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, clearly show all necessary working and check their answers for suitability. As calculators are not permitted, it is vital that candidates carry out their calculations accurately. Candidates should be reminded of the need to read questions carefully, focusing on key words or instructions.

General comment

Workings are vital in 2-step problems, such as **Questions 11**, **15**, **22**, and **24**, as showing workings enables candidates to access method marks if the final answer is incorrect. Candidates must make sure that they do not make arithmetic errors especially in questions that are only worth one mark when any good method will not get credit if the answer is wrong, for example **Questions 5**, **7**, and **12**. Candidates should note the form their answer should take, for example, **Questions 4** and **17** as a fraction in its simplest form and **Question 23** in standard form.

The questions that presented least difficulty were **Questions 3**, **4**, **6** and **14**. Those that proved to be challenging were **Question 1(b)** congruent polygons, **Question 11** surface area of a cuboid, **Question 16** external angle of a polygon, **Question 20** highest common factor, **Question 21** probability and **Question 22** convert m/s to km/h.

In general, it could be seen that candidates attempted virtually all questions as there were very few left blank. The exceptions that were occasionally left blank were **Question 17** relative frequency and **Question 21** which has been mentioned before as challenging.

Comments on specific questions

Question 1

(a) Candidates did very well with this opening question. There were a small number of other polygon names seen, in particular hexagon and heptagon.

(b) The most common wrong answer was *A* and *F* which are similar polygons not congruent ones as they are different sizes. This was one of the more challenging questions because candidates mixed up the meaning of similar with congruent.

Question 2

Many candidates wrote down the correct method. When calculating how much Mia pays, many said that \$7.50 was the cost of $\frac{1}{2}$ kg of salmon when they should have written \$7.05. Sometimes candidates gave the correct answer after writing down this wrong value which shows that they understood what they were calculating, just the writing of the interim amount was incorrect.

Question 3

The very few wrong answers were due to making arithmetic errors after showing 84 ÷ 4 or for using 4^2 instead of 4. The first gained the method mark but not the second as that was an error in method. This was the question that candidates found the easiest to answer.

Question 4

Again, this was a question that was handled well by a large majority of candidates. A few did not cancel correctly or turned the fraction into a decimal. This question was only worth 1 mark so if any errors were made, no marks were awarded.

Question 5

Some candidates treated the times as if they were integers, giving the answer 280. Other candidates' working showed that they had calculated that there were three hours between 9 and 11am instead of only two. Some made errors with whether they were adding or subtracting the 10 and 30 minutes from the number of hours; the method could be, for example, 10 + 120 + 30 or 10 + 180 – 30 or 180 – 20.

Question 6

This was in effect a multiple-choice question with only 2 choices as –5 is not equal to 2.

Question 7

The most common error here was for candidates to find half the perimeter or to make arithmetic slips. A few worked out the area of the rectangle.

Question 8

Wrong answers seen included 1, infinite or circle.

Question 9

This functions question was well answered. Wrong answers included $\frac{1}{4}$ or 8. For the 8, candidates may have seen that 32 is halved to give 16 so carried on that pattern without reference to the rest of the information. With the $\frac{1}{4}$, candidates were confused about which way the division was to be done.

Question 10

The most sensible unit to measure lengths in a classroom is metres and area is given by the power of 2 so the answer is m^2. Some chose a volume unit or cm^2.

Question 11

There were good, clear methods and answers here. Although the area of two faces has the same numerical value as the volume, it was clear that some meant 60 to be the volume as there was no attempt at the calculation of another side. This did not get any marks. A mark was available to those that showed the method for calculating the area of at least two different sides. Candidates who gave the full method but made an arithmetic slip were awarded 2 out of the 3 marks.

Question 12

Here, errors included ignoring or dropping negative signs for example, saying 31 or – 3 – 28 = 25. Some did not use the correct order of operations, giving their working as –7 × 7 = –49.

Question 13

The three elements here were 4, 9 and 16. Sometimes candidates included 1 or left their answers as 2^2, 3^2 and 4^2. As the question asks for elements, the squares must be worked out as integers.

