OCR
RECOGNISING ACHIEVEMENT

GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education **J925**

OCR Report to Centres

June 2012

CONTENTS

General Certificate of Secondary Education

Applications of Mathematics (Pilot) (J925)

OCR REPORT TO CENTRES

Overview

The total number of entries for Applications of Mathematics units increased from 2366 in June 2011 to 6979 in June 2012. In this series, a total of 3301 candidates certificated for the J925 Applications of 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 just entering Methods in Mathematics (J926) in 2011 and now making entries for Applications of Mathematics (J925) to some centres having tried the specification with one or two classes in 2011 now using it 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 tier, in some instances without adequate preparation.

The question 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. It was pleasing that there were fewer questions on the Applications papers with high 'omit rates' and in particular that almost all candidates were prepared to attempt the 'Risk' question on A382/02. Weaknesses included the setting up of equations (A381/01, A381/02).

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.

All papers included questions which expected candidates to be able to interpret and analyse problems and generate strategies 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, actual performance was reasonably close to the forecasts at most thresholds. In order 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.

A381/01 Foundation Tier

General Comments

The majority of candidates were able to show what they could achieve. As a rough indicator of this, only about one in twenty-five gained less than a fifth of the available credit. There were some instances of part questions being left unanswered, but these were relatively few. The great majority of candidates were able to make a serious attempt at all the questions. There was no evidence that time was a problem. This was similarly the case for literacy considerations.

Presentation and clarity of number work was generally satisfactory, although instances of less than clear working and confusing or absence of any logical layout were in evidence. This was, as might be expected, more obvious in questions tagged as Quality of Written Communication (QWC) questions.

Overall, performance appeared to be marginally better than in the corresponding session last year.

Marks, however, were lost needlessly, either by failing to show all working, in order to give rewardable evidence of correct methods, or simply failing to answer the question in full. Two examples of the latter were: failure to show or state explicitly that 2 miles was equivalent to 3.2 kilometres in Question 2 part (e), and failing to calculate (3 – 5 + 4) required in Question 7 (although in many cases giving the correct coefficient of x). Not all candidates appear to realise that instructions such as “Show clearly how you decided” or “Support your answer with numbers” are instructions that have credit attached to them.

It was suspected that a small number of candidates might not have had access to calculators – as evidenced by the incidence of “pencil and paper” methods employed – sometimes to candidates’ disadvantage.

The least capable were most successful with question parts 2(c) and 4(b)(i) with 4(a)(iii), 2(f)(iv) and 6(d) the least so. For the most capable question parts 2(f)(iv), 4(a)(iii) and 2(f)(ii) were the most challenging and 2(c), 4(b)(i) and 1(a) the least. This may be summarised as: “reading scales”, “subtraction and multiplication in a simple context” were found easiest and “working with fractions” and “bearings” the hardest. The over-arching area found to be the most challenging was algebra as evidenced by the relatively poor achievement in “plotting linear relations” and “setting up linear equations”.

Comments on Individual Questions

1 Taken as a whole this was one of the better-answered questions. A very large majority of candidates were successful with the first two parts. Although a common error in part (a) was “14” – perhaps a mispronunciation of “40”. Some errors were made in subsequent simplifications of $\frac{4}{40}$, but these were not penalised. The majority of candidates found part (c) accessible but a minority had obvious problems differentiating area from perimeter with “80” (the perimeter) the most common error, followed by “40” – the semi-perimeter (20 + 20)? Very little working was shown in part (d) and possible follow through marks in all probability lost. Part (e) was found particularly challenging by the least capable. Most candidates were able to gain partial credit by performing one of the necessary calculations, but tended to state the comparison with no evidence of any working or in a few cases performing both calculations but omitting to use them to state whether or not Sanjay was right. There were a small but significant number of candidates who confused and muddled up metres, kilometres, balls of wall and squares – a more systematic approach, perhaps employing short sub-headings or bullet points, might have reduced this. Some candidates are still unsure how to approach questions indicated as assessing their Quality of Written Communication.

2 Most candidates were able to gain partial credit for part (a), with a number able to recover and gain the second mark after failing to gain the first or to gain a follow through mark for correctly writing their answer to (i) in words. The prime error was to add too many zeros, followed by “70” and “700”.

