Oxford Cambridge and RSA

GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education **J926**

OCR Report to Centres June 2016

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

B391/01 Foundation Tier

General Comments

A good spread of marks was seen for this paper and the paper differentiated quite well, with marks across almost the whole range.

Questions 7(b), 9, 10(b), 12 (b) and (c), and 15 required candidates to interpret and analyse problems and use mathematical reasoning (AO3). Performance was reasonably good for Q9, which was the QWC question (as indicated by the asterisk on the question number) with candidates generally giving good explanations and Q10(b) was generally well answered with many correct names of shapes being given. In Q7(b) many candidates just wrote down calculations with no other explanation and Q12(b) was not well answered, with quite often answers being crossed out and replaced. Some candidates may have found Q15 to be daunting, possibly due to its unstructured nature.

Manipulation of fractions in questions 5 and 13 proved to be difficult for a significant number of candidates.

The omission rates for questions in this paper seem to be lower than for some previous papers.

Comments on Individual Questions

1 This was a well answered question, with almost all candidates getting the correct answer in part (a) and a large majority getting the correct answer in part (b). The most common error was having the values in reverse order (in (b) this could have been through candidates looking at the amount of decimal places in the number rather than the place value). Part (c) was not answered as well as the other two parts, but it was answered correctly by the majority of candidates. In part (c) there were again some lists in reverse order and some answers of $\frac{8}{9}$, $\frac{1}{4}$, $\frac{2}{3}$, where candidates had possibly only considered the denominator of the fractions.

2 In part (a) many candidates were not considering the numerical probability of getting one particular number when rolling a die and the answer 'likely' was by far the most popular answer; 'evens' was also common. Part (b) was almost always correct. Answers to part (c) were mostly correct, although in (c) there were a number of 'evens' responses.

3 In part (a) the multiplication was generally well attempted. There were a variety of methods seen, with the grid method probably being most prominent. There were some arithmetic errors within the calculation leading to the wrong answer, one of the most common of which was multiplying 7 and 8 as 49. There were also some inefficient methods seen, for example listing 72 eight times as an addition sum. These methods often resulted in errors. In part (b) the division was answered well by the majority of candidates, but this part was more problematic with a small number of candidates leaving it blank. Those employing the traditional division sum method were more successful than those using alternative methods such as trial and improvement involving multiplication.

4 Part (a) was usually correct. Part (b) was also done well by a large number of candidates, but common incorrect answers were 4 (from subtracting), 2 (possibly from division?) and 28 (from an error in multiplication). Part (c) was also well attempted by a large majority of candidates. In part (c) some candidates wrote out each line of working, but many gave the correct answer with no working. The answers 32 and 28 were common incorrect answers here.

5 The decimal value 0.1 was generally correct, but the fractions caused more problems (even the value of 0.5, where fifths were often given). The value of 0.15 caused the most problems with $\frac{1}{15}$ being the most common fraction given, along with $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{1}{7}$ (from 100 ÷ 15?) and $\frac{1}{4}$. There were also some answers of $\frac{1.5}{10}$.

6 Part (a) was almost always answered correctly and part (b) was done well by a large majority of candidates, but the common error of reversed coordinates was seen from a small number of candidates. In part (c) the reversing of the coordinates was more commonly seen. The vast majority plotted the correct point in part (d), with a few plotting at (4, -2).

7 Part (a)(i) was done well by the vast majority of candidates, the most common error being to line up the 3km in the tenths column in the addition sum leading to an answer of 1.8. Part (a)(ii) was usually correct, the most common incorrect answers were 0.9 from using Anna and Bikram and 2.8 or 0.8 from mistakes in the subtraction. There were more errors in carrying out the subtraction in part (a)(ii) than in carrying out the addition in part (a)(i). Part (a)(iii) produced more incorrect answers, amongst them were 0.9 (from a subtraction), 9 (perhaps from 0.9?), 10 (using Caitlin and Bikram) and 3. A large majority of candidates successfully solved the problem in part (b). The most common incorrect answer given was 30 from 46-16, i.e. omitting to subtract the original 8km.