Question 14

The two triangles are similar so there is a scale factor for equivalent side lengths, but the equivalent angles are the same.

(a) The scale factor is 5 so sides in *DEF* are 5 times the size of those in *ABC*. Some candidates worked out all three sides then picked out the wrong side.

(b) Most gave the correct answer of 90°. No marks were given for the answer of right angle as the size of the angle was asked for. If this was incorrect, the wrong values were mostly 60° or 120°.

Question 15

Some candidates thought that the total number of sweets was 28 not that this is the number that Rosie had. This gave a calculation of 28 ÷ 12 for the value of one share which is impossible in the context as this does not give a whole number. A few found that Aisha got 20 sweets which is correct but not the answer that was required. If they then added the two amounts, then this was the correct final answer. With ratio questions, it is important for candidates to check whether it is one person's share or the total amount that is asked for.

Question 16

This question was made harder than some as no diagram was given to aid candidates. As a first step, drawing a diagram is vital in order to visualise the situation. Some remembered the direct formula correctly. There were some who tried the more complicated method of finding an internal angle then subtract that from 180°. Here, this formula was sometimes remembered incorrectly so no marks were awarded.

Question 17

Many were able to form a fraction using the correct data. Not all candidates went on to cancel down fully to a fraction in its simplest form – in this situation, these candidates were awarded a mark. The phrase, relative frequency, may have been unfamiliar to some candidates as this was one of the two questions that was left blank most often.

Question 18

This was done correctly by many candidates. Occasionally, candidates put a factor of 2*a* outside the bracket. This left a decimal (2.5) in the bracket – this was not correct. The factors and terms inside brackets must have integer coefficients.

Question 19

This was another problem-solving question. The first stage is to realise that if 5 numbers have a mean of 8 then the total of the numbers is 40. Then the given numbers can be subtracted. This problem can be done by choosing a number then working out the mean of the numbers, but this trial and improvement method will not get any marks unless the candidate gives 12 as their answer.

Question 20

Candidates found this challenging. Candidates incorrectly gave other factors for example, 2 or 7 instead of the highest, 14 or even more than one factor which is not correct as the question asked for the highest common factor which is, by definition, only one value. As with **Question 1(b)**, candidates might have muddled definitions – here, highest common factor with lowest common multiple, as 84, the LCM, was often seen as an answer. Some used a grid to find the factors of each number, then proceeded to add 2, 7, 2 and 3 which totals 14 but this did not get the mark as the answer is clearly from wrong working.

Question 21

This was a challenging question and one the candidates sometimes left blank. Here, the question was made slightly more complex by not giving a probability tree or a probability space for candidates to work with. Not all the relevant probabilities were given in the question, so the first step was to work out the probability that Ahmed wears socks that are not red. Many did not do this step so gained no marks. Whether or not the correct fractions were used, many went on to add them rather than use the correct method which is to multiply the probabilities when a combined probability is required. The question did not ask for the answer in a particular form so any equivalent answer was acceptable.

Question 22

Candidates found this speed conversion challenging as many inverted the conversion operations by multiplying by 1000 and dividing by 60^2. The mark most candidates were likely to receive was for changing 30 m in to 0.03 km. Some candidates changed the seconds into minutes instead of dividing by 60 again to get this into hours. In questions like these, candidates should look at their answers to check they make sense in context – 3000 km/h is far too fast a speed and 0.5 km/h is far too slow. Workings were often disjointed as candidates tried one method then another. This was a good example of where candidates should read the question very carefully to work out what needs to be done and what is the most efficient method that will limit the places where arithmetic errors could be made.

Question 23

In general, candidates gained at least one mark here. This was not a straightforward standard form calculation as one of the values had to be converted into standard form before multiplying. It is perfectly acceptable to convert the first number from standard form then multiply and finally change back to the correct form, but this method is far less efficient, takes longer and has more places where arithmetic errors can be made.

Question 24

This last question was not found to be particularly challenging considering its position in the paper. It was necessary to write down an equation then solve it to find the number of biscuits in the pack. Sometimes candidates gave the correct answer of 17 biscuits but omitted the equation so did not gain the first mark. With algebra questions it is often best to show all workings with a single step per line, so method marks can be awarded if there is an incorrect final answer.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/22
Paper 22 (Extended)

Key messages

Candidates should always leave their answers in their simplest form.

