GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education **J925**

OCR Report to Centres

January 2012

J925/R/12J

Oxford Cambridge and RSA Examinations

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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OCR REPORT TO CENTRES

Overview

There was a significant increase in entry for all papers from January 2011 and, for most papers, a similar entry to June 2011. The vast majority of candidates were appropriately entered, although, particularly for Applications 1, examiners considered that Foundation rather than Higher would have been a better route for some candidates. A good spread of performance was seen on all papers, with marks on the Applications papers being slightly lower than those seen on the Methods papers.

Working was evident in most candidates' responses. Many, in both tiers, made an effort to show logical progression in their work but for many others working was in the form of rough jottings rather than organised presentation. 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. This was particularly evident in the questions involving scale and costings.

A range of questions addressed the quality of written communication (QWC). Examiners reported some improvement in the quality of communication in questions which focused on explaining how a solution had been reached. However in other questions weaknesses were evident in following mathematical conventions, particularly the use of brackets.

The reports on the individual papers reflect on questions where candidates appeared not to have met the topic. Across the linked pair, they included non-calculator calculations, relative frequency, tessellations, vectors and histograms and not all of these are harder topics for the tier.

Candidates responded well where there was a gradual progression of difficulty within a question and where various topics were assessed within the same context. There was certainly no evidence that candidates were less inclined to tackle latter parts of questions.

Many questions required explanations and responses often lacked clarity and omitted to refer to information provided or calculated.

Questions involving estimation were generally not well answered. Candidates failed to appreciate that to find an estimate of the diameter of a roll of newsprint they needed to compare the diameter with their estimate of the heights of the two people standing behind the roll. When estimating answers to calculations many tried to work out the calculation and then round the final answer rather than rounding their original figures.

There was a wide spread of performance on the various problem solving questions. Candidates generally performed better on questions clearly involving number calculations such as the internet advertising, coins in a machine and finance questions. However there was a tendency for some candidates to use an informal method, find an incorrect solution, fail to check back with the original data and then not be eligible for any method marks. In the Higher tier papers candidates failed to appreciate the mathematics they needed to use to solve a problem, in particular using Pythagoras and setting up equations.

Overall the results are encouraging. For all papers performance was reasonably close to the forecasts at most thresholds. To improve standards further Centres are encouraged to focus on the aspects raised in this report.

A381/01 Foundation Tier

General Comments

The overall standard was broadly similar to that of the previous session. There were slightly over half the number of candidates for this session compared with June 2011.

The majority of candidates experienced significant success, but there was a very small minority who gained so little credit that the examination cannot have been a particularly positive experience – however less than 3% of all candidates recorded less than 10% of the available marks. Only a small number of candidates tended to give up after finding the examination more difficult than anticipated. The average omission rate was just over 10% – a slight increase on the previous session. Nevertheless the great majority of candidates made a serious attempt to complete as much as they were able. Over one third gained half or more of the available marks.

The legibility of writing and number work was typically at least satisfactory. More working out than usual was seen, possibly a result of some candidates realising that marks may be gained for partially correct work – providing this is clear and unequivocal.

There was no obvious indication that time was a concern for any of the candidates and the literacy demands of the paper did not appear to have a detrimental effect on their ability to respond to questions.

The question which proved challenging to all capabilities was Question 9. Overall it was only attempted by just over half of all candidates. This question was designed to assess candidates' ability to lay out (communicate) their algebraic working. The other question which was used as a vehicle to assess the quality of candidates' written communication was Question 4(d). This was slightly better answered than the corresponding question in the previous session. Nevertheless candidates lost credit as a result of unclear layout coupled with confusing calculations and a cavalier attitude to units. The use of bullet points or short headings would greatly clarify working; such a structure might also support candidates in their actual working.

A general point of which all candidates need to be aware is the importance of showing working for all questions, and to take particular note of instructions such as "show how you arrived at your answer" or similar, where full marks cannot be gained without justification/reasons being given by the candidate. At a more mundane level something of the order of one in ten of candidates lost credit by not adding the units to their numerically correct answer to Question 3(b)(i). A similar observation may be made regarding money notation at other parts of the paper.