8 The vast majority of candidates were able to complete the reflection in part (a). In part (b)(i) there were many who it appeared did not understand the meaning of ‘order’ of rotational symmetry, with responses such as 90°, clockwise and anticlockwise given. Values of 1 and 2 were also given and there were a small number of null responses. Shading of the triangles was done well in part (b)(ii).

9 This QWC question was done well with a large majority of candidates setting out clear working. Some did not show how the £33 for B was made up and using 4 pairs of skates was an error for some who may not have read the question carefully enough. Some were doubling up the values for A, i.e. 9+9+7+7 then multiplying by 2. There were a few candidates who had an arithmetic mistake, but as long as working was shown most only lost 1 mark. Some candidates showed working out in places next to the given details in the question and they did gain credit for this, but we expect the explanation for the answers in the lines provided for the answer.

10 Part (a) was well answered, with a large majority gaining full marks and most gaining some marks. A large majority of candidates also gained some marks in part (b), with many scoring all three marks. The most common incorrect shapes given were kite, trapezium and triangle. Some candidates only gave the names of two or one shape.

11 The most common error throughout this question was to omit to give answers as probabilities and just give whole numbers, often the correct numerator. An incorrect denominator was also often used throughout the question, commonly 11. $\frac{5}{25}$ was the most common incorrect response in part (a), along with $\frac{5}{11}$, 5 and 7. In part (b), $\frac{4}{11}$ and 4 were common incorrect responses. Part (c) was generally better attempted than parts (a) and (b). 14 was a common incorrect response, but there was more use of 25 as a denominator. In part (d) many candidates gained at least one mark for the correct use of 2, either alone or as the numerator of a fraction. 11 and $\frac{11}{25}$, were often given. A small number of candidates did not provide numerical answers, giving responses such as "likely" and there were a small number of candidates who did not use correct notation, for example giving "7 in 25" for part (a).

12 Both part (a)(i) and (a)(ii) were reasonably well attempted with a majority of candidates having correct responses. There were many who did not show any working and so were either working the answers out mentally or simply guessing. Those who did not show any values linked to each power or root could not gain any marks if they chose the incorrect value. In part (a)(ii) many wrote 16 underneath 8^2 and then that value was ringed without going any further. In many cases 3 or more values were found to be different; this should have led candidates down the route of checking their working.

There were not many correct responses in part (b), but of these 5 and 2 was a popular correct choice. 11 in the numerator and 2 in the denominator was a common incorrect choice.

In part (c) a small number of candidates gave a correct response, with $1^2=1$ being the most common correct example. $0^2=0$ was also given. There were relatively few giving a value between 0 and 1. The most common incorrect statement was to say that negative numbers become smaller when squared, with examples such as $(-2)^2 = -4$.

13 In part (a)(i) the vast majority gave the incorrect response of 0.6, with very few giving the correct answer. Part (a)(ii) was better attempted, but still only a minority gave the correct answer. Common incorrect responses were 0.2, 2, 3.8 and 0.5. The fractions calculations in part (b) also proved difficult. In part (b)(i) $\frac{6}{8}$ was the most common response. There were a number who showed understanding that the denominator in each fraction needed to be the same, but failed to do anything with the numerator and gave $\frac{2}{15}+\frac{4}{15}=\frac{6}{15}$. Also seen was $\frac{10}{15}+\frac{12}{15}=\frac{22}{30}$. In part (b)(ii) only a small minority gave a correct answer; by far the most common response was $1\frac{3}{8}$ from ignoring the 1 and putting it back at the end. There were very few who made the first correct step of converting $1\frac{1}{2}$ to an improper fraction. There were a number of candidates who converted the denominator in each fraction to be the same in order to then multiply; this was apparent in the workings of those who ignored the whole number as well as some of those who did make the first correct step. $2\frac{1}{4}$ was frequently seen where the values had been added. A small minority of candidates scored a method mark for giving $\frac{3}{2}\times\frac{3}{4}$.

