OCR
RECOGNISING ACHIEVEMENT

GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education **J926**

OCR Report to Centres

June 2012

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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 specification 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.

OCR will not enter into any discussion or correspondence in connection with this report.

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General Certificate of Secondary Education

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OCR REPORT TO CENTRES

Overview

The total number of entries for Methods increased from 3599 in June 2011 to 7515 in June 2012. In this series, a total of 3694 candidates certificated for the J926 Methods in Mathematics GCSE. This increase can be attributed to various factors, including some centres choosing to delay moving to the new specification until June 2012, to some centres having tried the specification with one or two classes in 2011 now using the specification with the full cohort. There was evidence that some candidates had been entered for a legacy specification in January 2012 at Foundation level and were now entering this new specification at Higher level, in some instances without adequate preparation.

The papers proved accessible to all the candidates, although the Higher tier examiners felt that some candidates would have been more appropriately entered on the Foundation tier. The papers provided adequate challenge for more able candidates at each tier, including some at Foundation level for whom the Higher tier might be a possibility in the future. Candidates generally performed slightly less well on topics which are unique to the linked pair qualification including, at Foundation level, inequalities, at both levels, proof and Venn diagrams, and, at Higher level, interpreting the gradient at a point on a curve. Weaknesses included basic non calculator number skills (B391/01 and B391/02) and the setting up of equations (B392/01, B392/02).

Working was evident in most candidates' work but often this was in the form of rough jottings rather than a logical progression to a solution. For some questions, particularly those requiring an explanation, ruled lines are provided. Many candidates assume that this means they must write a paragraph of continuous text whereas they would be better advised to set out their reasons point by point. For some of the QWC questions which required a justification for a decision, prompts such as 'show clearly how you decide' and 'support your answers with numbers' were provided but many candidates failed to follow this guidance and were unable to score full marks. In addition candidates would be well advised to use words to identify their calculation (eg B392/01 deal 1, 'cost of 3 chicken balti' alongside 3 × 8.50).

All papers included questions which expected candidates to be able to interpret and analyse problems and use mathematical reasoning to solve them. For most papers examiners reported that candidates appeared to be increasingly prepared to tackle questions set in novel situations and thus achieved at least partial credit for their response.

Overall results for Methods and Applications were broadly similar although clearly many candidates were stronger in one specification than the other. For all papers performance was reasonably close to the forecasts at most thresholds. To improve standards further Centres may wish to focus on the aspects raised in the detail of the individual PE reports.
Centres are reminded that they are able to analyse the performance of individual candidates and of groups, comparing results to that achieved by all candidates, using the Active Results service at www.ocr.org.uk/interchange/active results.

B391/01 Foundation Tier

General Comments

The average mark for this sitting of this component was comfortably over half marks and there was a good spread of results covering a wide range of possible marks. On this non-calculator paper candidates showed some weaknesses in handling calculations involving decimal quantities. Many candidates did not seem to know what was required for factorising the quadratic expression in Q10(a) and there was some weak written communication by candidates attempting to solve the linear equation in Q10(b).

More candidates were scoring at the higher end of the mark range than in January, but amongst entries at the top end of the ability range there were no candidates who should obviously have been entered at the higher tier instead. Overall the paper seemed to differentiate well and the area, perimeter and volume, and sample space and probability questions were very well attempted. Some problems appeared to have been evident in responses to questions involving intersection and union of sets in Venn diagrams and algebra.

There appeared to be sufficient time for candidates to attempt the whole paper.

Comments on Individual Questions

1 The majority of candidates scored well on this question. Part (a)(i) was very often correct. In part (a)(ii) many candidates did not show working but earned full marks. The majority scored at least one of the marks for giving 12, but 144 was rarely seen as part of the working. In part (b) more than half the candidates scored full marks with many others scoring one mark for $\frac{3}{9}$ unsimplified. The majority of candidates did try to show method in a variety of ways in part (c), but some just wrote the numbers in order, with the majority of these being in the incorrect order. The most common comparison was with decimals, but there was some use of percentages. Some worked with $\frac{3}{10} = \frac{12}{40}$ and $\frac{1}{4} = \frac{10}{40}$ but could not put 0.23 in the same form. ¼ was usually given as 0.25 by those who tried to give it as a decimal. Some candidates tried to draw diagrams and others tried to explain in words why they had their particular order, but these approaches were unsuccessful.

2 This question was answered well by the majority of candidates. In part (a) a majority earned full marks, but some just scored one mark for one of perimeter or area correct, and a small minority mixed the two terms. Many scored full marks in part (b), and those that did not tended to score only 1 mark, as they found a rectangle with a correct area or perimeter but didn't check that it fulfilled both requirements and did not try to find another rectangle. There were some arithmetical errors in part (c) but the majority scored full marks and 1 mark was also awarded often, particularly for finding 18.

