CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/12
Paper 12 (Core)

Key messages

To succeed with this paper, candidates need to have completed the full Core syllabus, be able to apply formulae, show clearly all necessary working and check their answers for sense and accuracy. Candidates should be reminded of the need to read questions carefully, focussing on key words or instructions.

General comments

Workings are vital in multi-step problems, such as **Questions 14**, **15**, **18**, and **19(b)** as showing workings enables candidates to access method marks. Candidates must make sure that they do not make arithmetic errors especially in questions that are only worth one mark when any good work will not get credit if the answer is wrong, for example, **Questions 9**, **12** and **19(a)**.

The questions that presented least difficulty were **Questions 3**, **7**, **8**, **11**, **12**, and **19(a)**. Those that proved to be the most challenging were **Question 1** write a number in figures, **Question 19(b)** use of experimental probability, **Question 22** equation of a line and **Question 24** graph of a transformation. In general, nearly all candidates engaged with the majority of questions as there were very few questions left blank. The exceptions that were occasionally left blank were **Questions 19(b)** and **Question 24**, questions that have already been mentioned as challenging.

Comments on specific questions

Question 1

Some candidates did not give the right number of zeros. Very occasionally, the digit, 2, was missed out altogether.

Question 2

Candidates did well here giving the correct answer and did not need any workings.

Question 3

(a) Candidates were able to read the table to find the average temperature for July.

(b) Similarly here, candidates were able to use the table to find the highest average rainfall.

Question 4

Most were correct with their choice of names. There were a very small number gave an incorrect word, for example, septagon.

Question 5

Here, many correct answers were seen. Incorrect answers included 4516.65 or 45.2 which is the correct value to just one decimal place. Another incorrect answer, 45.20 was not a correct rounding.

Question 6

(a) Very occasionally the wrong event was chosen.

(b) Here, there were a few candidates who drew a horizontal line or arrow to show the region where the probability of event E could be rather than drawing a single vertical arrow like those already on the diagram.

Question 7

This question was handled well by candidates.

Question 8

This question on mapping diagrams was one of the most straightforward of its kind as the function is simple to determine, $f(x) = 2x$. Even if candidates did not find the function, the patterns in the in the domain and the range were simple to discern with 9 being the missing value.

Question 9

The great majority of candidates gave the correct answer. A few showed the correct working and then made arithmetic errors. As this question is only worth one mark, this correct working could not be given any credit.

Question 10

It is perfectly acceptable for candidates to re-write the statement in the blank space to try different positions for the set of brackets and then show then in the statement. This is far preferable then to have crossings out over the statement. Sometimes candidates used two sets of brackets with one being correct and one incorrect. This did not get any marks. In questions like this, candidates must follow the instructions and only use one set of brackets.

Question 11

Virtually all candidates showed clear working and gave the correct answer.

Question 12

This question has already been mentioned as one of the questions that candidates found the most accessible.

Question 13

(a) This was a twist on the usual bookwork question of finding the next two terms in a sequence as this asked for the next and the first term so it was not just a repetition of the same method.

(b) Here, there were many clear explanations either describing adding on 7 twice to get 37 and 44 or using the formula for the *n*th term, for example, $44 = 7n - 12$, $n = 58 / 7$ and stating that is not an integer. This second method is more complex than the first but either got the mark. Some candidates stated only that 42 did not fit the *n*th term formula without going further– this was not sufficient to show why 42 was not in the sequence. In **part (a)**, if candidates gave a value for *y* that was not a multiple of 7, then they still got the mark for a correct explanation that followed through from their value.

Question 14

This type of question has various methods that can be applied. With this question, candidates could find the cost of one pen then multiply that by 18, or they could find the cost of 6 pens and add it to the cost of the 12 pens, or they could just multiply the cost of 12 pens by 1.5 to get the cost of 18. Occasionally, a candidate's working was so scattered in the answer space that they would not be able to easily check for errors.

Question 15

This was another question where the multi-step method had to be determined. As the answer was asked for speed in km/h candidates needed to change the time in minutes into hours and recall the formula for speed. The simplest method is to convert 90 minutes into hours (1.5) and then divide the distance by this. Those who did this as two separate steps were the most successful. Those who went straight to the calculation of distance over time often had difficulties with the time conversion. The correct method of distance over time gained a method mark even if the next stage was incorrect.

Question 16

(a) This was done well by most candidates. Sometimes a candidate gave Mia's total score or used the key incorrectly giving 75, her score for each of the other two subjects.

(b) There were some very accurate compounds bars drawn here with correct use of the key. The use of the key was simplified by the fact that Suzi scored the same mark in each test.