14 The correct answer was given by approximately half the candidates. There seemed to be about equal numbers of the two incorrect shapes chosen. There was much indecisiveness over which shape to choose, indicated by many crossings out and some candidates had more than 1 shape ringed.

15 Many candidates had an incorrect strategy or no strategy for attempting this question. Some candidates could correctly state the formula for the area of a trapezium, parallelogram or triangle, but then did not know how to apply this to the given information and did not get any further. Many got to the point of $(11+6)\div2=8.5$. Of those who did get the correct answer of 4, there were few who showed logical working and most appeared to be using trial and improvement. There were many different calculations given involving several combinations of the given numbers. Many were dividing 34 by 6, 5 or 11 as a starting point. Values were often written on the slant heights and used in calculations and the inappropriate use of Pythagoras' theorem was also seen fairly frequently.

B391/02 Higher Tier

General Comments:

The paper differentiated quite well with marks across the whole range. It also proved accessible to most with low question omission rates (only questions 9(c), 11(b), 13(b) and 14 were above 0.05), so it looks clear that students are being advised to attempt all questions. Very few candidates gained overall marks in single figures, suggesting that there were few for whom entry at foundation level may have been a more rewarding experience.

Questions 2, 9 and 10 required candidates to interpret and analyse problems and use mathematical reasoning (AO3). Responses to question 2 often used trial and improvement rather than a formal method. In questions 9 and 10(a) very little working was shown.

Question 6 was the QWC question (as indicated by the asterisk on the question number) and required candidates to estimate, which was often neglected. In general candidates were annotating their work, although some had taken this to the extreme and the maths got a little lost in these situations.

Comments on Individual Questions:

1 The first part of this question was very well done. Where candidates scored 1 mark it was more often given for identifying the largest fraction. In part 1(b) success at identifying the largest and smallest of the given decimals was low. The smallest value of 0.72 was not frequently found, but giving 1/0.7 for the largest was more achievable by most candidates. There were a noticeable number of answers reversed in this part of the question.

2 Those that used algebra to answer this question were generally successful at arriving at the correct answer, however a number using this method were let down by poor arithmetic skills and incomplete processing; many arrived at $8.5h = 34$, but were then unsuccessful in calculating the answer of 4. Trial and improvement was a method used by a significant number of candidates and often led to the correct answer. A good number of candidates had correctly identified the shape as a trapezium and quoted the area of a trapezium formula.

3 The majority of candidates gained full marks in part (a). It was obvious that candidates knew that the graph must extend across the whole range and very few plotted the points, but then neglected to draw the line. Candidates were very successful at answering part (b). Of those that had produced incorrect responses to part (a) the follow through mark was awarded to the majority, but it was clear that some candidates had used the algebraic method rather than the graphical method to find the value of a as their value did not follow through their incorrect graph.

4 Candidates were slightly more successful in part (a)(i) than (a)(ii). The most common incorrect answer in part (i) was 0.6. A variety of methods were used, such as the grid method for multiplication, conversion to fractions and percentages. In part (ii) those candidates that showed no working generally gave answers scoring zero. The majority of candidates scored in part (b)(i), the main error being to leave the answer as an improper fraction. In part (b)(ii) responses showing correct conversion of $1\frac{1}{2}$ to $\frac{3}{2}$ and multiplying (which could be credited with part marks) were not seen very often; again the main error was to leave their answer as an improper fraction.

5 The majority of candidates scoring zero did so as they missed the instruction to respond with a **single** transformation. Beyond this the majority of the missed marks were for omitting the direction of rotation.

6 This question required estimation and a significant number of candidates scored 2 instead of 4 as they had not estimated any of the given figures. In QWC questions it cannot be stressed enough how important it is to set out the work logically and showing all the steps; random figures scattered about the page will not score highly. When estimation is required it is important to show figures rounded e.g. 261.5 to 250,260 or 300. All steps should be shown, even if they might seem obvious e.g. 5 gallons at about £5 per gallon so 5 x 5 = £25, etc.