3 Part (a) was usually correct although 'millions' did sometimes appear. Some candidates had difficulty in spelling forty correctly, with 'fourty' the most common error. Part (b) was often correct. A common wrong answer was 15. Very few did not know what to do in this part. Some arithmetic errors were made in part (c), but one mark at least was usually scored. Some candidates did not line up the numbers correctly and few took the opportunity of using the table to add the numbers.

4 All parts in this question were very well answered. In part (a), a common wrong answer was 81 + 9. In part (b) a number of candidates used the 100 to make their subtraction. It was quite common in parts (b) and (c) to have the figures written in the wrong order. Wrong subtraction of 9 was another fairly common error, such as 36 – 9 = 25.

5 This was a well attempted question, particularly in part (a). Some candidates did not put marks on the line, but just wrote the words in correct positions. It was pleasing to see many well expressed reasons for part (b) and the majority earned the mark. Some candidates lost the mark by making assumptions eg "there is one in a million chance", or gave an answer that was too vague. A fairly common error was to state that there may not be an even number of tickets.

6 This question was well answered, with the majority of candidates scoring two marks or more, with parts (a) and (b) differentiating well between candidates. Many candidates knew how to substitute for *b* in part (a) but struggled to do the division, often leaving their answer as 39/3. Some multiplied to give 117. In part (b) 33 was a common wrong answer from simply replacing the *q* by 4. Part (c) was done very well with the vast majority earning the mark, but in this part a number of candidates found *x* = 3, but then gave the answer as 15 or even 5, or with 3 embedded in 5 × 3 = 15.

7 In this question more than half the candidates earned five or more of the six marks. The vast majority of candidates earned the marks for co-ordinates in parts (a) and (b)(i), with a smaller number of candidates than in the past reversing the co-ordinate values. Candidate drew the shapes well in part (b)(ii), with most scoring some marks. The vast majority of candidates found a kite, with trapezium being the next frequent correct quadrilateral drawn. There was some confusion over the names of the parallelogram and trapezium, with them often being the wrong way round. Common errors were to draw an arrowhead for the parallelogram or plotting a point to make a triangle.

8 Candidates of all abilities found this question to be challenging, particularly in part (a) where the notation n(...) was not familiar to a sizeable minority of candidates, as words describing the sets were quite often seen for the answers. A frequent error in part (a)(i) was to give 3 as the answer. A main misunderstanding in this question was to treat the shapes in the intersection as a separate entity, rather than realising that they belong to both sets. Those that did give a numerical answer often got them the wrong way round for parts (a)(ii) and (a)(iii), so only a small minority had these parts correct. Part (b)(i) was well answered by the majority of candidates, with "4 sided shapes" being the most common description, although "quadrilaterals" was often seen. There were fewer candidates successful in part (b)(ii) which was poorly answered with many candidates trying to state that it was not 4 sided shapes. Those who did get it correct rarely used the term "regular polygon", with 'all sides the same' or an answer of 'equilaterals' being common. Part (c) often had a circle as their answer but several drew a kite or a regular polygon. A small number of others placed their answer wrongly, either in one of the sets or both or drew it in the space below the question.

9 Most candidates found dealing with decimals very difficult and few correct answers were seen throughout the question. Some scored 1 mark in part (a) for understanding that 1.2 squared meant 1.2 × 1.2, but 2.4 was by far the most common answer and very few had the correct answer. More than half the candidates scored 0 marks in part (b), but a small minority scored part marks in part (b)(i), with figs 16 being seen, often 1.6, although it was often negative and so didn't score. $^-$0.16 was also seen at times for 1 mark. The most common answer for part (c) was 2.25. Those that did understand that it was not ÷2 usually did not use the fact that dividing by ½ is the same as multiplying by 2, with many trying to write division sums.

10 A large majority of candidates scored 0 marks for this question. Most candidates did not understand what "factorise" meant in part (a). A common answer was $15x$ from $25x - 10x$, some put numbers in for x and some tried to solve it. The brackets in part (b) also caused major difficulties and it was only a small minority who multiplied them out correctly within the equation. When combining terms such as $4x + 2 = 6x$ and $5 - 2x = 3$ it was also very common to see errors in isolating and combining terms, although some did score a mark for dividing correctly to give their final answer.

11 Although a completely correct hexagon was rarely seen, candidates did score well on this question by drawing the correct length line and/or getting one 120° angle accurate, even if they didn't draw a hexagon! The most common incorrect shape drawn was a pentagon. The majority of the hexagons drawn were irregular, some from a slight lack of accuracy, but others clearly did not understand that the angles should all be equal and very stretched hexagons were quite common. There were very few different strategies seen in the construction, with constructing equilateral triangles or using points on a circle being very rare.