Whenever a question requires an answer to be given in standard form a fractional answer will not score full marks.

General comments

There was a significant improvement in the presentation of solutions, whereby working before the final answer was clear with sufficient detail shown.

There appeared to be confusion for some candidates regarding the difference between the complement of the union of two sets and the complement of the intersection of two sets.

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

Some candidates lost marks through careless numerical slips.

Comments on specific questions

Question 1

Nearly all candidates answered this question correctly showing a good understanding of prime and square numbers. Some candidates gave 87 as a prime number.

Question 2

Nearly all candidates answered this correctly.

Question 3

(a) The majority of candidates answered this part correctly. The common error was giving an answer of 4.08.

(b) This part proved to be more challenging with a significant number of candidates giving an answer of 0.3.

Question 4

There were no problems with understanding the question but errors in arithmetic occurred.

Question 5

Most candidates dealt confidently with the probability but there were some errors where candidates gave their answer as $\frac{1}{3}$.

Question 6

This question proved a good source of marks for nearly all of the candidates.

Question 7

The majority of students scored both marks. There were a significant number of candidates who correctly isolated the *x* term but were unable to give a completely correct final answer.

Question 8

This question tested the candidates understanding of numbers in standard form.

(a) The majority of candidates scored full marks for this part. The common error was not giving their final answer in standard form but leaving it as 16×10^{-2}.

(b) This part was found difficult by candidates, with very few fully correct answers. The most common answer was $\frac{1}{4} \times 10^8$. A number of candidates were able to convert the fraction to a decimal, but then left their answer as 0.25×10^8.

Question 9

Nearly all candidates scored the method mark for this question by equating the sum of the exterior angles to 360°. A small number of candidates tried working with interior angles but they were unable to make meaningful progress. There were some careless numerical slips when dividing 360 by 24. Candidates are recommended to cancel numbers first before trying long division.

Question 10

The majority of candidates scored at least the two method marks, by realising that they had to subtract the *x*-coordinates and the *y*-coordinates before using Pythagoras's theorem. Answers of $\sqrt{45}$ or $3\sqrt{5}$ both scored full marks.

Question 11

There were many perfect solutions to this question. It was pleasing to see candidates' work set out clearly and logically leading to correct answers.

Question 12

There were many correct answers for this question. A small number of candidates spoiled a perfect solution by re-factoring their answer and giving their final answer as the question.

Question 13

The final answer to the two parts was identical. It is important on all questions requiring candidates to identify a region in a Venn diagram that candidates make their final answer clear.

(a) This part proved to be challenging and there were very few correct answers.

(b) The majority of candidates scored this mark. Candidates were easily able to identify the intersection and then the complement was everything else in the diagram.

Question 14

This question tested candidates' algebraic skills. They were required to eliminate fractions, expand brackets and collect terms in *x* before re-arranging their equation. There were many perfect solutions which showed an excellent understanding of algebra. Candidates who did not score full marks were still able to score method marks after an algebraic slip.

Question 15

Many candidates scored full marks. Candidates who factorised the question immediately were more successful than the candidates who wrote $5x^2 - xy - 4y^2 = 5x^2 - 5xy + 4xy - 4y^2$ and then tried grouping terms.

Question 16

Candidates should try to show all working in a clear and organised way and, again, it was pleasing to see many fully correct solutions. Errors were seen when candidates forgot to halve the sphere and others who used the surface area formula rather than the volume formula. Some candidates who set up the initial equation correctly forgot to cancel out π and were then unable to take the cube root.

Question 17

There were very few fully correct solutions to this question. Some candidates were unable to identify that the probability of a prime number was $\frac{4}{6}$, which would have given the candidates one mark. Some candidates found the probability of rolling two prime numbers correctly but omitted the probability of rolling three prime numbers.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/32
Paper 32 (Core)

Key messages

Candidates should ensure that they have the correct equipment for the examination, including a graphic display calculator and ruler. Candidates should be encouraged to show all their working out. Many marks were lost because working out was not written down and the answer given to only one or two significant figures. If the answer to a question is exact, then the candidate should write that answer down fully unless otherwise asked for in the question. Teachers should ensure that the candidates are familiar with command words. The candidates should be aware that if the question states 'Write down' then they do not have to work anything out.

