

Candidates frequently sought to achieve high marks by including as many B and A techniques as possible but, where these lead to redundancy or their outcomes were not used in the argument, they were not eligible to receive full credit.

Once again, the final strand proved to be the most demanding. Candidates found giving arguments based on the analysis of the data and critically evaluating their processes challenging. Hence, marks in this strand often lagged behind those in S and C.

However, many good examples were seen in which candidates used cumulative frequency diagrams to compare distributions, not just through the median but also considering the spread. Scatter diagrams had their results tested through correlation coefficients and histograms were used, sensibly, to consider the shapes of distributions.

Other tasks remained popular, such as Estimate, and the work here showed the same strengths and weaknesses as outlined above.

Too many centres failed to provide the Centre Authentication Form with the coursework and some centres submitted tasks without Coursework Cover Sheets for each candidate. This sometimes made it difficult to identify each candidate's work.

There was a feeling that a significant minority of centres had encouraged candidates to follow certain paths through their coursework. In some cases the repetitive structure of subtasks and use of techniques suggested some possible collusion and little understanding of the reasons for undertaking the work.

However, as this component concludes, it is hoped that candidates have been able to explore their world through the application of mathematical concepts and gain understanding, and enjoyment, as a consequence.

# Grade Thresholds

**General Certificate of Secondary Education**
**Mathematics A (Specification Code J512)**
**June 2008 Examination Series**

**Component Threshold Marks**

| Component | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 100 | | | | 64 | 53 | 43 | 33 | 23 |
| 2 | 100 | | | | 68 | 56 | 45 | 34 | 23 |
| 3 | 100 | 83 | 66 | 49 | 33 | 20 | 13 | | |
| 4 | 100 | 76 | 60 | 44 | 28 | 17 | 11 | | |
| 5 | 48 | 43 | 37 | 31 | 26 | 22 | 18 | 14 | 10 |
| 6 | 48 | 43 | 37 | 31 | 26 | 22 | 18 | 14 | 10 |

**Specification Options**

**Foundation Tier**

**FA**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 378 | | | | 300 | 250 | 200 | 150 | 100 |
| Percentage in Grade | | | | | 25.8 | 22.1 | 17.2 | 15.7 | 11.4 |
| Cumulative Percentage in Grade | | | | | 25.8 | 47.9 | 65.1 | 80.8 | 92.2 |

The total entry for the option was 9660.

**FB**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 378 | | | | 300 | 250 | 200 | 150 | 100 |
| Percentage in Grade | | | | | 29.4 | 24.6 | 18.9 | 13.5 | 8.5 |
| Cumulative Percentage in Grade | | | | | 29.4 | 54.0 | 72.9 | 86.4 | 94.9 |

The total entry for the option was 7851.

**FC**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 378 | | | | 300 | 250 | 200 | 150 | 100 |
| Percentage in Grade | | | | | 23.2 | 29.0 | 18.5 | 12.9 | 8.5 |
| Cumulative Percentage in Grade | | | | | 23.2 | 52.2 | 70.7 | 83.6 | 92.1 |

The total entry for the option was 882.

**Higher Tier**

**HA**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 500 | 450 | 400 | 350 | 300 | 250 | 200 | | |
| Percentage in Grade | | 7.8 | 19.3 | 27.9 | 26.5 | 12.6 | 3.2 | | |
| Cumulative Percentage in Grade | | 7.8 | 27.1 | 55.0 | 81.5 | 94.1 | 97.3 | | |

The total entry for the option was 7001.

**HB**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 500 | 450 | 400 | 350 | 300 | 250 | 200 | | |
| Percentage in Grade | | 8.7 | 23.9 | 29.8 | 24.7 | 9.7 | 2.0 | | |
| Cumulative Percentage in Grade | | 8.7 | 32.6 | 62.4 | 87.1 | 96.8 | 98.8 | | |

The total entry for the option was 10113.

**HC**

| | Max Mark | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|
| Overall Threshold Marks | 500 | 450 | 400 | 350 | 300 | 250 | 200 | | |
| Percentage in Grade | | 2.8 | 10.5 | 20.6 | 31.5 | 12.1 | 13.3 | | |
| Cumulative Percentage in Grade | | 2.8 | 13.3 | 33.9 | 65.4 | 77.5 | 90.8 | | |

The total entry for the option was 250.

**Overall**

| | A* | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| Percentage in Grade | 4.0 | 10.7 | 14.1 | 26.4 | 17.4 | 10.5 | 7.5 | 5.1 |
| Cumulative Percentage in Grade | 4.0 | 14.7 | 28.8 | 55.2 | 72.6 | 83.1 | 90.3 | 95.7 |

The total entry for the examination was 35757.

Statistics are correct at the time of publication.

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