12 This question discriminated well. A very large majority earned the mark in part (a) and over half the candidates scored full marks in part (b). The majority used correct notation for probabilities. Common errors were that some counted the grey table headings within the outcomes resulting in 35 as a denominator, and giving the number of outcomes rather than giving a probability, with answers of 3 and 12.

B391/02 Higher Tier

General Comments

The paper differentiated quite well with marks across the whole range. A smaller proportion than previously produced marks in single figures but there remained a few candidates for whom entry at foundation level may have been a more rewarding experience.

Basic arithmetic continues to let many candidates down. The inability of candidates to do the basic four operations led to a fairly substantial loss of marks by some candidates.

Questions 1(b), 4(b), 9 and 10(b) required candidates to interpret and analyse problems and use mathematical reasoning (AO3). Performance in these questions proved mixed with question 1(b) having a fairly high facility, questions 4(b) and 9 being lower and question 10(b) being very low.

Question 3(b) was the QWC question as indicated by the asterisk on the question number. As such it was expected that candidates should set out the solution to the equation showing the algebraic steps and with no wrong statements. A large majority of the candidates did this very well with very few producing answers with no algebraic justification. It appears that candidates are much more comfortable in this situation than in previous cases where geometric reasons and logic have often been required.

Venn diagrams is one of the topics which distinguish this specification from other Mathematics specifications, yet it appeared that many candidates were insufficiently used to the demands they were faced with in question 11.

Comments on Individual Questions

1 Part (a)(i) required candidates to carry out the operations in the correct order and to multiply two decimals correctly. Only a minority were able to do both although a larger number gained 1 mark for doing either correctly. All too often the response was $0.4 \times 0.2 = 0.8$. More were successful with part (a)(ii) from a variety of approaches. Those using fractions could often not convert to an improper fraction or were let down by their arithmetic. Those using decimals often were unable to divide 38.5 by 7. A few divided instead of multiplying.

Part (b) was more successfully done. Most candidates placed the brackets correctly in part (i) although common wrong answers were $10(^-4 + 3) + 2$ and $10(^-4 + 3 + 2)$. Fewer were successful in part (ii) but about half gained both marks. Many gave only one pair of brackets, the available marks clearly not giving them the clue that two pairs were required. A few candidates crossed out and put new brackets in this question making it sometimes difficult to discern their intention. Candidates would be better served in this situation by writing out the question afresh, as a few did.

2 The better candidates did excellent constructions in this question with about a quarter gaining full marks. There were two marks available for one side subtending an angle of 72° at the centre and most candidates were at least able to gain these. A few candidates seemed to just draw any pentagon with vertices on, or even not on, the circle and a few drew hexagons. The topic is specifically described on the specification and so candidates should be familiar with it.

3 Part (a) was very well done with about half gaining both marks. Some only extracted one factor and some attempted a trinomial type of factorising with two brackets. Weaker candidates often had no concept of factorisation and attempted to simplify or 'solve' the expression.

As stated in the general comments, part (b) was much better done than previous QWC questions. The common errors were to multiply the brackets out as 15 – 2x or sign errors in isolating terms. Statements like 10x = 13x/10 followed by x = 1.3 were penalised as this was a QWC question.

4 Although just under half the candidates managed to reach the correct answer of 34 miles in part (a), the working was often a jumble of figures across the page which made the award of part marks difficult. 1½ + 2¾ was often incorrect even when attempted by decimals and the result was often incorrectly multiplied by 8. Some multiplied by 2 or 4 or even 10 thus losing marks through not reading the question clearly. Relatively few used the possibly simpler method of multiplying the individual distances by eight and then adding.

Part (b) was less well done with only a minority gaining the correct answer. Here too the working was usually a jumble of figures across the page and again awarding of part marks was difficult. There were a variety of possible methods and the simplest one of 2½ + 3⅜ – 2¾ was rarely seen. More often candidates found the whole distance travelled on Friday – the whole distance travelled on Thursday or the total distance there – the total distance back. Here two decimal approaches were usually no better than fraction ones. A large number of candidates found one of the relevant distances including the trip home but failed to subtract the relevant amount so they got the <u>increase</u> in distance.
Although the best candidates did this very well, the fraction work of the majority was disappointing.