7 Those that correctly calculated the centre angle of 72° generally scored well on this question, with only a small minority only scoring 2 through inaccurate use of a protractor. Those that chose to calculate the interior angle of 108° were less successful. Some candidates had drawn a pentagon but missed the fact that the question asked for a regular pentagon. The only other shape seen was a hexagon.

8 Generally a well answered question, the majority of the errors came in part (b)(ii). If candidates understood index laws they were generally able to correctly follow through their answer to the correct result. Those that had not applied the laws of indices had tried to calculate the values in part (a)(ii). The most common incorrect answers to part (b) were -100, -20 and the incomplete processing of $^1/_{10^2}$.

9 Parts (a) and (b) were well done. A very small minority used more than one pair of brackets in part (a). In part 9(b), the majority of candidates scored either zero or 2 marks. Issues arose with the use of 3 in part (c) and very few students managed to find numbers that gave the required -16, with or without the 3.

10 The majority of candidates scored in this question and candidates often managed to score in both parts. They showed a good knowledge of square numbers, prime numbers and cube numbers.

11 Correct wording of key circle theorems in this question was essential. Of those candidates that knew the term ‘cyclic quadrilateral’, the common error was to state that opposite angles are equal. A significant number of candidates referred to the ‘Alternate Segment Theorem’ in part (b), but gave incorrect angles suggesting they did not understand the theorem.

12 The early parts of the questions were answered more successfully than the later parts. Candidates that understood the Venn diagram were let down in part (b) by not acknowledging the ‘non-replacement’ of the question. Some candidates correctly interpreted this and gained marks through the ISW element of the question. Of those candidates that didn’t gain full marks in (b)(ii), many gained 1 mark for 1 correct product.

13 Part (a) was generally well answered, candidates clearly knew the answer to this or not. The most common incorrect answer was to give 3*x*. Similarly in part (b), candidates were generally fully successful or unsuccessful. Some candidates were able to identify the gradient as - and when they were successful at this they generally ended up with the correct answer. Lots of candidates drew correct sketches of the line, but this rarely led to a correct answer.

14 Few candidates were successful at this question. The working for this question was quite often erratic showing little that could be credited with method marks.

B392/01 Foundation Tier

General Comments

The range of marks was from 0 to 87 with the majority being between 45 and 75.

Presentation was generally good and most used a ruler for the graphs and diagrams, although there were still occasions of students drawing using a pen and therefore being unable to rub out. Presentation of written answers was good. There were occasions when students wrote over answers, but it wasn't common. Visible working wasn't always shown and some lost method marks for including workings when it was clear they had accessed the question.

It was clear students weren't always making efficient use of their calculators, but preferring to use a written method – particularly on percentage questions.

All questions were generally attempted by students.

Comments on Individual Questions

1 Part (a) was tackled successfully by the majority of students, although some unable to name the correct 2D shape. Spelling was also extremely varied. A small number of candidates gave an incorrect answer for the area in part (b); 12 was the most common incorrect response through using 6 instead of 5 for the width and there was often no working shown. Almost all candidates scored 2 on part (c) with only a small handful mixing up the x and y coordinates. In part (d) candidates who drew the diagonal and marked the midpoint on the diagram were more likely to gain full marks, but many scored 1 as they incorrectly identified the x coordinate as 4 or 5.

2 A good response was seen from most, with candidates seeming familiar with this topic.

3 Part (a) was answered well and the majority gained all 4 marks available. Part (b) caused more difficulties, although again the majority of candidates did well. A common problem appeared to be candidates unsure as to exactly what they needed to do to demonstrate that Lucy was incorrect. The candidates who lost marks usually did so because they did not find out what the 12^{th} term actually was and instead they just showed that doubling didn't work or explained that the sequence was add 11 rather than doubling. It was frustrating to see candidates with access to calculators make errors and lose marks when adding 11, but some candidates did not seem to use them for what they felt were simple operations.