(c) All the candidates that answered the question gave the correct student's name.

Question 17

Many candidates gained both marks for factorising out both factors and leaving the bracket as $(2y – 5)$. A few gained a single mark for correctly factoring one of the two factors giving either $7(2y^2 – 5y)$ or $y(14y – 35)$. Others factored out both factors but then made a division error, so what remained in the brackets was not correct. This did not get any marks.

Question 18

Sometimes candidates did not leave the answer in standard form as asked for in the question. Some wrote the numbers out in full, worked out the multiplication and tried to turn their answer back into standard form. This method has many places where slips can be made and is not recommended. Candidates are less likely to make errors if they leave the numbers in standard form, carry out the multiplication and ensure their final answer is in standard form. Candidates must remember that the powers of 10 need to be added not multiplied.

Question 19

(a) As mentioned at the start, candidates did very well here using the table to give an estimate for the probability of landing on green.

(b) In this part it was seen that candidates often misunderstood the use of experimental data to estimate frequencies as the answers were often the probability of getting a red. Quite a few found the number of times, 405 and then divided by 2000 to turn this into a probability. A few made arithmetic errors but were still able to gain the method mark.

Question 20

With this question, candidates had to recall that a quadrilateral has a total internal angle of 360° not 180° as used by some, set up the equation correctly then solve it to find the value of x.

Question 21

Sometimes $x = 7$ was seen as the answer instead of $x < 7$. Some manipulated the numbers incorrectly giving $20 + 6 > 2x$ instead of $20 – 6 > 2x$.

Question 22

This was the second most demanding question on the paper. Candidates either did not attempt to rearrange the equation as shown by answers of –6 or had difficulty rearranging the equation giving –3 as their answer. The equation of a straight line is a section of the syllabus where candidates are not always confident.

Question 23

To solve simultaneous equations, candidates must look at the given equations to see which method is the simplest with the smallest number of places that they could make arithmetic errors. Here, if the equations are added then that eliminates *b* and gives the value of *a* immediately. They can then simply substitute back to find *b*. The marks often indicate the complexity or otherwise of a question. This is only two marks so the equations can be solved without many lines of method. If candidates choose to use a long method that is acceptable but the final answers must be correct as the marks are for the actual values and not method.

Question 24

This is another area of the syllabus where many candidates are not very confident. Many knew it was a translation along the *x*-axis but went to the right which an f(x – a) translation instead of to the left. Some drew a vertical transformation, f(x) + a. Most knew, that as this is made of ruled line segments, their translation must also be ruled.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/22
Paper 22 (Extended)

Key messages

Candidates need to show all of their working. Incorrect answers without working cannot be given credit, whereas partial credit can be awarded if a correct method is shown.

Candidates should ensure that when factorising an expression, and one term to be factorised is x on its own, then this will become a 1 when written in a factorised form.

On a non-calculator paper, candidates are recommended to use exact fractions rather than conversions to inaccurate decimals.

General comments

Candidates were well prepared for the paper and demonstrated very good algebraic skills.

Some candidates lost marks through careless numerical slips, particularly with negative numbers and simple arithmetic operations.

Candidates should make all of their working clear and not merely write a collection of numbers scattered over the page.

Some candidates lost marks through incorrect simplification of a correct answer.

Comments on specific questions

Question 1

(a) This was well answered by nearly all of the candidates. The main error occurred with omissions, which could have been spotted by counting the number of numbers in their final table.

(b) This part was well answered. Occasionally an answer of 3 was seen, indicating that the candidates had omitted the stem.

Question 2

This question was correctly answered by virtually all of the candidates. A few candidates gave the answer as $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$.

Question 3

This question was correctly answered by virtually all of the candidates. The only error seen was an answer of 6.

Question 4

Many candidates correctly gave the two correct values for x. The common error was only giving 5 as their answer.

Question 5

(a) Nearly all candidates scored full marks for this part. A few candidates found the gradient of *AB* rather than the mid-point.

(b) The majority of candidates scored full marks. The common error was the manipulation of negative signs when finding 5 – (–3) or (–4) – (–2).

Question 6

This question was testing the candidates' ability to manipulate powers.

The majority of candidates scored full marks but a significant number did not realise that they had to write 4 as a power of 2 before simplification.

Question 7

This question was correctly answered by virtually all of the candidates, demonstrating an excellent understanding of probabilities.

Question 8

The majority of candidates scored full marks. There were some slips in the simplification of correctly expanded brackets.

Question 9

All parts of this question were well answered.