Candidates’ estimation skills appeared to have improved since the last two sessions, as had their ability to read scales as illustrated by performance on parts (c) and (d). Although the majority were successful in part (d), “32” (from 4×8), 2 (from $8 \div 4$) and ½ (from $4 \div 2$) were not uncommon. This suggested insecurity with simple “rates of change” problems. The demands of finding the fraction of a whole number were successfully coped with by the majority as illustrated by the responses to part (e).

A large majority found the bearings content in parts (f)(ii) to (iv) a challenge. This was the first time that this content had been assessed. The majority were able to show a good understanding of word formulae and most were able to gain at least partial credit from part (g). Candidates were less successful in naming a rhombus though – despite the request for its “mathematical name”. Finding angles using the angle properties of triangles, straight lines and parallel lines proved too great a challenge for the majority of candidates – but an improvement on previous sessions.

The work involved in part (i) was accessible to most candidates.

3 This was answered poorly. Many candidates were very insecure with order of operations on their calculators. There was a tendency to ignore the initial question posed “How close is the value of π using the expression?”.

4 In (a), parts (i) and (iii) were found difficult by most. As might have been expected the latter part attracted the common errors with responses of $\frac{1}{7}$ $\left(\frac{1}{3+4}\right)$ and $\frac{7}{12}$ $\left(\frac{3+4}{12}\right)$ prevalent. However, a large majority were successful in part (ii). Part (b) was well answered with part (iii) the least accessible, common wrong responses were “£2” and “5p”. A good understanding of simple percentages was shown in part (c)(i), but this did not continue to part (ii). In this case, the majority failed to gain any credit. There was no obvious pattern to the errors made.

5 Taken as a whole the best answered question, particularly by the most capable. Almost a half of all candidates gained full credit.

6 One of the least well answered questions, about 1 in 6 candidates failed to gain any credit and only 1 in 10 gaining full credit. Nevertheless, this represented a better performance on similar questions set in the past. Correctly calculating the two lengths given the formula in part (a) was only achieved by a minority. A number of candidates interpreted the problem as one involving number patterns, as evident by the common errors 23 (2×5 mm tooth) and 34.5 (3×5 mm tooth). The majority gained partial credit by managing, in (b), to plot a single point. The last two parts were too great a challenge, with the last part only attracting any credit from a very small minority. Most candidates tended to give quasi-medical reasons in part (d), rather than using the graph as instructed.

7 This proved to be a very challenging question for the great majority. In common with previous sessions setting up and using linear equations was found very difficult, indeed almost a half of candidates failed to attempt the final part. Partial credit was available for the first part and almost 1 in 4 took advantage of this. However there was a disappointing proportion that left answers as $6x + 3 – 1$ or $6x + 7 – 5$, thereby losing credit by omitting to perform a simple piece of arithmetic, after successfully carrying out the "hard" algebra. A common error in the final part was "50" (probably originating from 19 + 19 + 12 – the perimeter). A number of candidates clearly had no appreciation of the properties of an isosceles triangle.

A381/02 Higher Tier

General Comments

Although a large proportion of the paper was accessible to the majority of candidates some questions proved challenging for most of them. In general, marks ranged between 15 and 45 with far more above 45 than below 15. Presentation of work was generally good or better, some scripts with working clearly shown. However questions requiring reasons or an explanation of the mathematics were less well answered. For some candidates their working was often haphazard and difficult to follow making it difficult to award method marks when the answer was incorrect. There was no evidence to suggest that candidates were short of time on this paper although weaker candidates made no attempt at some questions.

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

Comments on Individual Questions

1 In (a) a large majority appreciated the significance of symmetry and were able to give the correct time. Common errors included 10.35 and to a much lesser extent 1.35 and 1.20. Almost all of those with the correct time in (a) were able calculate the time of the journey in (b). About half of those with an incorrect time earned the mark in (b) for following through correctly from their wrong answer in (a). Part (c) proved more of a challenge with a majority able to apply the correct formula, but the main difficulty encountered was working with a time in hours and minutes. A large number gave 2h 30m as 2.30 here. In order to award method marks it is essential that candidates show their working, especially in the case of candidates working with the wrong time interval.

2 Most candidates were able to complete the list correctly. Very few scored no marks. Candidates were only slightly less successful in (b)(i). Of the few errors seen some were due to candidates stopping after finding the scale factor of 2.5 or failing to go on from 1 portion needs 60g. Again a large majority were successful in (b)(ii). Common errors included $1000 - 10 \times 50$, failing to find the quantity of sugar for one portion, and $1000 - 50$, failing to use the number of portions from the previous part. In many of the parts candidates failed to show any working. This was not a problem when the answers were correct, but when incorrect it was not possible to award method marks.