5 Many fully correct lines were drawn in part (a). The vast majority of attempts were ruled and plotting of points was accurate. A few drew only part of the line between x = 0 and x = 3 or were correct for positive x but not negative x. Others had their line passing through (0, 2) but with incorrect gradient which was usually positive and sometimes incorrect through errors in reading the scale. Weaker candidates drew the y = 2 line and gained no credit for this. A small number drew a line with gradient of 3 but not through (0, 2).

In part (b), when only an answer was shown is was not clear whether they had used their graph or solved the equation algebraically to find an answer. Some had used an algebraic method (not penalised) as they showed full working alongside their answer but some showed lines on the graph showing they had used their graph as well. It was surprising to see a relatively high omission rate with this part as it is a skill of which higher level candidates should be capable.

In part (c) there were many correct solutions although some omitted the necessary 'y =' part of the equation. Others had only the y = 3x part correct and this gained some credit. A few drew the line but more often they only plotted the points (0, 4) and (1, 7). The correct answer usually came from drawing the correct line rather than substituting (1, 7) in y = 3x + c.

6 This was easily the best answered question on the paper. Almost all gained the mark for the table and most were then able to give the correct probabilities from the table. Just a few used an incorrect total often by including one or both of the row/column heading values leading to totals of 30 or 35. Very few miscounted the number of fours but here again errors were usually due to including the fours from the row/column headings or from thinking the probability of getting a 4 should have a 4 in the numerator. Only a very small number gave answers in incorrect form eg 3 : 25.

7 In part (a) the majority of candidates carried out the correct translation. The most common error was to use the vector $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$. Just a few translated triangle C instead of triangle A.

In part (b) about half of the candidates recognised the transformation as a reflection but a significant number of these thought the line was $y = x$ rather than $y = {}^-x$. By far the most common mistake was to give a combination of transformations which often included a reflection but also a rotation or translation. These gained no credit.

The shape was frequently enlarged by scale factor 2 or ½ and placed in a variety of positions. Those who used rays were often successful but some were inaccurately drawn. Some plotted (−2, 4) and (−2, 0) correctly but the third point was often at (−4, 0) A few drew an enlargement with scale factor ⁻1 with centre (0, 2) and gained some credit while others used centre (2, 0).

8 In part (a) the majority used the correct method and these were usually successful. Most used the given formula but some split or enclosed the trapezium. Unfortunately a significant proportion found the volume of the prism and thus scored no marks. Weaker candidates were often unable to put the right lengths on the diagram in order to substitute correctly into the formula.

The topic of 3-dimensional coordinates is clearly unfamiliar to many candidates and whilst about half were successful with part (b)(i), fewer were successful with the other two parts. Weaker candidates usually had totally incorrect coordinates whilst even stronger candidates had the right coordinates in the wrong order.
(0, 8, 7) and (7, 8, 3) were fairly common answers to parts (ii) and (iii).

9 This question proved difficult for many candidates, even some of the stronger ones. Very few diagrams were seen and so it was difficult to tell whether it was the visualisation of the shapes or the naming of the shapes which caused the problems. Most of the quadrilaterals were common wrong answers and some candidates gave shapes other than quadrilaterals. In parts (b) and (c) about a third of the candidates were successful, whilst in (c) a very small minority recognised the rhombus.

10 This question was expected to be more testing than some of the others and so it proved. The whole question showed that the understanding of indices at the higher demand level is rather weak. The best candidates did part (a) well and some picked up part marks for one or two of reciprocal, power and root. All too often the first response was to divide 64 by 3. In part (b) many knew that the product was $ab \times 10^{12}$ but very few recognised that the constraints on a and b meant that ab was greater than 10 and hence the required power was 13 and the required c was $\dfrac{ab}{10}$.

11 As stated in the general comments, the topic of Venn diagrams is a distinctive part of this specification and as such requires careful attention. At higher level, three set problems are expected. The majority of candidates simply put the numbers for the intersections onto the diagram eg putting n(P ∩ C) into P ∩ C ∩ B'. This usually meant that none of the required 7 entries were correct. Some stronger candidates omitted to work out or insert n[(P U C U B)'] despite the line for the answer. All parts of (b) were marked on a follow through basis and so the marks were still available even when no marks had been scored for the Venn diagram. This meant that the majority of candidates gained the mark in (i) and (ii). Only a very small proportion, however, were able to identify P ∩ (B U C).

Some candidates ignored the request for probabilities and merely wrote down the number of members.

B392/01 Foundation Tier

General Comments

A good spread of performance was seen in this paper. Most candidates attempted to show some working but it was often very disorganised and at times difficult to credit. It was noticeable in questions such as Q1, where a method mark was available for some correct areas and perimeters, that this mark was rarely awarded as most of those who showed working proceeded to gain full marks.

In general candidates were less successful on the higher demand questions, such as those involving algebraic explanation, use of Pythagoras, circumference of a circle, percentage change and solving inequalities.