4 In general good understanding was shown in this question. Only a small handful of candidates showed any working, so most responses saw either 0 or 2 marks awarded.

5 This topic seemed familiar to candidates again with good solutions being seen even when working with negative numbers. Only a small number of candidates multiplied 5 by 3 instead of cubing it, and the majority used BIDMAS correctly in part (d).

6 This question was tackled well by the majority of candidates, although the difference between units for money (5p versus £0.05) lost some marks in part (b). There seemed to be reluctance across the whole paper to show working meaning method marks could not always be awarded and this question highlighted this. A high number of candidates who scored 0 in part (a) did correctly follow through in part (b).

7 Again a lack of working out often meant method marks could not be awarded. In part (a) candidates were not always clear as to what isosceles meant and many simply had two angles that added up to 140°, which was awarded M1. In part (b) many candidates got confused with angles on a straight line and did not realise that at each point angles added to 180°, so they tried to add all angles on a line to 180° (a common error for *s* was 180 - 25 - 70).

8 Responses to this question showed a good use of calculators in most cases.

9 This question was disappointingly answered. Many candidates did not calculate the volume and were unable to rebuild the cuboid with a different square base. The majority of incorrect answers had no square base at all which suggest they did not access this question well. Many had a lack of understanding of volume.

10 This question was answered well. The most common mistake in part (a) was in the first number as it was a negative. The line in part (b) was generally drawn well; the majority of students used a ruler and scored 2 marks. Of those with errors in part (a), most scored through follow through in (b). There were instances where students forgot to join the points however. The majority of students scored on part (c). Most used algebra to answer it and there were very few using their graph, meaning even if students lost marks on the previous parts they managed to answer this question.

11 The most common response in part (a) was the incorrect 330°. The question was not answered well as students didn't realise the angle was the same size. Part (b) was answered better, but this was a common question for students who scored highly to make a mistake. Some managed to score for recognising the scale factor, but most either scored 2 marks or 0 (or no response) marks. It was common for students to label the edges with lengths rather than realise the perimeter could be multiplied by 3.

12 This was not answered particularly well. A number of candidates scored 1, potentially through an element of guesswork.

13 Most students scored on this question and the common score was 2 marks. The common error was in the increase by 6%.

14 Part (a) was generally answered well. The common loss of marks was through students not cancelling the fractions down or identifying 30% as 1/3. Part (b) was not answered well. Generally students wanted to put a decimal and the box wasn't big enough, so they rounded or put 0.7 recurring. Students did write a longer decimal, but very often it did not have the recurring signs or wasn't long enough to score marks. In part (c) students generally scored. The common answer was 0.4. There was a common mistake of changing 1/3 to 0.3, but this didn't affect their final answer if correct. The majority went for changing the fractions to decimals rather than adding the fractions and dividing by 2. There were students who successfully changed to percentages, but then didn't use a percentage sign and gave an answer of 40 that scored 0.

15 This was a challenging question for all but a handful of students. Not many scored 5 as poor reasons were often given (usually just a calculation) and those that scored 4 generally received this for identifying all 6 angles rather than for identifying 4 angles and providing valid reasons. The biggest problem was through students not finding the angles within the hexagon, but outside; D was commonly referred to as 90°. The question was generally attempted, but usually with just 2 or 3 angles found correctly. Responses that failed to score generally identified all the angles as 120° (regular hexagon) or 60° (360/6).

16 Parts (a) and (b)(i) were answered well. The common mistake in (a) was students dividing 60 by 8 and then 60 by 7. In (b)(i) the common error was $\frac{2}{3}$; a few students put $\frac{2}{5}$, but generally students scored marks. Part (b)(ii) was a challenging question for the majority and was commonly not answered or responses receiving 0 marks were given; very few students grasped what was being asked. 3 : 1 was the common incorrect response. There were instances where students realised there were 6 blacks; only a handful identified that 9 red were in the bag (or had the ratio 9 : 6).