General comments

Most candidates attempted all the questions, so it appeared as if they had 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.

This session most candidates appeared to have a graphic display calculator and knew how to use it to draw graphs and find intersection points accurately.

Comments on specific questions

Question 1

(a) (i) All candidates could identify an even number.

(ii) Most candidates wrote down the square number correctly.

(iii) Here too, most candidates knew the cube number.

(iv) The majority found the correct multiple of 7.

(v) Not all candidates found the prime number. 123 was a common wrong answer.

(b) (i) Some candidates did not know how to find the cube root but a few of those gained a follow through mark for writing their answer correct to 3 decimal places. A few did find the correct cube root but then wrote their answer to 3 significant figures instead of 3 decimal places. Those who showed the full answer to more than 4 decimal places gained 1 mark but, those who just wrote an answer to 3 significant figures gained no marks.

(ii) Most of the candidates could find the correct answer but not all of them managed to round their answer to the nearest hundred.

Question 2

(a) The majority of the candidates wrote down the correct number of hamsters.

(b) (i) There were many errors made in finding the range. A common wrong answer was 4 (from 6 – 2) and 36 (from 42 – 6).

(ii) The median was not often correctly answered. The most common wrong answer was 5.

(iii) The mean was also poorly answered with only a few candidates using the correct method. Most candidates just added up the frequencies and divided by 7.

(c) Nearly all candidates had the correct bar chart.

Question 3

(a) This proved a rather difficult number for many candidates. Quite a few candidates used the word 'lakh' which is not acceptable as an answer.

(b) Most candidates found the average correctly.

(c) (i) The majority of the candidates wrote 60% but a few tried to work out the number of visitors that had to pay rather than the percentage – even though there was a percentage sign on the answer line.

(ii) Many candidates managed to gain one mark here for multiplying 31 100 by 15. Not so many candidates continued to find 60% of this answer and arrive at the correct answer.

Question 4

(a) (i) Nearly all the candidates managed to show that 2% of 600 is 12.

(ii) A good number of candidates managed to work out the amount correctly. Others wrongly multiplied 600 by 1.335 first and then subtracted the 12.

(b) Many candidates either had the correct answer or gained follow through marks.

(c) In changing the money back to pounds, many candidates either had the correct answer or a follow through mark.

Question 5

(a) The majority of the candidates wrote down the correct mode. The most common wrong answer was 5.

(b) Some candidates did not know how to work out how many parents had 1 child or 4 children.

(c) The probability also proved difficult for many candidates and there were only a few fully correct answers.

Question 6

(a) (i) Nearly all candidates managed to write down the correct two terms.

(ii) Finding an expression for the *n*th term was also very well answered.

(b) Here too, there were many fully correct answers.

Question 7

(a) (i) Only about half of the candidates knew this was a right angle.

(ii) The majority of candidates gave a correct answer for angle *OCB*.

(iii) For angle *ODB* there were few correct answers, but some candidates scored 1 mark for writing 114°.

(iv) Not many candidates realised that triangle *ODB* was isosceles and so there were also few correct answers seen or follow through marks awarded here.

(b) (i) There were many correct answers for the area of the circle. Some candidates lost a mark because they used 3.14 for π and this gave an inaccurate answer. Some candidates wrote their answer only to 2 significant figures. If they showed their working out, they gained one mark but if they did not then no marks were awarded.

(ii) Only a few candidates knew that they had to use trigonometry to find the length of *OC*.

Question 8

(a) Many candidates managed to plot the points correctly.

(b) Most candidates knew that this was a negative correlation. Only a few candidates thought it was positive or had no correlation.

(c) The majority of candidates found both means correctly.

(d) Few candidates scored full marks drawing a line of best fit. Many candidates drew the line within the given tolerance but did not draw it through the mean point. Others did not draw their line in tolerance nor did it pass through the mean.