Comments on Individual Questions

1 This question was usually well attempted; clear precise diagrams were seen with a supporting written comment. There were a few good diagrams where the correct comment was made but no indication of the size of the angle, which led to the loss of some credit. The wrong drawing but with correct angle measurement and comment also gained partial credit. Some candidates were diverted into considering sum of angles in a triangle – a number stated that the triangle was isosceles so the angle must be 45°. A small minority failed to gain any credit, but over a half gained at least half the available credit. It appeared that the great majority of candidates had access to geometrical instruments.

2 Overall about half gained at least half the available credit for this question.

(a)(i) A well answered item, but errors seen when candidates attempted to write 5 billion in figures; very rarely was there was a wrong answer for 20 divided by 5. The least capable gained half the available credit. This figure rose to almost nine in ten for the most capable.

(a)(ii) Common errors were “77”, “0.23” and “2.34” but about a third of candidates were successful. A number of somewhat wild solutions were observed; these appeared to have no logical basis. A higher facility had been expected, suggesting some insecurity regarding the concept of x% percent as “x pennies in the £1”.

(a)(iii) Although 40/100 was the easiest answer to give, many candidates successfully cancelled down; 1/40, 40/1 and 0.4 were seen occasionally. Incorrect simplification after a correct initial response was not penalised.

(b) The number of candidates who did not know the number of days in a year was somewhat surprising. Nevertheless more than a half of candidates gained full credit. The range of acceptable answers allowed many candidates to achieve partial credit; 7200 was a common wrong answer – possibly derived from 600 × 12 (months).

(c)(i) Well answered; over three quarters of candidates were successful. A common wrong response was “4”.

(c)(ii) The first challenging item in the paper, less than a quarter of candidates were successful. The units challenged a number; many omitted the correct units – thereby losing some credit needlessly. However the correct digits presented were awarded some credit; a common error was to multiply by 200 instead of dividing by 200, showing some insecurity working with inverse functions in the context of number machines.

(d) As indicated above this item was designed to assess candidates’ Quality of Written Communication (QWC). A few clear precise attempts were seen with the minimum of calculations for the award of full marks. The rubric to “show clearly, with supporting evidence” was ignored by some. Candidates tended to be lax with money units.

3 The majority of candidates were able to gain half or more of the available credit for this question.

(a)(i) Well answered by a very large majority of candidates of all capabilities. The common wrong answer was "the Sun" – possibly the result of misreading "smallest" as "most", or perhaps merely assuming that the list was ordered.

(a)(ii) Most candidates were successful; a few candidates picked up partial credit for listing two correct newspapers. Only a very small minority failed to gain any credit.

(b)(i) Few gained full credit, but a majority of candidates gained partial credit, usually for "121", "multiplying by 50" or 605 clearly evident in their working. Confusion between area and volume was evident as was some carelessness over units. The former errors were worrying suggesting that candidates think that all the information within a question needs to be used – selecting the relevant information to solve a problem is a skill assessed in this specification.

(b)(ii) Estimation was a challenging topic for some candidates; many merely measured 5.5 from the diagram; another common wrong response was 1100. The former may have been the result of assuming the question required an estimation of the actual diameter of the roll of newsprint as shown on the paper. Few candidates were successful with this item; however this was only slightly worse than on a similar question asked in the previous session.

(b)(iii)The connection between diameter and radius was completely lost to a surprising number of candidates; some attempted to find the area of a circle, but the most common error was to double the diameter. Only a minority were completely successful. However a "follow through" was available from part (ii) – which a significant number of candidates availed themselves of.

(c)(i) Just under half of candidates were successful. A common wrong response was 0.4. This would have been acceptable had "£" qualified it. It was difficult to be sure if 0.4 represented carelessness over units or a misunderstanding regarding percentage calculations.