17 Students generally scored one mark for expanding the brackets in part (a). They tended to make mistakes on the -1 and attempted to cancel it by subtracting 1 from both sides, getting an answer of 6.5 and a common mark of 2. There were also a high number of candidates who had very little algebraic manipulation skills and scored 0. Students still struggle to rearrange formulae and responses to part (b) generally saw no responses or responses receiving 0 marks. The common error was to exchange t and v.

18 Part (a) was not answered particularly well, but students generally managed to find the area of the triangle. The common mark awarded for the semicircle was for finding the radius. There was the odd occasion were students wrote 8 x pi and no other working, in which case BOD was awarded (due to the numbers used in the question it wasn't clear whether they had used the circumference formula and got lucky or they actually had found the area of the circle, which was 16pi, and divided it by 2). Occasionally students didn’t round appropriately. The common confusion was using Pythagoras’ theorem. Students scored well in part (b). There were a few instances of students squaring and cubing the number. Another common error was 4.33 and no other working, which unfortunately scored 0.

B392/02 Higher Tier

General Comments

Candidates generally performed well and only a very small proportion appeared to be entered at an inappropriate level. Very few (approximately 1%) failed to gain at least 20 of the 90 marks available.

The paper differentiated well while giving all students the opportunity to demonstrate higher level skills. Questions with no responses were quite rare and, when evident, did not appear to have resulted from any lack of time.

The standard of presentation was very varied, but was improved from previous years. There are still candidates however who show no logical progress through a solution and scatter the answer space with irrelevant working. This particularly applied to the more functional (AO3) questions (8a, 14 and 15). Many candidates are still rounding answers prematurely and losing marks for inaccurate final answers, but again these seem to be reducing in numbers. Some offer a final answer that does not give the required accuracy without showing a "better" value in their working or, in many cases, the required rounding has been ignored.

Questions 2 and 12(a) were the two areas where the quality of written communication (QWC) had to be considered. There were many good attempts at answering these questions and it was quite rare for no marks to be awarded in either case, but few also gave complete enough explanations for full marks to be considered.

It is obvious that even more sophisticated calculators are being used effectively throughout the examination.

Comments on Individual Questions

1 This was generally a successful start to the paper with a very large majority scoring full marks in part (a). Few errors were seen; where they did appear they mainly related to the fractions, $\frac{4}{9}$ for 44% being the most common. Part (b) was more problematic although a large number gave the required fraction ($\frac{1}{14}$). Many used a calculator and failed to take account of the accuracy required by rounding their answer, most probably in an effort to fit the lengthy recurring decimal into the box provided. There was plenty of evidence that the dot notation used to indicate recurrence was understood even though there was a string of six numbers repeated. Most candidates gave a correct answer in part (c), with $\frac{2}{5}$ or 0.4 being the most common responses (probably from converting $\frac{1}{3}$ and $\frac{1}{2}$ to decimals). Those who found a common denominator usually gave $\frac{5}{12}$ as their answer.

2 This was the first of two QWC questions. A large proportion (just over half) scored 4 of the 5 marks for correctly identifying all six angles and most were able to obtain correct values for at least some of the angles. Credit could be given for angles correctly identified on the diagram. The right angle was most commonly stated angle. A much smaller number were able to give valid geometrical reasons to support all their answers, with candidates often thinking that a detailed description of how they calculated the angle would suffice. 'Angles about a point' was the reason offered more than most and it was accepted for at least two of the angles when supported by additional information relating to the other relevant parts. Many made assumptions without reference to symmetry, on which their reasons were usually based. A small number simply assumed that since the shape was a hexagon all the angles were 60°, or a combination of 60° and 120°. Some correctly split the hexagon into two equal shapes and then used properties of parallel lines and a rhombus to justify their answers. A fully correct and reasoned answer scoring full marks was rare, but so was the number of responses gaining no marks.