Question 10

Although most candidates scored full marks, this question did discriminate between candidates.

A significant number of candidates found the average of $6\frac{1}{2}$ and $6\frac{1}{3}$. A few candidates worked out the totals as 26 and 19 but then gave their answer as –7.

Question 11

Nearly all candidates gave the correct answer for the next term of –13. Although there were many correct answers for the nth term, those candidates who could not get the correct answer but realised that it must be a quadratic function scored one of the two marks available. Some candidates earned the method mark by showing a second row of differences as 4.

Question 12

This question proved to be a good discriminator. Candidates were able to eliminate fractions correctly to give $3xy = a - x$ and then the rearrangement to $3xy + x = a$. However, the factorisation of the left-hand side proved to be very demanding.

Candidates who factorised correctly normally scored the final mark.

Question 13

Many candidates scored full marks. Candidates understood the method to rationalise the fraction. The only slips occurred in the simplification or cancelling by a factor of 2.

Question 14

There were some very good attempts at a common denominator but errors were seen in dealing with the subtraction of terms in the numerator.

Some candidates found the correct answer but then spoilt their work by incorrectly cancelling their algebraic fraction.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/32
Paper 32 (Core)

Key messages

Candidates need to know how to use their graphic display calculators to carry out those requirements listed in the syllabus. They should be encouraged to show all their working out. Many marks were lost because working out was not written down. Marks were also lost when the candidates did not write their answers to the correct degree of accuracy as stated on the front of the question paper.

General comments

Most candidates attempted all the questions and so appeared to have sufficient time to complete the paper.

Candidates should be careful when writing their answers. If no specific accuracy is asked for in the question, then all answers should be given exactly or to 3 significant figures. Giving answers to fewer significant figures will result in a loss of marks and, if no working out is seen, then no marks will be awarded. When working out is shown and is correct then partial marks can be awarded.

Candidates should bring the correct equipment to the examination. Many appeared not to have a ruler with them to draw a straight line.

Comments on specific questions

Question 1

(a) (i) Nearly all candidates could pick out an even number.

(ii) All the candidates found the factor of 50.

(iii) All the candidates found a multiple of 7.

(iv) Only a small minority of candidates knew what a triangle number was. Some candidates omitted this part of the question and others wrote answers such as 39, 27, 41 or 49.

(v) Nearly all candidates could find the cube number.

(vi) Some candidates could not recall the definition of a prime number. The common incorrect answers were 21, 38 and 39.

(b) About half of the candidates found the correct answer to 4 significant figures. Other candidates wrote an incorrect answer without any working out – in some cases the answer was almost correct but, since no working out was seen, then no marks could be awarded. A minority wrote their answer to 4 decimal places instead of 4 significant figures.

(c) Most candidates found the correct answer to 5 decimal places. A few did not show any working out with an incorrect answer or did not give their answer to 5 decimal places.

Question 2

(a) A minority of candidates counted only one cup of tea for Alexa. However, the majority found the correct answer.

(b) (i) More than half of the candidates had the correct answer. A few gained a method mark, but others either had no method shown or used an incorrect method.

(ii) Most of the candidates either had the correct answer or gained a follow-through mark for this part.

Question 3

(a) Nearly all of the candidates knew the size of the interior angle of a rectangle. Other answers given were 43, 63 and 180.

(b) A few candidates did not use trigonometry to show the value of the angle. The other candidates were awarded the method mark. Not all of these showed a correct answer to 3 or 4 significant figures first and so did not get the answer mark.

(c) (i) Nearly all of the candidates found the correct size of the angle.

(ii) The majority of candidates found the correct size of the angle. Incorrect answers included 53 and 100.

(iii) Here too, nearly all of the candidates were awarded the mark.

Question 4

(a) The vast majority of candidates could write down the mode.

(b) Most candidates managed to find how many more times a 2 was thrown than a 1. A common error was to divide 7 by 4 instead of subtracting it.

(c) Only a few candidates found the mean correctly. Many added 1 + 2 + …+ 6 and divided the total by 6. Others added the frequencies and divided by 6.

(d) Only a few candidates found the correct sector angle. A common error was multiplying $\frac{360}{40}$ by 3 instead of 5. A minority of candidates omitted this part of the question.

Question 5

(a) All the candidates were able to plot the points correctly.

(b) The majority of candidates knew that the shape was a trapezium. Others just repeated the word quadrilateral.

(c) Most candidates wrote down the correct coordinates for the mid-point.

(d) Most of the candidates managed to find the correct gradient. Common incorrect answers were $\frac{1}{2}$ and another $\frac{4}{3}$.