Candidates continue to confuse area and perimeter, and volume and surface area.
Some candidates appeared very reticent to tackle novel questions despite their performance on more straight forward questions being comparable to candidates scoring relatively well on problem solving questions.

Two questions, Q10 and Q15, assessed the quality of written communication. In Q10 candidates would have benefited from clearly indicating which deal their calculations referred to, showing their method and not just the final costs and writing money in the correct form, £25.50 not 25.5. In Q15 candidates would have benefitted from setting out each stage of their work with a reason on separate lines rather than using continuous prose.

It was very difficult to decipher the work of some candidates, particularly when figures were poorly formed. Candidates appeared to be satisfactorily equipped for the paper.

Comments on Individual Questions

1 Most candidates were able to identify the shape with the smallest area but finding the shape with the largest perimeter was more problematic. The most common incorrect answer in part (a) was A, the shape with the largest area rather than the largest perimeter. Many candidates failed to record areas and perimeters and as a result were less successful in reaching the correct answers. The majority of candidates were able to identify the pair of congruent shapes. The common incorrect pair was E and G.

2 Almost all candidates correctly answered parts (a) and (b) and most were able to use inverse operations in parts (c) and (d). Common errors in part (c) included 7 and 40 and in part (d) 15.

3 The majority of candidates stated the correct number of cubes in part (a) but some miscounted or attempted to find the surface area. A minority of candidates were able to find possible dimensions for the cuboid. Some found three numbers which totalled 80, others recorded 2, 2, 2 without any working and others divided 80 by 3. Very few candidates found the biggest cube that could be made and a few more gave the dimensions of any cube. Some candidates wrote cuboid or rectangle and a substantial number gave two dimensions, particularly a 10 by 10 square.

4 Almost all candidates were able to give the correct coordinates of the vertex D and the midpoint of AC. There were very few instances of reversal of *x* and *y* coordinates. About a half of the candidates found the correct area of the triangle. Errors included finding the dimensions 4 and 6 but then simply multiplying to give $24cm^2$, using incorrect dimensions (particularly 5 and 7), multiplying the three lengths after measuring AC (or using Pythagoras in a few instances). Some candidates chose to count squares but often this led to 11 rather than the correct 12 cm^2.

5 The majority of candidates were able to use fractions and percentages in this question. Part (c) was the most challenging but candidates coped better than in previous sessions.

6 About three quarters of candidates were able to use these simple ratios. In part (a) errors included simple arithmetic mistakes and using the ratio 4 orange beads to 1 brown bead. In part (b) many candidates counted the beads (rather than spotting the ratio from the diagram) and then recorded 18 to 12 or a partially simplified ratio.

7 Almost all candidates correctly completed the table in part (a). Most recognised that the number of rails was going up in 3s but often an answer of 60 was given in part (b), from 3 $\times$ 20. About a quarter of the candidates gave the correct number of rails but few scored full marks for their explanation. A common error in this part was to give an answer of 48 from reasoning which involved multiplying 5 posts by 4 and 12 rails by 4.

8 The most able candidates answered this question very well, writing a general rule for the total of consecutive numbers at an early stage and then using algebra to justify their rule. Almost all candidates scored full marks in the first part and about half were able to write a rule linking the total with the middle number but many just described how to find consecutive numbers.

A significant number of candidates failed to answer parts (b) and (c). However, about a third of the candidates were able to write a rule in part (b) and to use an example to demonstrate the rule. Others gained part marks, particularly for listing 5 consecutive numbers.

Just under a third of candidates were able to write expressions for the consecutive numbers in part (c)(i), some without having tackled part (b). Common errors included writing $2a$, $3a$, $4a$,..., a^2, a^3, a^4 .. ., *b*, *c*, *d* .... or a sequence of numbers. The most able candidates completed (c)(ii) satisfactorily, generally starting by adding their expressions in the previous part and equating $7a + 21$ *to* $7(a + 3)$.

9 Only about a half of candidates were able to describe the rule in words. Errors included referring to the numbers on the two dice without stating that the total was 8, including a condition that *r* and *b* were different and just giving an example for *r* and *b*. A minority of candidates drew graphs in part (b). It was more common to see just 1 or 2 points plotted. Just over half the candidates found the pair of numbers satisfying both rules but only the more able candidates were able to relate this pair to the intersection of the graphs.

10 A wide range of responses were seen to this question. Unfortunately working was generally presented in a haphazard fashion and then a conclusion written on the ruled lines. Most candidates were able to find the cost of deal 1 but many had difficulty working out 20% for deal 2 and some of those who reached £6.80 or £7.04 thought that this was the cost of the 4 meals. Some candidates combined the chicken and lamb meals but still gained credit as long as working was shown. A few candidates correctly reasoned that deal 1 was a discount of 25% and compared this with 20% for deal 2.