3 This was answered well by a majority of candidates. A minority of the rest of the candidates picked up one mark for a correct non-rounded answer or for correctly rounding an incorrect answer. Some common errors included the omission of the negative in front of the answer, truncating the answer rather than rounding and in some cases ignoring the square root. Quite often a candidate making an error failed to show a result in their working with more than two decimal places and so the mark for rounding correctly could not be awarded.

4 In (a) most candidates obtained the correct answer. Where errors occurred it almost always involved units, giving answers such as 0.375p or 0.38p. A few candidates reversed the division ($10 \div 3.75$). Most candidates answered this correctly by comparing the cost of one nugget. Some went on to suggest that the larger portion was better value because there was only 1p difference but you got 10 nuggets instead of 6. A few compared the cost of 30 or 60 nuggets correctly.

5 Part (a) was very well answered with most candidates gaining all three marks, some by changing the fractions to a common denominator, others by converting to decimals. A few candidates picked up two marks for placing three of the four fractions in the correct order. In (b) a majority used the largest fraction and were able to calculate the number of sweets left. The most common error was calculating the least number of sweets eaten leading to 'Behnaz 18'. In (c) a large majority were able to give the fraction and write it in its lowest terms. A small number misread the question and gave an answer of $\frac{3}{5}$.

6 In (a) a large majority collected the terms correctly. Obtaining $6x - 2$ was a common error and to a lesser extent $3x + 1$ after obtaining the correct answer. A few attempted multiplying the three terms. In (b)(i) few candidates failed to earn some credit with a majority picking up two marks for a complete solution. Some lost a mark either by not calculating the third side or by failing to state that two sides were equal. Most candidates struggled to make any headway in (b)(ii) and only a few were able to score any marks with many others making no attempt. This was the QWC question and to earn at least one mark candidates were expected to equate two of the sides and solve the resulting equation. Very few attempted this approach and those that did sometimes failed to check the sides of the triangle for their solution. Those who obtained $x = 1$ as a solution showed that the sides were 5, 5 and –2 but failed to state that was not a possible option. Those who showed any working often used trial and improvement and failed to pick up any marks.

7 A large majority of the stronger candidates were able to form two correct simultaneous equations and go on to solve them. For many of the weaker candidates the equation $4x + 2y = 58$ was the main stumbling block. Those who understood the principle of the question were able to pick up one mark by finding the solution to the problem without forming the two equations, usually by trial and improvement. Failure to write down two equations and solve them cost many candidates the three method marks.

8 This proved a challenging question for a majority of candidates with many failing to appreciate that the LCM of 27 and 45 was the required solution. Only a minority earned the three marks. Candidates who successfully found prime factors of 27 and 45 seemed unable to work out the next step to get the lowest common multiple. Some listed multiples of 27 and 45, often successfully, but arithmetic errors were common. Some gained a mark for an answer that was a multiple of 27 and 45.

9 A large majority failed to recognise corresponding angles in (a), the two most common wrong answers being 'because they are on parallel lines' and 'alternate angles'. Some attempted to describe the parallel lines, which was insufficient. In (b) there were many 'wordy' answers, but very few were able to give reasons for two pairs of equal angles and state that the similarity was due to equal angles. It needs stressing that the reason for similarity needs to be stated. A minority of candidates gained one mark by either identifying two pairs of equal angles (without reasons) or one pair of equal angles with a correct reason. In part (c) about half of the candidates realised that D was the midpoint of AB. Others described how D was a 'corner of two triangles' or the 'centre of enlargement' and so scored no marks.

10 A majority of the strongest candidates were able to make good progress and score full marks. For other candidates it proved more challenging with many making little or no progress. A few were able to work out that $\frac{1}{6}$ represented 6 pages, and hence that $\frac{5}{6}$ for previews would be 30 pages, but then failed to realise that these 36 pages represented $\frac{1}{3}$ of the total pages. Many candidates attempted to add the given fractions together, ignoring the fact that the $\frac{5}{6}$ was a fraction of the remaining pages and hence they needed to work out $\frac{5}{6} \times \frac{1}{3}$. The very few candidates that attempted algebra often made a similar mistake by adding $\frac{2}{3}x$ to $\frac{5}{6}x$. Working out was often haphazard and difficult to follow.