(c)(ii) The most common error was to give the increased price of the newspaper rather than the newsprint. Follow through was available from part c(i). However, the majority of candidates failed to gain any credit.

(c)(iii)The most popular error was to just adding on the answer to the previous part. Although credit was available following through from parts (i) and (ii), the large majority of candidates failed to gain any credit.

4 Only a small minority failed to gain at least some credit for this question, but only a minority were able to gain full credit. Imprecise wording and confusion between the different types of triangle were common.

(a) The majority gained partial credit, most of these involved a correct answer but with a wrong or inadequate reason given.

(b) A large majority gained full credit – better answered than part (a).

5 Generally a well answered question, with the vast majority achieving at least partial credit.

(a)(i) Well answered but with a few odd notations seen and, as might have been expected, “10 × 5” was the most common error. The large majority of candidates gained full credit.

(a)(ii) As could have been predicted 50 following from 10 × 5 was a common error but nevertheless half the candidates were successful.

(b) Calculated answers were often seen without any rounded or estimated values. Many candidates still find interpreting a “rough calculation” challenging and only a small minority gained credit.

(c)(i) Well answered by the majority. The extra large “e” or the reversed “E” were often wrongly ringed.

(c)(ii) The majority of answers were correct but “2” was a very common wrong response.

(d) Only a small minority of candidates failed to score on this question. However only a few gained full credit.

(e) Poorly answered; some measuring was obvious, performance for angles *a* and *b* was better than for *c*. For the latter angle, 110° was a common incorrect response. Very few candidates gained full credit; the majority failed to gain any.

6 The majority gained at least some partial credit for this question.

(a) Candidates found reading the scales a challenge with many rounding off to 70. A large proportion of candidates did not appreciate the correct scale, believing that each square in the height axis represented 0.1 inches instead of 0.05 inches.

(b) Comparatively few completely correct graphs were seen, credit was very often awarded for correctly calculating the coordinates of the three points of interest. The use of a ruler was not always evident.

(c) Poorly answered with half failing to gain any credit. Partial credit and follow through was available – and gained by a small minority. In the few cases that full credit was awarded it often followed full marks in the previous two parts.

7 Partial or full credit was awarded to a minority with the question being omitted by a small minority. Some very imaginative responses such as $a^2 + 3a = 18$ or $\frac{27}{3a} = 3$ were seen. Incorrect responses tended not to be true equations or were deemed too naive, for example: $a = 3$ or $a = 6 - 3$.

8 Overall, for the whole question, about half of all candidates gained half or more of the available credit. Nevertheless just over a quarter of candidates omitted parts (a)(i), (a)(ii) and (b).

(a)(i) Lack of calculator skills and ability to round to 2 decimal places were apparent here. The large majority failed to gain any credit.

(a)(ii) The follow through allowed many to gain a mark for rounding to the nearest whole number, just under half gained credit.

(b) Correctly answered by over a third of candidates, but omitted by about 1 in 4 candidates.

(c) Answered correctly by the majority of candidates, partial credit was available but this only applied in a small number of cases. It is likely that if some candidates had showed a little working they may well have gained some credit for a “28” or “4” seen.

9 This was found a challenging concept and question for the majority of candidates. It was omitted by almost half. Very few managed to show the substitution or state the values of a and b. There were a noticeable number of substitutions for $am + b = r$ and $m = 4$ leading to $44 + 10 = 54$ – the classic misconception of algebraic expression confused with place value (ie $3x$ interpreted as effectively $30 + x$). Overall found too challenging by all but the most capable candidates. Few candidates answered the whole question correctly. A small amount of partial credit was available for those who solved the original equation correctly.