(e) Most candidates used Pythagoras' Theorem correctly. A minority of candidates had incorrect answers without working and so could not access the method mark.

(f) Only half of the candidates found the correct perimeter or gained follow-through marks for using their answer to the previous part correctly. A few gained one mark for adding two correct lengths. The remainder gained no marks.

Question 6

(a) (i) The majority of candidates found the correct volume of the sphere.

(ii) The majority of candidates found the correct surface area.

(b) (i) Most candidates found the correct profit although a minority subtracted incorrectly.

(ii) Most candidates found the correct sale price. A few just found the reduction or used the answer for the previous part instead of $25.

Question 7

(a) (i) Nearly all of the candidates found the correct value for x.

(ii) Again, most candidates worked out this part correctly.

(b) About half of the candidates represented the inequality correctly. Incorrect responses were drawing the circle at -2 instead of 2, putting an empty circle at 2 or drawing the arrow going in the wrong direction.

(c) The majority of candidates had the correct simplification.

(d) Nearly all of the candidates found the correct answer. Incorrect answers included 16 or 4.

(e) (i) Just over half of the candidates managed to add the fractions correctly. Other answers included $\frac{5m}{14}$, $\frac{4m}{9}$, $\frac{3m^2}{14}$ and $1\frac{9m}{14}$.

(ii) There were only a few correct answers for this part. Some candidates did not cancel fully but gained one mark for partial cancellation. Others cross multiplied or tried to find a common denominator.

Question 8

(a) All candidates plotted the points correctly.

(b) Most candidates knew the type of correlation. Answers of continuous, negative and none were also seen.

(c) (i) The majority found the correct mean age. Incorrect answers included 80, 45 and 39.5.

(ii) Most candidates found the correct mean score.

(d) Candidates appeared to be unclear on how to draw a line of best fit. About half of the candidates scored one mark for either the line passing through the mean point or being within the tolerance. The rest drew lines that were neither through the mean point nor within tolerance.

(e) Candidates were able to score a follow-through mark for reading correctly from their line and the majority did so.

Question 9

(a) (i) Only a few candidates had all three parts correct. A minority of candidates were unable to get any part correct, showing a lack of knowledge of set notation.

(ii) The majority of candidates completed the Venn diagram correctly. Common errors were to place the 1 in the wrong section or to miss out one number.

(b) About half the candidates had the correct shading. Others were clearly not confident about set notation, shading the intersection or the union.

Question 10

(a) Nearly all candidates found the correct volume but a few had incorrect units.

(b) Although many candidates found the correct surface area some found only the curved surface area and others used an incorrect formula.

(c) Only a small minority of candidates found the correct arc length. The others either used their answer from the previous part or used the area of the top rather than the circumference.

Question 11

(a) Most candidates described the transformation fully. A few candidates only had a partial description and there were instances of candidates having more than one transformation.

(b) Many candidates gave a full description. Common errors were to give the wrong centre or to give more than one transformation. A few candidates could recognise that it was a rotation but could not give any further information.

(c) Many candidates gained full marks. Other candidates gained one mark for either translation or for the vector.

(d) Only a minority of candidates could draw the correct enlargement, with some drawing it in the wrong position. A number of candidates did not attempt this part.

Question 12

(a) All candidates drew the correct sketch.

(b) Only a small minority of candidates had the correct equation. Incorrect answers included $x = 0$, $x = 1$, $x = y$, $y = 1$, $x = 0.5^y$ and negative.

(c) Nearly all candidates drew the correct parabola. The common error was to draw the graph of $y = x^2 + 4$.

(d) More than half of the candidates found the correct zeros. A minority of candidates did not attempt this part.

(e) Only a few candidates found the correct *x*-coordinates. Other candidates did not find the correct points or gave their answers to an insufficient degree of accuracy.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/42
Paper 42 (Extended)

Key messages

Candidates need to remember to include sufficient working in order to gain method marks if their final answer is incorrect.

The general instruction is that answers should be given correct to three significant figures unless the answer is exact or the question states otherwise. A few candidates lost marks through giving answers too inaccurately. When the question says show an answer is a value correct to, for example, 3 significant figures, it is necessary to find the value to at least 4 significant figures first.

Candidates need to be able to use their graphics display calculator for statistical questions and/or for solving equations by drawing a sketch.

General comments

The paper proved accessible to all the candidates with few very low marks seen. There were very few instances of candidates omitting question. There was much very impressive work from a large number of candidates. Time did not appear to be a problem for candidates as almost all finished the paper.