(e) Many candidates managed to score a follow through mark by using their line of best fit correctly. Others used their line correctly but did not give their answers accurately.

Question 9

(a) All candidates managed to write the coordinates correctly.

(b) Many candidates just measured the length of *AB* and gained no marks. The question said ‘calculate’ indicating that measuring was not appropriate. A few used Pythagoras’ theorem but did not write their answer correct to 3 significant figures.

(c) Most candidates managed to find the mid-point correctly.

(d) The most common wrong answer for the gradient was 2. Only a few candidates wrote the formula the wrong way around with the *x*s on top.

(e) There were quite a good number of follow through marks awarded for the equation of the line.

(f) There were only a few correct answers to the ‘show that’ question. Many candidates just wrote ‘yes’ or ‘no’ with an attempt to explain it in words but no mathematical working was seen. Quite a few candidates did not answer the question at all.

Question 10

(a) Not very many candidates found the correct value for *m*.

(b) Most of the candidates knew that this was a 90° rotation.

(c) About half of the candidates managed to find the correct translation.

(d) Very few candidates managed to enlarge the figure correctly.

Question 11

(a) Many candidates found the correct answer to the inequality. A common wrong answer was –9.

(b) A majority of the candidates managed to solve the simultaneous equations correctly. A few candidates made a mistake in finding one value but correctly substituted this value into an equation to work out the other value. If this was done correctly, they were awarded 1 mark.

(c) The simplification was answered well overall with many candidates being awarded both marks. Some candidates had one part correct and one wrong and so were only awarded 1 mark.

(d) The expansion was well answered by most of the candidates.

(e) (i) Some candidates had difficulty finding the value for x. The most common wrong answers were 9 and 6.

(ii) This part had more correct answers with the most common wrong answer being 2.

(f) (i) The subtraction of the fractions was answered well by many candidates. A few just gained 1 mark by having a correct common denominator. Not all candidates wrote the answer in its simplest form.

(ii) Just under a half of the candidates had correct answers to the division. Some candidates managed to gain a mark by inverting the second fraction and multiplying but then did not know how to continue.

Question 12

(a) It was pleasing to see that nearly all the candidates had a graphic display calculator and nearly all of them managed to sketch the graph correctly.

(b) Very few candidates could write down the equations of the asymptotes.

(c) The line was also correctly sketched by most candidates.

(d) Here too there were many fully correct answers for the points of intersection. A few candidates had one correct point and one incorrect and only a few did not write their answers to 3 significant figures.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/42
Paper 42 (Extended)

Key messages

Candidates need to show sufficient working to gain method marks in case their answer is incorrect.

The general instruction is that answers should be given correct to three significant figures unless the answer is exact or the questions states otherwise. A few candidates lost marks through giving answers too inaccurately.

Almost all candidates were familiar with the use of the graphics display calculator for curve sketching questions, but many did not use them for statistical questions and/or for solving equations.

General comments

The paper proved accessible to almost all the candidates with few candidates scoring very low marks or leaving out questions.

Some questions towards the end of the paper proved very challenging and only the very best candidates were successful. Here omission rates were slightly higher.

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

There was some impressive work from better candidates showing strengths in dealing with higher algebra and logarithms.

Most candidates showed all their working and set it out clearly. Answers without working were uncommon but some candidates work on a few questions was a jumble of figures which made the award of part marks difficult. Time did not appear to be a problem for candidates as almost all finished the paper.

Comments on specific questions

Question 1

All parts of this question were done well. The most common mistake was in **part (e)** where many candidates gave the answer to one decimal place or made a slight error in their calculations.

Question 2

(a) This was done well. Most recognised the transformation as a translation. Some sign errors were apparent in the vector and occasionally in the numerical values.

(b) This was also done well. The most common error was omitting the degree of clockwise rotation. There were only a handful of candidates who used more than one transformation.

(c) This was done well. A few candidates reflected in $y = k$ where k was not equal to 1.

(d) Although done well by most candidates, a few wrongly positioned the image.

Question 3

(a) There was a great variety of answers to this part. The most common error was a reference to tangents.