11 A large majority of the better candidates scored well on this question, demonstrating a clear understanding of reverse percentages. Some failed to pick up the final mark by giving the new price rather than the increase in price. One common wrong method was calculating an increase of 2.5% and then adding it on. Another was to calculate 17½% of £24.99 and subtracting the result. In both cases a surprising number of candidates used mental methods to calculate the percentage, often involving an arithmetic slip. At this level it was expected they would calculate a percentage of an amount by multiplying by a decimal or a fraction over 100.

12 Another question that proved challenging with many making no attempt, especially part (b). Only a few candidates appreciated the need for the cube root of the volume scale factor. These usually went on and earned full marks in both parts of the question. Having found the volume factor many made no attempt at cube root and gained no further marks. Many candidates treated the two jugs as cylinders, also gaining no marks. A few who could not answer (a) were able to use the information from (a) to correctly calculate the height of the smaller jug.

13 In (a) only a small minority of candidates recognised 'proportional to the square of the speed', with a large majority treating the question as direct proportion. Only a small number gained all 3 marks with slightly fewer gaining 2 marks for finding the constant of proportionality. Some candidates used the square root instead of the square of the speed. Of the candidates that were successful in (b) the preferred choice of method was substituting 2.5 into the formula. Some got as far as realising the energy was reduced to 25% of its original value but then failed to give the percentage decrease. However the most common wrong answer given was 50%.

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 increasingly able to apply their Mathematical understanding to both familiar and unfamiliar situations. There was a higher standard of answers in this exam session especially seen in weaker answers. There was an improvement in the way students answered the QWC questions 8 (b), 11(b) and 11 (d) as students showed better combinations of text and explanation to justify their answers.

Comments on Individual Questions

1 A large majority of candidates were successful in most of part (a) with almost everyone gaining at least two marks, with the final row proving beyond many candidates. Candidates were able to show their understanding of the application of ratio to the repeating pattern in part (c) with a good variety of correct answers seen.

2 It was pleasing to see candidates were largely able to demonstrate their understanding of scatter diagrams with over a third of candidates scoring full marks. Some candidates tried to find the mean weight of Jack's plums by finding the mean weight of each bag of plums which was not what the question asked for.

3 This was a successful question for many candidates. Some struggled with ensuring their dosages met all the criteria, usually managing to get their dosages 24 hours apart but starting at 3 a.m. rather than 3 p.m. Other candidates had a total of 5 dosages rather than 4 but these candidates usually still scored as their last dose was often 24 hours after their first.

4 Almost all candidates were able to link the information contained in two types of diagrams with over half gaining all seven available marks. Some candidates wrongly found the total number of students in the four bar charts when trying to find out how many students were members of the chess club.

5 Over a third of candidates successfully constructed the correct rectangle. Other candidates wanted to replicate the identical parallelogram here ending up with a congruent parallelogram being produced. Candidates also regularly produced a parallelogram such that P was to the right of Q rather than on the left as it should be in the correct rectangle. A minority of candidates found their point P and then failed to join the shape.

6 Candidates were very accomplished in finding the distance from the railway to the village and they were usually competent in finding the speed. To get marks for the line candidates needed both the correct gradient and a stop at 12km. In the last part most candidates got the right answer or correctly followed through from their graph.

7 In this question candidates were able to demonstrate their knowledge of loci. A quarter of candidates gained all 4 marks with very few scoring none. The first missing route was correctly found most often with the other routes found half the time in equal measure.

8 The vast majority of candidates scored highly on part (a) with few errors seen. In part (b) it seemed candidates were put off by the phrase that the dice was not fair. Weaker answers spoke about it not being fair that Molly threw the dice more times than Jess and Laura rather than thinking about whether the dice itself was fair – which was what the question was all about.

9 A lot of correct responses were seen here with many candidates showing careful working by listing the weights of the lion cubs in order of their imperial weights. They were then able to list the metric weights in order and then match up the weights to the names appropriately.

10 Around a third of candidates did manage to correctly identify the median in part (a). In part (b) most candidates talked about the potatoes being different sizes rather than the fact that the calculation would have been correct for the mean potato weight rather than the median. This part required a degree of sophisticated thinking often not seen at Foundation level.