Whilst most candidates displayed knowledge of the use of a graphics display calculator, some still are plotting points when a sketch graph is required.

Most candidates showed all their working and set it out clearly. Answers without working were very rare but some candidates work on a few questions was a jumble of figures which made the award of part marks difficult.

Comments on specific questions

Question 1

(a) (i) This question was answered extremely well. A very small number of candidates rotated about the wrong point.

(ii) This too was answered very well. A small number of candidates reflected in the *x*-axis.

(iii) Almost all candidates gave a single transformation and it was usually correct. The most common error was to view the transformation as a rotation.

(b) This part was also extremely well done with all three requirements almost always correct. Just a few said the transformation was a stretch.

Question 2

(a) This was almost always correct with just a few candidates giving 260 000 or 261.

(b) This was usually correct with the most common error being to give a positive power of 10.

(c) This was almost always correct.

(d) Both parts were almost always correct.

(e) (i) This was almost always correct.

(ii) This part was slightly less well done. Some candidates omitted to find 40% of $695 and a few had difficulties dealing with the 1.2%. Almost all, however, were familiar with compound interest.

(f) Clearly this was the most demanding part of the question but there was much impressive work. Almost all candidates could set up the original equation and all but a few were able to solve it correctly.

Question 3

(a) Both parts of this question were done extremely well.

(b) This part was less well done with a significant number of candidates giving both coordinates instead of just the *y*-coordinate.

(c) Most candidates did this very well indeed. Just a few, having substituted to find *c*, made errors in solving.

(d) Some candidates were unable to find the gradient of the given line and therefore were unable to obtain the correct value for the perpendicular. These candidates were, however, able to use a correct pair of *x* and *y* values to reach a value of *c*.

(e) This was answered well with just a few candidates losing some accuracy in the drawing and occasionally giving a misplaced region.

Question 4

(a) (i) This part was almost always correct.

(ii) The mean was slightly less well done with a few candidates making numerical errors and some using the wrong formula. Almost all gave working, indicating that they were not using the statistics functions on their calculator.

(b) (i) Almost all gave the correct cumulative frequencies.

(ii) The curve was usually very well drawn with just a few plotting at the middle of the interval instead of the upper limit.

(iii) Both parts of this were very well done. Just a few candidates misread the scale.

Question 5

(a) This part was almost always correct.

(b) Almost all candidates knew how to find the length of an arc but a substantial number found the length of the minor arc.

(c) Although this was done well by the majority of candidates, a few used length of arc or perimeter of a sector instead of area of cross-section.

(d) (i) Most candidates wrote the original expression for area correctly. Some, however, were careless in their algebra in omitting brackets in their later work and a few multiplied brackets out incorrectly. Just a few solved the equation here instead of establishing it.

(ii) The factorisation was usually correct.

(iii) This too was usually correct, although a very small number used the quadratic formula rather than the factorisation method required. Candidates should remember that if they are told to use their answer to a previous part, not doing so will mean they cannot be awarded marks.

(iv) Almost all those who were successful in the previous two parts were able to obtain the correct height.

Question 6

(a) All three parts were done very well by most candidates. Some however, started with an incorrect variation equation and therefore made little progress.

(b) Very few started with the wrong variation equation in this part and the vast majority reached the correct answer.

Question 7

(a) Most candidates gave good sketches with just a few overlapping at the asymptotes. Just a few answered this part by plotting points rather than using their graphics display calculator.

(b) Those with good sketches usually produced the correct answers here. Just a few gave, for example, $y = 1$ or $x = 0$ rather than $y = 0$.

(c) This part was the least well done question on the paper. Many candidates attempted algebraic approaches rather than using their sketches. Even those who knew the general method, often omitted part of the solution or only gave their answers correct to two significant figures.

Question 8

(a) Most candidates were successful in this part.

(b) The vast majority of candidates successfully substituted into the cosine rule but many did not realise that it was necessary to show the answer to at least four significant figures in order to convincingly show the answer was 20.3 correct to three significant figures. A number, starting with the angle version of the cosine rule, made errors in transforming the formula.

(c) Whilst most candidates were able to work out angle *ABC* or angle *BAC*, many could not then go from that answer to a bearing. Most candidates used the sine rule but a number used the cosine rule.

(d) Whilst a number of candidates found the calculation of the time difference difficult, most were successful and also converted to decimals of an hour correctly.

Question 9

(a) (i) Most candidates were able to set up the right equation and solve it correctly. A number, however, omitted the +8 and some weaker candidates used for example, $3x – (x + 2)$ instead of $3x + (x + 2)$.

(ii) Most shaded the correct area although a few confused intersection and union.