A381/02 Higher Tier

General Comments

Although a large proportion of the paper was accessible to the majority of candidates the later questions proved challenging for most of them. In general, marks ranged between 15 and 45 with far more below 15 than above 45. In a majority of cases the presentation of work was good or better but for weaker candidates working was often haphazard and difficult to follow. Candidates were often aware of the correct method to use but basic errors in arithmetic resulted in a loss of marks. There was also a significant number of transcription errors from the data given in the questions, from calculator displays or simply from one line of working to the next causing many to lose some marks. Other areas of concern include change of units and the calculation of a percentage of a quantity.

For some candidates entry at the Foundation tier would have been more appropriate.

Comments on Individual Questions

1 In (a) a majority of candidates were able to round correctly and estimate the number of words but only a minority of these went on to conclude that Dave was wrong for both marks. Many rounded but either went no further or could not evaluate their estimate. Some merely multiplied the given numbers. In (b) few candidates obtained the correct answer of 5.0. Some could obtain the correct answer to the calculation but then gave their answer to two decimal places. A sizeable minority made no headway with the correct order of operations when using their calculator. In (c) a large majority of candidates were successful. Many changed the fractions to equal denominators, usually 36, 72 or 216, while some converted to decimals and percentages and others calculated a fraction of an amount.

2 In (a) a large majority were able to give an answer in the acceptable range. Some simply gave an integer answer, usually 69 or 70. In (b) a majority of responses earned 3 marks. A small minority completed the table of values but then did not attempt to plot the points or plotted them incorrectly, misreading the scale on the vertical axis. A large majority were successful in reading from their graph in (c).

3 This is one of the questions where transcription errors were often seen. Most responses earned at least two marks with most of these going on to earn full marks. Candidates earning two marks often lost the final method mark by failing to show any method when they calculated the VAT incorrectly. Others misunderstood the delivery and collection charges and either applied only one of them or applied both of them for each day. Very few candidates used the percentage multiplier 1.2, preferring instead to calculate 20% and add it to the cost. Calculation of 20% was often a case of stating the value of 10% and doubling it, often introducing errors in the value of 10% or rounding the value of 10% to the nearest penny.

4 In (a) few candidates earned both marks, failing to appreciate that the swimmers had to return to the starting positions. Consequently, a majority picked up one mark for an answer of 3 or for listing multiples of 15 and 40 to obtain a common multiple. In (b) a large majority picked up this mark either for the correct answer or by following through correctly from their wrong answer in the previous part.

5 In (a) a majority failed to obtain the correct volume of concrete, either failing to appreciate the need for a change of units or by changing the units incorrectly. In both parts of (b) a large majority picked up all four marks either for the correct answers or by following through from previous work. Errors in part (a) would often lead to impractical answers in the final part but many candidates appeared totally unaware of their errors in the first part of the question.

6 Only a small minority coped with the change of unit in (a) and obtained the correct answer. It was common to see 54 multiplied or divided by any one of 10, 100 or 1000 and answers such as 540, 5.4, 0.54, etc were common. Others struggled to cope with changing hours to seconds and the use of 60 rather than 3600 was often seen. Again, many appeared oblivious of the fact that their final answer was impractical. In (b)(i) a majority picked up all three marks. For others, some gave answers in grams and picked up one mark. Others forgot to change the miles to kilometres whereas some divided by 1.6. In (b)(ii) there was a fairly even spread of marks. The common error was to consider only one passenger thereby picking up only 1 mark.

7 A majority picked up all three marks, usually by calculating 17% of the total production and subtracting. Some used a less efficient method and calculated the loss of production for each factor. A very small number lost the final mark through arithmetic errors and some transcription errors. A common mistake was to deduct 3% of the total production then to deduct 6% of that answer, etc. Some lost marks by failing to show any method when calculating the percentage of the production. Yet again, rather than calculate 17%, many candidates attempted 10%, 5%, 1% and 2%. As in question 3, this often introduced arithmetic errors and transcription errors. Quite often the value for 10% was incorrect with no evidence of the method used. In (b) candidates were less successful and only a minority picked up all four marks. Most attempts centred on calculating the total amount of flour needed before working out the number of loads required. Less common was the number of loaves that could be made from one load before calculating the total number of loads. A small number followed a correct method but then rounded down their final answer. Common errors revolved around the incorrect change of units despite being given the conversion. Some multiplied kilograms by 1000 along with others using 10 or 100. As in previous parts several transcription errors were seen.