11 The majority of candidates gave the correct answer of £1860 in (a)(i) but answers of £1500 (ignoring the £360) and £23100 (60(360 + 25) were common.
About half of the candidates scored in part (ii) for at least a partially correct formula. Few candidates appeared familiar with rearranging formulas and a very small number were able to complete the rearrangement correctly. Common responses were $n = 18H + 400$ and $18n + 400 = H$. Performance on the final part was better although many reverted to the using the Warsash Hotel rule and gave an answer of 34.

12 About three quarters of the candidates scored at least one mark in part (a). Common errors included $s = 75°$(equating to ∠DCB), 65 °(equating to ∠EBC), 40° (from 40 + 65 + 75 = 180). In part (b) about half the candidates identified the 3 angles equal to the given angle but about a third failed to score having marked one of the obtuse angles as 80°.

13 The majority of candidates did not appreciate that they needed to use Pythagoras (or a very accurate scale drawing) to answer part (a). About 10% of the candidates worked out the extra distance walked by Dave and a further small percentage just worked out the length AB. The most common answer was 465 (½(540 + 390)). Performance on part (b) was slightly better. Common errors included using πr, πr^2 or simply $2r$ for the circumference.

14 Over a quarter of candidates failed to tackle this question and, of those that did, only the most able scored full marks. Non calculator methods were in evidence in both calculations but errors generally arose with the 22½% and few reached a percentage matching £3.08 by trial and improvement. Many candidates filled in answers in the table but showed either no working/method or just a few scattered figures.

15 Just over a third of candidates scored at least one mark in this question, some just giving 45°, more giving both 45° and 135° but just a few supporting the angle sizes with adequate explanations.

16 The correct inequality was the one most frequently ringed, a slightly smaller number ringing $7y < 3y + 10$. Very few candidates were able to solve the inequality and even fewer to describe the solution. Some candidates thought that they were expected in part (b) to describe all the steps in their work.

17 Few candidates understood the term reciprocal in part (a). Common errors were 0.5 and 2.236 (from $\sqrt{5}$). Candidates were considerably more successful in part (b). Over half the candidates gained the mark for the calculation in (i) those writing $20 + \sqrt{26}$ or an answer of 25 or 25.0 failed to score. Over half scored both marks in the final part and others scored a method mark for finding an arrangement such as $5 \times 6 + \sqrt{24}$ which was bigger than their (i).

B392/02 Higher Tier

General Comments

The performance of candidates fitted reasonably well within what would be considered as a normal distribution pattern with a slight skew towards the top end. The range of marks awarded would indicate that the majority coped well with the paper and very few were entered at an inappropriate level. Sufficient time had been allocated to enable the paper to be completed and blank spaces, where no response had been offered, were comparatively rare. Candidates had obviously been well prepared and usually made an attempt at every question. Most candidates appeared to have the appropriate equipment including calculators.

Equally, the majority of students displayed a good understanding of the need to include working in their responses and fewer marks are being needlessly lost as a result. However, some concern must be shown for the quality of presentation in a minority of cases. It would be of considerable benefit if students could be offered more practice in setting out responses to questions of a more functional nature and, equally, those with AO3 content. Weaker candidates are frequently offering work that shows little evidence of a logical process through to a solution. They should also be aware that premature rounding of values often leads to an answer outside of the range required for full marks.

Two questions required candidates to show good quality written communication, 11(a) and 12(b). Many responses to these questions showed some understanding of the problem but often lacked the ability to present an argument effectively.

Comments on Individual Sections

1 The vast majority showed that they were able to use a calculator effectively and gave a correct response in part (a). A couple of answers of 101.68 suggested that π had been used in place of $\sqrt{}$ and a small number rounded 25.099 to 25.01. In part (b) the most common error, resulting in 1 mark only, was to use 24 inside the square root instead of 42. Very few candidates scored 0 marks.

2 Almost everyone managed to substitute correctly in part (a)(i) and then obtain a correct value with only a few managing to lose the negative sign in the answer. Simplifying incorrectly sometimes resulted in an answer of 7/2. The re-arrangement in part (a)(ii) caused more problems although the majority still scored full marks. Many failed to score due to an incorrect first step often trying to subtract *b* from both sides before dealing with *c*. In part (b) most candidates understood the method for finding the volume of cuboids and arrived at a correct response involving various forms of $b \times b \times 2b$ but many were then unable to simplify the formula correctly.