11 In this question best answers were seen with students who fully understood that the extra 20 minutes would only be added once when cooking a chicken. In parts (b) and (d) candidates often reserved their deliberations for a particular pair of weights of chickens rather than considering a general case. Such answers usually did gain some credit and part marks were awarded. In part (c) candidates usually scored well on the *x*-axis and less well on ensuring their *y*-axis was scaled with reference to the given origin 0. In part (d) candidates did try to explain their thoughts but they found extreme difficulty in trying to equate whole kilograms with multiples of 450g.

12 Most candidates did manage to correctly place the extra square at either the top or bottom of the given net. The triangles were far more problematic with most trying to place their extra triangles at the end of the "arms" of the given diagram. In part (b) almost all candidates could not deal with the $\sqrt{2}\,t$ thinking this was either $\sqrt{(2 \times t)}$ or often $\sqrt{}$ (twenty *t*) such as $\sqrt{(27)}$ say if their trial value of *t* was 7. Most candidates simply did not attempt this part of the question. Those who did tended to use trial and improvement with very limited success, especially given the accuracy required in the question.

13 This proved to be a high-scoring question for most candidates who showed that they could successfully see the links between different types of diagram and then use them to formulate reasoned true/false statements. In part (b) the usual error was to have Arizona and Washington placed in the wrong order but many fully correct answers were seen.

14 This question was a good discriminator for the paper with around half of the candidates scoring 0 or 1 for the question. Part (b) in particular was challenging as it required candidates to think using algebra and only the most able were able to do this. A pleasing number did, however, manage to solve the last part of the question even when they did not have algebraic expressions above.

15 The vast majority of candidates scored at least one mark here. Those who did not usually had no understanding of what constitutes a view as they usually repeated the 3D diagram from above or produced a net of varying standards for the door wedge. Candidates found the trapezium view easiest as it was simply copying from the 3D view. They were less successful with the two rectangular views with the 2cm by 3cm view seldom seen.

16 Some excellent and thorough answers were seen by candidates who wrote down their calculations as they went along. The work of weaker candidates petered out after finding the correct first value of 5.8. These candidates could often transfer their last entry from the first row to the first entry on the second row. In part (b) only a quarter of candidates answered this successfully despite the fact that it could have been answered without even attempting part (a)

A382/02 Higher Tier

General Comments

All candidates had sufficient time to complete the paper and examiners were pleased to note that many candidates had been prepared well for this examination.

In general, candidates showed clear working. This greatly adds to their demonstration of their mathematical knowledge and understanding and allows candidates to gain valuable marks where they have not managed to reach a fully correct solution. However there were a number of questions, notably the graphical questions, where no working was shown making it difficult to award marks if responses were not quite correct.

It was pleasing to note that the majority of candidates appreciated the need to justify mathematically with a significant number supporting their justifications with reference to appropriate information given using correct mathematical language and better candidates supporting their justifications with appropriate calculations.

Areas of concern include knowing and using values to an appropriate number of decimal places and significant figures, giving a money value in a correct form and the conversion from mm to km, including a conversion in stages from mm to cm to m to km.

A small number of candidates did not have the knowledge and skills to respond to the demand of the higher tier specification and for these candidates the foundation tier would be a more appropriate examination to demonstrate the mathematics they do know.

Comments on Individual Questions

1 In general candidates found this question to be straightforward. In part (b) examiners noted that a number of candidates gave one correct and one incorrect value. Part (c) differentiated well with weaker candidates not appreciating that coordinates did not need to have integer values. The more common response was (4.5, 4) rather than (1.5, 0).

2 There were many good responses to this question with candidates showing a fair understanding of this topic achieving at least 4 marks. The side view caused the fewest difficulties. To gain full marks three views, not just duplicate views, were needed with accurate side lengths. A significant number of candidates drew a net for one of their views.

3 Most candidates found this question to be straightforward. To gain full marks in part (a) examiners were looking for an awareness of the required degree of accuracy of answers to write in the table, given the context and an awareness to use these answers to the required degree of accuracy for the next step. Examiners felt that greater care was needed by some candidates in writing answers with the correct number of zero's after the decimal point. Part (b) was usually correct, even when the table was not, where candidates were required to appreciate the difference between 4 significant figures and 4 decimal places.

4 The majority of candidates answered this question well, gaining at least half marks, correctly interpreting and applying the information given from both graphs. California was almost always positioned correctly and examiners noted occasional errors in either the position of Washington or in the relative sizes or Oregon and Arizona.