8 A very small minority of candidates made no attempt at this question and, of those that did, few achieved full marks. Most of these calculated the area of one of the small rectangles before calculating the width of the bottom rectangle. This led to the value of x which in turn allowed them to calculate y. A very small number realised that five of the vertical rectangles would fit along the length of the large rectangle and found y simply by dividing 3 by 5. This led to the value of x, although not all managed to obtain the correct value. A small number picked up one or two marks for setting up expressions for different sections and then equating them but usually failed to go on and solve them. For many others there were attempts at trial and improvement which were usually unsuccessful, simple guesswork or false assumptions about the rectangles.

9 In (a) a majority picked up the mark for appreciating that a circle and a triangle had to add to 59 using the first row and hence two squares were 92 which led to the answer. Some approached this in reverse, which was acceptable, and some assigned values to a triangle and a circle which was also acceptable provided they totalled 59. In (b) candidates were less successful, with only a minority obtaining the correct total. Some candidates set up simultaneous equations and were usually successful at solving them. Some used trial and improvement but with less success. Those who assigned values in (a) and continued with them in (b) usually scored no marks.

10 Roughly one in four candidates made no attempt at this question. Of those that did, most made no headway at all. Some attempted to apply either cube root or squaring but generally applied this to only part of the expression. Many displayed no understanding of the negative power. Others simply multiplied by the power or subtracted. Few were able to pick up any marks at all.

11 Most candidates attempting this question struggled to cope. Many simply calculated 9% of the share value and subtracted this. This was repeated a further two times. Some combined the percentages and calculated 27% and subtracted. Only a few treated the question as a reverse percentage. Some credit was given for those that treated it as a reverse percentage using 27%.

12 Roughly one in four of the candidates made no attempt at this question. For those that did the most common approach was to measure the angles and calculate the total. This was rarely correct and was rarely accompanied by any explanations for the working. Some simply guessed values for some of the angles but this usually resulted in little success. Very few recognised the lower shape as a kite, some referring to it as a quadrilateral (which was acceptable) and others as a square. No candidate worked with the angles at the six points although some did refer to the angles in the triangle and the angles in the kite. There were no attempts to set up equations for the unknown angles.

13 Roughly one in five of the candidates made no attempt at this question. Of those that did, most had no appreciation of the difference between linear, area and volume scale factors. Many struggled to cope with the different units from the model to the actual car. Many attempted to convert the units of one area by multiplying or dividing by 100. The most common response was 12.6 multiplied or divided by the candidate’s version of the area scale factor. For those with some understanding of scale factors there was some confusion in how to obtain the volume factor from the area factor. Some took the cube root and then squared.

A382/01 Foundation Tier

General Comments

All candidates appeared to have sufficient time to complete the paper. It was also pleasing to see that candidates are becoming increasingly prepared to show their method and their working out, especially as this is a paper for Foundation level candidates. This greatly adds to their demonstration of their knowledge and strategies as well as picking up valuable marks where they have not managed to reach a fully correct solution.

Comments on Individual Questions

1 A large majority of candidates were successful in part (a) as they could identify the correct fraction. In part (b) a minority of candidates did obtain an estimate within the required range as the angle for travel was exactly three times the angle for fuel and power. In part (c) the most common error was for candidates to assume that the angle for food and drink was a quarter, which led to answers outside the accepted range.

2 It was pleasing to see methods being shown here as candidates found their total. A large majority of candidates gained the 2 marks for the correct total of money. A few candidates made minor errors calculating the pence part but did correctly find the £6 part. There were a small number who managed to get the pence correct but were either £1 short or had £1 extra. In parts (b) and (c) by far the most common errors were by candidates who did not realise that the question was specifically asking for use of Megan's coins rather than coins in general. As a result they could still pick up one mark for a correct way to pay £3.70 and they still had access to all the marks in part (c). Such responses typically used 20p coins which were not found in Megan's purse.