3 The majority of candidates coped well with the mathematics involved in part (a) showing a good understanding of basic Pythagoras. However, many lost a mark simply because they failed to appreciate the context and failed to give their answer to a reasonable degree of accuracy with many giving the distance across the field to the nearest millimetre (eg 263.892). The most frequent error that didn't involve Pythagoras was to add the sides of the rectangle and divide by 2 before subtracting from the sum and arriving back at 465m. The responses to part (b) showed a good understanding of the difference between area and circumference of a circle with only a very small minority using the area formula to obtain 9503.317...

4 Generally, a well answered question with a majority scoring full marks and a few losing just 1 mark for giving answers of £9.30 and 65%. Many seemed to feel that, as they were filling gaps in a table, there was no need to show working and lost potential method marks when their entry was incorrect. The most common incorrect value for the Millennium Tower was £2.70 (from failure to subtract this saving from £12). Those who failed to get as far as 35% or 65% for the Bus Tour usually managed to obtain figs. 308.

5 This question caused few problems and the success rate was very high. A very small minority lost a mark in part (a) for not cancelling fully or for continuing to 1 : 1.5.
In part (b) any incorrect responses usually involved £22.50 (sometimes with £11.25).

6 This question was made more accessible to the majority of candidates by the fact that there was no requirement to provide mathematical reasons for the angles. The better candidates scored both marks while a minority failed to score at all. A number gave the same value for both angles and others gave the supplementary angle for one or the other. There were several transposed answers but, as the correct answers were rarely seen in the correct positions on the diagram, they failed to score.

7 Most candidates coped very well with the removal of the brackets in part (a) and went on to give a correct answer. Expansion was certainly the preferred method with an insignificant number choosing to divide both sides by 4 and it was pleasing to note that very few now try to solve by trial and improvement. Again, a small minority disliked the negative value and decided to simply lose it while others, having expanded correctly, made an error with the re-arrangement which sometimes resulted in $4x = 14$. In part(b) it was obvious that a small number still do not like working with inequalities and prefer to work with an equation before reverting back at the end (sometimes incorrectly). Some, despite realising the meaning of the inequality, misunderstood the problem and, after stating that the answer must be less than 5, gave an answer of eg 4.

8 The better candidates scored well in both parts and even the less knowledgeable managed the mark for part (a) probably because use of a calculator gave an exact value of 125. However, part (b) was a little less successful as an entry of 1 ÷ 0.3 led to an answer of 3.3333... and, even those who understood the implication of the recurring decimal, often came up with 3.0000003 due to insufficient decimal values being used. The higher level candidates who used the fraction invariably came up with the correct answer.

9 Despite a very small minority who transposed the figures in part (a) most candidates knew how to find the mid-point and write down the co-ordinates correctly. Part (b) was one of the first questions to cause problems for a significant number. Common errors frequently involved plotting points without joining them for 1 mark. Non-scorers often drafted a locus that was equidistant from the line segment AB or simply joined the points A and B with a ruled line. In part (c) only a small minority were able to obtain the correct equation although many did manage to understand that a gradient of 1 was required. One error that did show some understanding was to give the correct equation of the line AB.

10 Completion of the table caused few problems in part (a) with only the occasional omission of the negative sign for the value where $x = 0.5$. Most candidates coped well with the more difficult values for y when plotting in (b) and the resulting curves were usually drawn within the tolerance allowed. While graph work is generally improving, the quality of pencil work still results in the unnecessary loss of marks through careless, multiple or "feathery" lines. Part (c) was less well answered with the majority failing to score at all. Plotting points was understandable as the lines were drawn on a grid. However, there was a general lack of understanding regarding asymptotes and many responses simply ran parallel to the original curves. Other errors included the reflection of the curves into the 2nd and 4th quadrants, translations in two directions and incomplete curves giving no idea of what will happen close to the y-axis.

11 Part (a) was the first of the questions designed to test the quality of written communication (QWC). Again, mathematical reasons were not required for the angles and, consequently, the majority scored full marks here usually showing clear, correct calculations to justify the values. The best candidates gave some of the geometric reasons for their answers with many of these recognising angles around a point and angles in a (symmetrical) trapezium. A significant majority of responses in part (b) failed to recognise the link between the scale factors for area and length and the mark for giving the length scale factor as 3 or 1/3 was rarely awarded. Methods varied greatly and many candidates were let down by the presentation of their working. Solutions that were not set out in a logical way often made it difficult for an examiner to follow in order to give method marks. The area of the small square (3.24) was usually obtained correctly and many went on to square root this value to get the length of the small side (1.8) although some thought that the length was obtained by dividing the area by 2. Only a minority continued from here to correctly use Pythagoras (or trigonometry) in order to find the length of the sloping side of the trapezium. The shorter length was often given incorrectly as 0.6 (from 5.4 ÷ 9) but the use of 0.6 or 2.4 as the height of the trapezium could still result in method marks being awarded. Many tried to proceed using the area of the trapezium and then confused vertical height with slant height sometimes obtaining 1.8 again.