(iii) Although many identified the ‘is an element of’ symbol, a significant number used the ‘subset’ symbol without putting set brackets round ‘Briony’.

(b) (i) This was almost always correct.

(ii) There was some impressive probability work displayed here with almost all candidates recognising the conditional probability. Of those who did make an error, the most common was the usual mistake of omitting the reverse pairs.

Question 10

(a) This part was only answered correctly by the better candidates. Some of the rest were able to show a cubed ratio but were then unable to subtract the required volumes. Many candidates made no progress at all or tried to work out volumes without squaring the scaling factor in the term for the radius. Most of those who were successful worked with the volume formula rather than working in ratios.

(b) Many candidates proved more successful here and showed detailed working which was well set out. However, there were still some candidates whose working was difficult to follow but who nevertheless still managed to make good progress. Of those who scored poorly, the most common error was to use the vertical height instead of the slant height for the curved surface area. There were also many candidates who worked out the total areas of the two cones which they then subtracted not realising that the curved surface areas should have been added.

Question 11

(a) The vast majority of candidates reached the correct answer.

(b) Again, this was almost always correct.

(c) This was usually very well done. Almost all knew to equate $3r + 1$ to r but a few made errors in solving.

(d) Most candidates reached the correct answer. Of those who did not find the correct answer, many did not set the expression equal to 20 and others did not expand the bracket correctly, often giving $3x^2$ instead of $9x^2$. Very few candidates used the efficient method of equating $3x + 1$ to ± 5.

(e) This was very well done by many candidates. Many who did not reach the correct answer gained some success from stating $x = 3^y$ or $\log y = 3\log x$.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/52
Paper 52 (Core)

Key messages

Candidates needed to look for patterns, not only to help them towards the right answers but also to check if their answers were correct. Candidates needed to read the information very carefully, some did not use the definition of consecutive numbers, and to make sure they were writing an answer to fit the question. For example, when asked to find the number of integers, a list was not sufficient.

General comments

Candidates were very good at completing the numerical answers within a table but needed more practice on the algebraic expressions to follow their numerical answers.

Comments on specific questions

Question 1

(a) (i) Candidates were able to calculate the values correctly.

(ii) Few candidates were able to answer this correctly. Some gave the number of integers whilst others listed all the integers between 3 and –3.

(b) (i) This question was answered correctly.

(ii) As in **part (a)**, although the candidates were able to calculate the missing values, most of them were unable to count the missing numbers.

(c)(i) Candidates managed to answer this question but often not with 7 and 8. One mark was awarded for those answers that satisfied the addition condition with non-consecutive numbers.

(ii) Most candidates were not able to calculate the correct number of numbers, even when they made a list.

Question 2

(a) Candidates needed to list the four expressions in terms of *a*, the first of the two consecutive numbers. Most candidates had difficulty in writing more than one correctly. The term *consecutive* was defined at the beginning of the investigation. Candidates are advised to read very carefully the information that is given with the task.

(b) It was necessary to achieve the correct number of 39 in two different ways. Most candidates were able to correctly substitute $a = 10$ into the expression and some found at least one of the pairs but were unable to use the pairs to find the number of integers.

Question 3

(a) (i) Most candidates completed all the spaces in this table correctly, showing a good understanding of the patterns.

(ii) As before candidates had difficulty finding the number of integers that could not be made. Most did not show any working out.

(b) Candidates were able to complete this table correctly.

Question 4

(a) This table was completed correctly with a few errors in the 2^n term. Candidates should always check their answers by looking for patterns.

(b) Again the most common error was in finding the *n*th term. Some candidates who could work out the expressions in terms of *a* correctly were not able to extend the pattern to a general term. Looking for patterns should be practised to help solving problems like these.

(c) (i) Several different errors occurred here. Some candidates followed the example too literally and used 2^3 instead of 2^2. Others had an incorrect highest total in terms of *a* even though the two consecutive numbers were given in the previous table; this led to an incorrect number of integers. Most candidates showed good working out despite making errors.

(ii) Some candidates used the method to find that the answer was 5 as stated in the question. This did not help them to explain why this was the wrong answer. Some did show a table of correct calculations which would have gained them at least one communication mark even though they could not explain a correct reason.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/62
Paper 62 (Extended)

Key messages

Premature rounding can spoil an otherwise correct method.

When the calculator is used for numerical answers candidates should always write down what they typed into the calculator.

General comments

Overall the candidates showed strong algebraic skills and there were many very good responses.

This March, the standard of response to the modelling task was higher than that in the investigation.