3 This was a successful question for nearly all candidates. Very few made errors in part (a) although a small minority did think Tom was 11 in part (b) and that Ben could be 16 in part (c)

4 Almost all candidates picked up at least one mark in part (a), with the majority gaining either the full 3 marks or having one error. Lots of inventive answers were given in part (b), including ones where two conditions had to be met simultaneously.

5 There were a few fully correct answers given but also a few candidates seemed to think they only had to connect one question to each calculation. Such candidates usually got the first three correctly matched with the correct calculation and then appeared to stop answering the last two parts. Very few candidates failed to score at all here.

6 Candidates seemed to enjoy the familiarity of television schedules and many were able to collect full marks for the question. A few managed to miscount the number of 30 minute programmes, usually ending up with an answer of 6 rather than 7. Part (d) did test candidates' understanding of what a mean value represents and it did cause quite a bit of confusion. A small minority did work out two calculations with about half of these candidates successfully obtaining the correct answer of 37.5 minutes.

7 In part (a) a majority of candidates obtained full marks. Common errors were to subtract 2 from 6 for bag R in (a)(i) or to subtract 3 from 21 for bag P in (a)(ii) instead of dividing by 3. An encouraging number of correct responses were seen in part (b) with a few spoiling their answers by including *q* in their expression. In part (c) again there were lots of good explanations seen with the majority of these hinging on the fact that 3 does not divide into 10. A small number of candidates showed what happened with 3 and 4 marbles in bag P and then concluded that there were no possibilities in between these values of P. A small minority wrongly assumed it was because 3 did not divide exactly into 8.

8 A very small minority managed to gain full marks in (a) with a few of those failing to round their answer to an integer. Most candidates tried to express 5 fluid ounces as millilitres and then apply a multiplying up method to reach 15 litres. Unfortunately many candidates thought that 15 litres was 1500 millilitres and this limited their access to accuracy marks in part (a). In part (b) almost all candidates found the total price for the five bottles of water and then did manage to gain the correct total price for their order form. The most common error was to fail to use their answer from part (a) and seemingly pick a number of packs of 100 cups from anywhere. A minority of candidates did manage to follow through their wrong answer from part (a) through to a successful conclusion for their number of cups.

9 A lot of correct responses were seen here, with many candidates writing on the shape to ensure they had the correct numbers of cubes in the shape. Of those who made errors in counting or calculating most did then proceed to subtract their value from 50.

10 In part (a) a large majority managed to get the correct answer, with the rest tending to multiply 570 and 9.5. In part (b) a pleasing number of fully correct answers were seen with many candidates using text and calculations to explain their methods. A few candidates managed to find the correct number of each coin with no further progress, and a similar number of candidates seemed to have no clue as to what to do with some calculations carried out.

11 This was a construction question and as such did require the use of geometrical instruments as referred to on the front cover of the paper. The vast majority of candidates managed to correctly draw the rectangle but few completed a fully correct net, often because they failed to use a pair of compasses. In part (b) correct responses usually referred to half a cylinder or a wordy version of a semi-circular prism. A small minority of candidates gave answers which were in effect partial or incomplete descriptions.

12 A minority of candidates found this question to be too difficult to give creditable answers. They seemed to not appreciate the need to use the 1.25 factor throughout the question. The most commonly gained mark on the question was for finding 8 packs in part (c) by dividing 240 by 30. A few candidates tried to find the circumference of the inner and outer circles, but this was usually unsuccessful in finding the required number of packs in part (c).

13 A healthy number of fully correct answers were seen here with candidates who interpreted 'evenly matched' as having the same team total score or occasionally the same team mean score. Candidates who tried to match up individual scorers nearly always failed to reach equality for the team. Common errors were to try to put all the higher scoring people in one team or to aim for gender based teams.