3 It was rare to find incorrect terms in the pattern of triangular numbers in part (a) and it seems that the sequence was familiar to most candidates. Candidates usually found one or more terms of the new sequence in (b) and spotted that the third term was critical, however some failed to make a comparison and scored just 1 mark. A small minority realised that the first formula should be quadratic while the second was linear and stated this fact to score full marks. Some candidates found the correct general term for triangular numbers. Many candidates scored well in part (c), although some methods were less than complete (200 ÷ 4 to get 50, for example). Few used algebra alone and most methods involved some trial and improvement.

4 Candidates coped quite well with ratio throughout this question. There were occasional misconceptions in part (a) involving the division of £60 by 8 and 7 separately instead of a combined total of 15. In (b)(i) the large majority gave the correct fraction, but there was evidence of 3 : 2 being converted to a fraction, giving , or giving black as . The number of candidates getting full marks in (c) was much lower than the first two parts. Many were awarded M1 for six black and some of these gained a further mark for giving an answer of 9 : 6. A few seemed to give a seemingly random ratio, such as 3 : 1, 15 : 1 or 4 : 1.

5 Part (a) was well answered by candidates who multiplied out the bracket correctly. The most common error was to expand $7(x + 2)$ to $7x + 2$ as a first step, although this was in many cases correctly carried though to give $x = 1.5$ for 2 method marks. A number of candidates rearranged the equation incorrectly and arrived at $2x = 13$ and then $x = 6.5$. Using trial and improvement worked in many cases, but method marks were rarely gained if an incorrect answer was obtained. The re-arrangement in (b) was generally well tackled with most candidates having a decent idea of the operations required. A common error was to remove '*a*' from the right hand side by dividing on the left (getting v/a) without consideration of '*u*'; other common errors included $t = uv/a$ and $t = v/u – a$.

6 The majority who realised that this was a very basic trigonometry problem managed to score 3 marks. There was a number who tried to use Pythagoras' theorem and others who simply measured the angle at around 25°. Some weaker candidates seemed to be confused by the use of ratio in the question and added the side lengths before using 180 ÷ 12 to get 15° or (90 ÷ 12) x 3 to get 22.5°.

7 Part (a) was another high scoring question for the majority of candidates. Most candidates were able to picture where the other end of the diameter was positioned, however there were some responses that lacked the negative signs. In part (b) a large number failed to spot the need for Pythagoras' theorem. Many responses had no method and appeared to come from guesswork, often giving a radius of 4 or 5. Part (c) caused problems for the large majority with only a small number understanding the components used in the equation of a circle. Many used the area formula for a circle as their answer, while a significant number made no attempt at all.

8 Many candidates provided correct responses to part (a), showing good understanding of the process involved in finding and adding the two areas. Most found the area of the triangle. Some failed to divide the circle area by 2 and the use of 8cm as the radius was also quite common. Some used Pythagoras' theorem to find the hypotenuse of the triangle and incorrectly used this value in their area calculation. Part (b) seemed to be straightforward and was mostly answered correctly. A few worked out 3503 ÷ 812 (confusing the units with the values). A recurrence in the answer caused a large number to write $4.\dot{3}$ or $4.\dot{3}2$, but this error in notation was condoned.

9 Almost all candidates picked up at least 1 mark in part (a) for two correct values and the responses to this question were roughly equally split between those receiving 1 mark and those receiving 2 marks. The main error was giving a *y* value of 1 when $x = -1$, possibly through not realising that calculators process $(-1)^2$ as 1 and -1^2 as -1. In part (b) plotting was generally accurate using values from their table. Curves were acceptably smooth and through their points

10 Candidates seemed to be quite well prepared for the algebra in this question. The majority scored well in part (a) and those that lost marks had usually made an error combining $18x$ and $-x$ to get $-17x$. Some lost the power in the first term ($6x + 18x - x - 3 = 23x - 3$), but still scored 2 marks. A small number incorrectly combined all terms in *x*, arriving at for example $24x^2 - 4x$. Part (b) was less successful, mainly due to the fact that factorisation was not the preferred method for most candidates. Many chose to use the quadratic formula and this caused problems due to the negative value for the coefficient of *x*. More than a few candidates simply used trial and improvement, often gaining B1 for $x = 2$. There were some trying to solve from $2x^2 - x = 6$.