Candidates showed good communication and most marks for this were gained. There was, however, a reluctance to show working for numbers in tables.

Candidates are as usual advised to read questions carefully as there were cases where more attention to the instructions would have avoided errors.

Comments on specific questions

Section A Investigation: Enclosed Cuboids

Question 1

(a) Nearly all candidates could correctly find the number of white cubes.

(b) (i) Only very few did not realise that another layer added 2 edge lengths to the edges of the previous cube.

(ii) Most candidates wrote the correct answer, but some would have improved their mark if they had shown how 124 was found. The most efficient method of calculating 124 was by $5^3 - 1$. Several candidates found some quite complex counting processes, which were less successful.

(c) The relationship between the total number of cubes and the number of white cubes was described correctly by most candidates. A few thought that the relationship was direct proportion. Some did not write a sentence connecting white cubes and the total number of cubes.

(d) Candidates were very successful in completing the sequences in the table. While most correctly calculated 342 there often no evidence seen as to how this number was found. Candidates are strongly advised, especially in this paper, to show what they type into the calculator. The question left a large space under the table before the marks [4] were indicated. This is a strong hint to candidates that working is expected.

Communication was also possible by indicating that the first sequence increased by differences of 2. The few who assumed that the sequence was arithmetic without showing the differences could not gain this mark.

A few candidates gave $2n - 1$ for the first sequence by not accounting for the fact that the first term had n equal to 0.

The heading n in the table implies that the expressions in that column should be written in terms of n. As this was not stated explicitly in the question some allowance throughout the investigation was given to those who wrote these answers in terms of L.

In this, and in similar subsequent questions, a significant number of candidates used a difference method to find the cubic expression in the second sequence. Those candidates were not as successful since the room for algebraic error is large.

Question 2

(a) Insufficient explanation was a frequent source of error in this question. For some candidates, the explanation of why $4^3 - 2^3$ gave the correct answer needed more detail and precision. In particular, stating why the numbers 4 and 2 appeared, and why the numbers were cubed, was important. For example, writing that the volume of the cube is 4^3 is more meaningful and precise than just writing that the cube is 4^3.

(b) Similar comments to those under **Question 1(d)** apply here with hardly any candidates explaining how they calculated 208 and 504. Again, there was plenty of space under the table hinting that working was expected. Some candidates were still able to find 208 and 504 without having expressed the formula correctly. Several candidates wrote $2n$ for the sequence 2, 4, 6, 8 not noticing that the first term occurred when n was 0.

Question 3

(a) This table continued the form of **Question 1(d)** and **Question 2(b)**. Again, many candidates were successful.

(b) The pattern of the expressions in the previous questions was summarised in this table. Candidates, who had correctly written the expressions as differences of cubes in the previous tables, had little difficulty continuing the sequence of expressions.

Question 4

(a) There were very many ways seen for calculating the number of cubes but it was not always clear from where the calculations came. For complex methods, clarity could have been improved had candidates used sketches and labels to support their calculations. The most efficient method, which the large majority of candidates used, was to subtract the volume of the inner cuboid from the volume of the outer cuboid. Communication of this method was usually clear and complete. There were a few candidates who, without success, calculated individual cubes with inner cubes missing.

(b) A large number of candidates, who had used the efficient method in **part (a),** were successful here. Those candidates who tried to add up the surrounding layers quickly got into exceptionally difficult algebra.

Question 5

This last question in the investigation required consideration of a face of a cuboid. There were many candidates who had not noticed the word face (written in bold) in the text and instead used ideas of volume. The expressions for volume do not lead to anything useful.

A few candidates thought that the face had a hole in the middle, analogous to the cuboid having an empty space inside.

Many correct equations were seen that were equivalent to $(2k + 16)(k + 16) = 546$. Candidates could have then saved some effort by efficient use of the graphing facility on the calculator: Sketching the graph of each side of this equation and finding the intersection point gives the answer directly.

Nearly all successful candidates chose to expand the brackets, rearrange and solve the resulting quadratic equation, either by factorisation or by using the formula. Some candidates would have gained more marks by showing how they solved the quadratic equation.

Section B Modelling: Enclosures for cats

Question 6

(a) (i) Nearly all candidates correctly substituted $\frac{d}{2}$ for r in the formula for the volume of the cone.

(ii) Use of half of the formula for the volume of a sphere was required as well as correct substitution of $\frac{d}{2}$ for r. Most candidates managed this successfully and simplified the answer as required.

(b) The large majority of candidates could equate the two expressions in **part (a)** and reduce the equation to give $h = d$. Some candidates could have simplified their expression for h in terms of d further.