14 A minority of candidates were baffled by this question. These candidates tended to view the positive gradient as evidence of travelling more and more quickly and a gradient of 0 being evidence of staying still. Some candidates appeared not to realise that the labels on the axes changed. In part (b) a lot of correct answers were seen, usually with speed on the *y* axis.

15 The vast majority of candidates scored at least one mark here. The most common answers implied that not all members had been surveyed, the majority of 11 to 10 was not a clear majority and that some members might not have had internet access or other similar PC reason.

16 Very few candidates plotted (4, 3) incorrectly but some failed to continue the line to the edge of the grid as instructed. These candidates had no chance of giving a correct answer in part (b). Exemplary answers were seen in better candidates' work which included simple text to support lines that had often been added to the graph above.

17 A very large majority of candidates explained that the reason was connected to the rounding of the figures in part (a). These candidates usually could plot the points in part (b) though there were a few errors in accuracy in some points. A similar proportion of answers in part (c) correctly identified that the population was increasing over the years.

18 This question proved to be very challenging for Foundation tier candidates. About a third of candidates did not even attempt it. A very small minority measured two pairs of comparable distances on both diagrams but these candidates then often did not know what to do with their measurements in order to make the suitable comparisons for scale. One candidate successfully used bearings to prove that the Underground map was not to scale.

A382/02 Higher Tier

General Comments

Examiners were pleased to note that many candidates had been prepared well for this examination; that they could justify mathematically and show clear working.

However a significant number of candidates found explanation and justification difficult. For example a statement that begins ‘According to my calculations …’ without offering any calculations is insufficient to mathematically justify their conclusions.

A number of candidates did not have the knowledge and skills to respond to higher demand questions in the higher tier specification.

Comments on Individual Questions

1 Most candidates found this question to be straightforward. To gain marks in part (b) examiners were looking for a full explanation with reference to the line.

2 There were many excellent responses to this question.

3 Good responses showed candidates with an awareness of the need to measure distances on both maps and make clear comparisons of scale factors or relative distances between pairs of underground stations.

4 In part (a) it was necessary to use a pair of compasses to gain full marks. Part (b) required candidates to appreciate that the side length and height of the triangle were different.

5 The majority of candidates answered this question well, correctly interpreting and applying the information given.

6 This question is a ‘new’ topic with good responses showing candidates able to interpret and apply mathematics. Where candidates did not achieve higher marks it was usually because they did not answer the question set. In part (a) no calculations were needed. Part (b) produced a range of answers and suggested that candidates did not consider the appropriateness of their solution and the context of the question.

7 This question differentiated well. In part (c) the best answers used the information about summary values to explain preferences for different ways to queue.

8 This was a challenging question. Candidates needed to recognise that Pythagoras was needed to find the side length of the octagon. Where candidates did not achieve higher marks it was usually because their algebra was poor.

9 Part (a) caused no difficulties. The risk of both women and men needed to be considered to gain all the marks in part (b). In part (c) justification required candidates to do some mathematics using the information given and not write a paragraph on their opinion of numbers of men and women in sport.

10 This question differentiated well. In part (b), the QWC question, full working, solutions and a final answer were needed to gain all the marks.

11 Part (a) caused no difficulties. To gain marks in part (b) candidates needed to have drawn the graph in order use the graph to read the maximum value of P. To get all the marks in part (c) candidates needed to calculate and state the function value for the *x* value being trialled and give an answer to the required degree of accuracy, clearly showing an answer just above or just below would not be correct.

12 This question required candidates to have an understanding of both bounds and kilogram to gram conversion. Good responses showed candidates with an appreciation of the need to use a maximum and a minimum value for the measures as appropriate.

13 A significant number of candidates appeared to have little knowledge of this topic.

14 This question produced a wide range of answers. Good responses successfully used the speed – distance – time formula for both sound and light and subtraction as appropriate.

15 Good responses successfully used the formulae for both volume of a sphere and area of a circle.

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