11 There was a 50/45 split between those who divided correctly by 1.2 and those who multiplied by 0.8 to get an incorrect answer of £55.20. A number of those with correct methods gave a response of £57.5, suggesting a lack of understanding in how to respond with money.

12 Part (a) was the second question where QWC was tested and while some were able to give correct equality statements, only a very small number (less than 5%) scored full marks for a complete explanation. Most statements lacked acceptable justifications, particularly for AM = BC and angle BPC = angle ANM = 90°; it was rare to see a congruence case relating to their statements. In (b) the ratios 1 **:** 2 and 1 **:** 3 were often given, suggesting the relationship between the ratios for length and area were not clearly understood. The part mark could rarely be awarded due to many incorrect responses being given without working, although a small number gained B1 for using AB = 2AM to justify a length factor of 2. Part (c) scored reasonably well; some candidates gave the correct ratio and many others were awarded a follow through mark for a ratio of $a : a + b$ from $a : b$ in (b). Several answers of 1 **:** 4 here followed on from responses of 1 **:** 2 in part (b), potentially through considering area and squaring their first answer.

13 In many cases the idea of proportion was clearly understood and candidates found a correct value for *k* and consequently a correct answer of 48. A common error was to work with $y \propto h$, resulting in an answer of 24, while some used $y \propto \sqrt{h}$ to get 16.97. In (b) those who obtained 48 in the first part usually gave a correct response of 5 here. Many correctly followed through from their (a) to get 12.5 or 78.125.

14 This was one of the more functional questions and produced great variety in both content and presentation, differentiating candidates well. Many candidates worked with 149° or 5°, usually with no use of appropriate trigonometry and were only awarded 1 mark. Success was normally achieved by using a direct route and applying the sine rule before using the appropriate triangle to find PG. Others were able to apply the sine rule by finding AP and then applying it again to find BP before finding PG. Some treated ABP as a right-angled triangle and wrongly applied Pythagoras' theorem or misapplied trigonometry linking together angle BAP and the length AB. Candidates often managed to score the first and/or the last marks for finding the angles of ABP or APB or for using their incorrect lengths to find PG.

15 This was another question of a functional nature where process and presentation were key elements. Higher performing candidates scored full marks using a correct, methodical process with accurate calculations. Others reached various stages, but made errors in method and/or calculations. A large majority correctly gave the volume of the cube. Many found the area of the base of the pyramid, but the multiplication by $\frac{1}{3}$ when working out the volume was often missed, giving the pyramid volume as 0.5 x 4.5^3 and so 364.5 was a regular incorrect answer (4.5^3 = 91.125 was frequently in use without applying any division). It was also common to award M1 for a 'correct' base area (evidence of 0.5 x 4.5 x 4.5) plus M2 for 9^3 - their 8 pyramids. A small number failed to appreciate that there were eight pyramids and subtracted either six or four. It was extremely rare to find a candidate who offered no response at all.

16 The number of candidates achieving full marks with a complete, correct method was relatively small and these usually either equated the expressions in x to eliminate y or they successfully used trial and improvement. As the solution had equal roots ($x = 2$) the latter method was reasonably straightforward. Many candidates dealt with the problem as they would deal with a pair of linear simultaneous equations and multiplied in an attempt to eliminate one of the unknown terms. Few reached the point where they had a correct quadratic equation to solve, but those who obtained $x^2 - 4x + 4$ [= 0] usually went on to get a correct result and in many cases the formula seemed to be the preferred method for this. A large number produced a page of work attempting to manipulate the given equations without reaching a point where either x or y were eliminated.

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