5 This question differentiated well across all candidates. The best responses showed all steps in the chosen method and used trigonometry correctly. Where candidates did not choose the most straightforward trigonometric method the detail in working shown enabled examiners to reward mathematical understanding. Where part marks were achieved the most common error was to subtract and not add the calculated heights. Fewer than ten candidates attempted to solve this question using a scale drawing, a method that proved to be unsuccessful.

6 Almost all candidates achieved the marks in parts (a), (b) and (c) demonstrating a sound ability to read values from a graph. Part (d) differentiated well; for candidates to achieve marks in this part they needed to choose a value from the graph, subtract 30 and find a percentage, however very little working was shown in this question part. Very little working was shown in part (e) (i) and without working a poorly executed line often gained no credit. The follow through mark was available in part (e) (ii) if candidates had drawn a suitable line. Part (f) (i) was answered correctly by almost all candidates while part (f) (ii) was comparatively poorly answered. It did differentiate between candidate's abilities with the most successful approach using reverse percentages while a trial and improvement approach resulted in varying degrees of success. Examiners noted that candidates did not always consider the appropriateness of their solution and the context of the question as there were more 'correct' answers of £121.6 instead of £121.60.

7 The majority of candidates achieved the mark for part (a). In part (b) for those candidates who had made arithmetical errors, showing full working enabled examiners to award method marks. Part (c) was answered well by many candidates showing correct interpretation of their sometimes conflicting different averages with credit given to those candidates who referred to the table with numerical justification. Part (d) (i) was generally correct and examiners noted that this was usually followed through with correct graphs in part (ii) from which most candidates could find the median in part (iii). In part (e) the best answers gave fluent and coherent responses backed up with calculations, using their median to respond to the first statement and responding to the second statement by reading an appropriate value from the graph and either converting their value to a percentage and comparing it to 43% or by converting 43% to 86 motorcyclists and comparing this to their reading. Examiners felt that many candidates could have made their method clearer by both showing their reading on the graph and showing their calculations. Credit was given to candidates who used values from the table appropriately to respond to each of the two statements.

8 Parts (a) and (c) differentiated well. Where candidates did not achieve higher marks in part (a) it was usually because they did not know, or were unable to use, the correct conversion from mm to km. However in part (c) the focus on a given target speed appeared to enable candidates to apply a correct conversion from mm to km. A significant number of candidates did not see the link between the three parts of this question and repeated all their calculations from part (a) in part (b), despite part (b) being worth only 1 mark, and did not seem troubled by dividing by a different power of 10 in part (a) and part (c) for the same mm to km conversion.

9 This question is a 'new' topic with very good responses showing candidates able to interpret and apply mathematics. Examiners were pleased to note that in part (a) candidates correctly identified the probability column or referred to N to determine the likelihood of an accident. In parts (c) and (d) candidates who substituted values in the given equation for annual premium before rearranging generally performed better than those who rearranged the equation and then substituted values. Part (d) produced a range of answers and whilst the reasons given for N suggested that candidates understood the situation, the final answer given for p suggested they did not always consider the appropriateness of their solution in the context of the question.

10 Parts (a) and (c) (ii) were poorly attempted by the majority of candidates, while parts (c) (i) and (d) differentiated well. In part (a) many candidates realised that the missing height for the top part of the cone had to be 2, but did not provide any suitable or sufficient calculations to support this. In part (b) most candidates were able to gain at least one mark for using the correct formula, if not always with the correct height for a radius of 15 or of 1.5. Part (c) (i) differentiated well and examiners were able to give part marks for clear working shown and/or for realising that the gradient was negative. Not all candidates understand that the gradient is just a numerical value and gave equations of lines or a term in *x*. Part (c) (ii) showed a poor understanding of this 'new' topic in applications. Part (d) saw a variety of shapes for the graph, some with too obvious linear sections. To gain full marks in this part greater care was required from some candidates who intended their graphs to pass through the origin.

11 Part (a) caused few difficulties. To gain full marks in part (b) candidates needed to set up the initial equation, using the correct number of zero's, and then to rearrange it to solve for b before calculating the annual percentage increase. The majority of candidates who attempted this question gained at least one mark for either a correct equation or for following through their value of b to find the annual percentage increase. However examiners noted that a significant number of candidates who correctly found the value for b were not able to convert their value to find the annual percentage increase.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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