(c) (i) Similarly to **part (a)**, nearly all candidates correctly substituted $\frac{d}{2}$ for h in the formula in **part (a)(i)**.

Seeing this substitution was necessary for the communication mark and most candidates showed this clearly.

(ii) To reach the answer candidates had to compare $\frac{\pi d^3}{24}$ with $\frac{\pi d^3}{12}$. Many compared the denominators and commented upon the effect of dividing by 12 and by 24. Several candidates chose a numerical value of d, and so only considered a specific cone and hemisphere. The question expected a general result.

Question 7

(a) Candidates were very good at giving the complete reasoning in this question to find the minimum floor area from a given list of information.

(b) Many candidates would have benefited from a more careful reading of the question, which asks about the base area and not the volume for a cone. The question required the rearrangement of the formula for the area of a circle in order to find the radius. The majority of candidates were successful at this. Sometimes the answer was spoiled by rounding the radius prematurely to 1.65 so that the final answer was about 1 cm out. Although 1.65 m is accurate to 3 significant figures the length of the diameter is 3.31 m.

Some candidates understood the minimum floor area to be that in the box on page 10 for one cat and did not consider the minimum area for the two cats. An allowance was made for that misunderstanding.

(c) The large majority of candidates were successful here, recognising that a height of 1.65 m was not sufficient. Some candidates mentioned the lack of height but did not offer the correct numerical value to confirm this. This measurement was required because there had been no calculation of height previously.

Question 8

(a) Most candidates were successful in putting the expression for the volume of the cone equal to 10 and rearranging the equation to give h in terms of d.

(b) There were many good graphs seen in this question. Some candidates could have looked more carefully at their graphics calculator display to see that the graph gets very close to the horizontal axis but is much further away from the vertical axis on the given axes.

(c) Many different and valid approaches were seen. A particularly efficient way to find the answer was to substitute $h = 2$ and $V = 10$ into the formula for the volume of a cone, after which it immediately follows that the area of the circular base is $15\,m^2$. In a similar manner, some candidates preferred to manipulate the algebra while the large majority opted to find a numerical value for the diameter or the radius. Premature rounding could result in an answer that was a significant $1000\,cm^2$ out.

Question 9

(a) A very large number of candidates did not extract the information from the correct place on page 10, taking their diameter instead from **Question 7(b)** which concerned minimum area and not minimum diameter. In this question candidates were required to realise that if the information box gave a minimum height of 2 m then a diameter of 4 m was necessary for the half-cylinder.

(b) In this *Show that…* question the good candidates showed clearly why $\frac{\pi d^2 w}{8}$ was correct by substituting $\frac{d}{2}$ into the expression for the volume of a half-cylinder and then writing $\left(\frac{d}{2}\right)^2$ equal to $\frac{d^2}{4}$. Other candidates wrote a first statement that was too close to the given answer. *Show that*... questions require all the details for the method used.

(c) (i) Only a few candidates had difficulty in rearranging the equation $\frac{\pi d^2 w}{8} = 10$ to make the subject *w*. In doing so nearly all showed the required multiplication by 8 and wrote $\pi d^2 w = 80$. It is important for candidates to understand that a *Show that…* question requires all the steps in any algebraic manipulation.

(ii) Nearly all candidates showed a satisfactory sketch of the graph and realised that the graph should not touch the horizontal axis.

(d) (i) Many candidates correctly wrote $w = \frac{8.6}{d}$ for the model. It was essential to write an equation to gain the mark for this question. Some showed the correct formula in their working but then did not write include '$w =$' on the answer line as required.

(ii) The majority of candidates who had the correct equation in **part (i)** were able to show a rectangular hyperbola intersecting the graph that had been sketched earlier. Some candidates labelled the graphs, which was especially helpful as the two graphs were quite similar.

(e) Most candidates found *d* from the intersection of the graphs in **part (d)(ii)**. Those who stated that $d = 2.96$ could have gained a further mark by showing where they found the 2.96, by marking this clearly on the graph. Several candidates took the length 2.90 as the height, instead of halving the diameter. There were many who preferred the algebraic approach, equating their answers to **part (c)(i)** and **(d)(i)**.

Question 10

This question drew together the different ideas from **Question 8** and **Question 9** by asking candidates to make a choice between the cone and the half-cylinder. Common statements said the cone should be chosen because, for an area of $8.6\,m^2$, its height was more than the required minimum of 2 metres, while the half-cylinder's height was less. Some candidates implied that the half-cylinder had a greater volume though the question stated that the volumes were each $10\,m^3$.