12 It was surprising that factorisation involving the difference of two squares was so badly answered by higher level students with only a minority of candidates giving a correct pair of brackets in part(a). A common error here was to give $(x - y)(x - y)$ as the factors and a sizeable minority had no idea about the form that their answer should take. Part (b) was the other question that considered QWC. Although the two ways of expressing 15 as the difference of two squares were found successfully in the majority of cases, the explanations meant to show that there were no others were rarely rigorous enough to earn full marks. Many didn't even attempt to progress any further. Those that did usually focussed on larger square numbers with some simply providing a list of squares. Stronger candidates mentioned the fact that 15 only had two factor pairs but only the best used factors.

13 This question tested understanding of the link between a sequence, its pattern and formula. In part (a), the very best candidates were able to work from the second difference, use the general formula $an^2 + bn + c$ to correctly show the values of a, b and c and then relate them to the given sequence. However, the vast majority only managed part marks. Most common here (for 1 mark) was the use of substitution to show that the first four terms were correct with others stating a second difference of 4 but going no further. Many failed to use four values and scored zero. Some moved on from the second difference to give the coefficient of n^2 and earn a further mark but many simply quoted the formula without any justification of the individual terms. Very few made use of the structure of the pattern to obtain $(n - 1)^2 + n^2$. In part (b) the best candidates impressed by solving $2n^2 - 2n - 499 = 0$ using the formula method, obtaining a positive answer of 16.3 and stating that, for 500 to be included, the answer should have been a whole number. Other quality responses (equally rare) showed that $2n^2$ and $2n$ were even and the addition of 1 made the result odd but often omitted to state that 500 was an even number. However, the most common approach was to find the values resulting from $n = 16$ (481) and $n = 17$ (545) and explain that 500 was not possible as the term number must be whole (not somewhere between 16 and 17). Many went no further than finding these values or using trial and improvement in an attempt to get close to 500.

Most realised that the sine rule was required in part (a) and used the correct values but many could not cope with the algebraic manipulation especially if they started with the trig. function in the denominator. The most common result from here was sin$A$ = 8 × 10/sin67 = 86.9. The candidates who were totally unsuccessful generally assumed that the triangle was either right-angled or isosceles (using eg sin$A$ = 8/10). Part (b) was the least successful question on the paper with only a tiny minority either correctly using a value of 132.6 and angle sum exceeding 180° or linking the relative sizes of the angles and the sides opposite. Many incorrect responses referred simply to obtuse angles being more than 90° or to the shape of the given triangle or that it was not possible for an angle to have two values. Only a minority scored all three marks in part (c) but an equal number managed to get two method marks for ½absin$C$ using their value for angle C.

14 The multiplication process in part (a) was generally well understood and only a minority of candidates failed to score at least 2 marks. Errors were made in collecting terms (eg combining ⁻7x and 6x to get 13x) but the most common mistake was to give 21x instead of 21x^2. A large number still do not realise that two brackets are required when factorising a trinomial. Those that made a reasonable attempt in part (b)(i) often struggled with signs and some placed x^2 in one of the brackets. Algebraic fractions remain a mystery to all but the best students. While many transferred their answer from (b)(i) into the numerator of (b)(ii) few attempted to factorise the denominator. By far the most common (incorrect) method was to cancel the 2x^2 terms as a first step. The small minority of candidates who correctly factorised both parts of the fraction usually went on to gain full marks.

15 A large majority of candidates scored 3 marks or more on this question and usually displayed good presentation skills although this was by no means consistent across all levels. The formulae for both volumes are given so it is not surprising that the correct form was generally used with most of the problems arising from either poor substitution or miscalculation. Occasionally r^2 was used in the volume of the sphere instead of r^3. Some forgot to halve the sphere and the height of the cone caused problems with many using the full height of 7.7 instead of 4.5. Units were usually evident and correct with a small number leaving them out and needlessly losing a mark.

16 A large number of candidates reached the first stage correctly and earned 2 marks for obtaining the length of DB as 11.3. Success was limited after this when many used Pythagoras again to find BM but too often failed to spot the simple trigonometry required to calculate the angle. Too many tried to complicate the process by using the cosine rule with very limited success while others failed to spot the mid-point height of 4 and used the full length of 8 in their final calculation. The SC mark was used on several occasions to the benefit of those who used DB = 8 and then progressed correctly.

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