(b) Those candidates who gave the correct answers to the first two parts, went on to do well throughout **parts (i) to (v)** of the question. A number gave unsimplified answers which led to more complicated algebra and some errors in later parts.

(c) This proved more difficult, although better candidates answered it well.

Question 4

(a) The great majority of candidates were successful with this part. There were a few candidates who used incorrect mid-interval values.

(b) This was almost always correct.

(c) Almost all candidates drew a correct cumulative frequency curve. Of those who did make a mistake, the most common error was in plotting one of the vertical values incorrectly.

(d) (i) This was usually correct.

(ii) Most candidates answered this correctly. The most common mistake was to misread the scale and read off at 161 instead of 162.

Question 5

(a) This was almost always correct.

(b) This was also done well, although a few candidates made sign errors.

(c) Almost all candidates knew the techniques involved in the solution. However, a significant number did not deal with the ‘2’ term correctly. In multiplying through by 20, they omitted to multiply the 2 by 20.

(d) Most candidates knew the basic rules of logarithms. A common error was to multiply 4 by x^2 before doing the division. The biggest problem, however, was in not realising that 2 = log 100.

(e) Most candidates gave both answers correctly. The most common error was to have a sign error in the formula or to give the negative answer to two decimal places incorrectly.

Question 6

(a) Most candidates gave an acceptable graph. Some candidates gave a graph of the correct shape but with excessive overlaps of the branches. As usual, those candidates who drew in the asymptotes first produced the best graphs.

(b) Most candidates clearly knew what the asymptotes were, but some could not write them as equations. Answers of simply –1 and 2 were sometimes seen.

(c) This part was almost always correct.

(d) A number of candidates omitted to draw the line. Answers to **part (e)** suggested that their line was correct on their GDC but that was not transferred to the question paper. Where the line was drawn, it was almost always correct.

(e) (i) Here a substantial number of candidates only gave some of the answers correct to two significant figures.

(ii) As usual this part proved to be much more difficult. Even some of the better candidates omitted one of the inequalities or did not deal with the asymptotes correctly.

Question 7

(a) This was answered well with just a few using the wrong variation.

(b) This part was also done well. The most common error was to take the cube root of the fraction instead of cubing it.

(c) This part proved more difficult. The majority of candidates reached $w = 2y^2$ successfully but many could not substitute the expression for y. Those that could often were unable to simplify the equation to the required form.

Question 8

(a) Most candidates were able to answer this part successfully. The only error seen was that made by candidates who added the squares in Pythagoras instead of subtracting.

(b) Most candidates knew that the Sine Rule was the required method. The main problem was that a significant number of candidates were unable to find the obtuse angle. Many gave a reflex angle.

(c) (i) The problems with **part (b)** and an apparent unfamiliarity with bearings led to some difficulty in this part.

(ii) The problems in **part (c)(i)** continued here. That said, better candidates did both parts well.

(d) Most candidates were able to find the area of triangle *ABC* successfully. The area of triangle *ACD* proved more difficult. The previous problems with the angles manifested themselves again and some weaker candidates substituted inappropriately in $\frac{1}{2}bc\sin A$.

Question 9

(a) (i) Most candidates found this to be very straightforward and very few errors were seen.

(ii) This too was very well answered, with just a few not rounding up to complete years.

(b) (i) Although this was well done by most candidates, a number used compound interest and others omitted to add on the principal to the interest.

(ii) Many candidates did this well. The most common error was to equate the expression for interest to 8000 instead of 3000.

(c) A large number of candidates gave the correct answer but did not show any evidence that a graphical method had been used. Of those who did show a sketch, these were often of very poor quality and often not satisfactorily labelled. There were many candidates who were unable to make any progress on this question.

Question 10

(a) There were some good and detailed answers to this part but, all too often, there were clear signs that the given answer was to be obtained at all costs. Some candidates used generic trigonometric ratios and omitted to label them appropriately; others managed to arrive unconvincingly at 2400 often omitting steps.

(b) Many candidates were unable to make any progress in this part. It was often the case that those who had given a detailed answer in the previous part were also successful here. Most candidates did not rearrange the given formula but preferred to use a two-stage process to work out a missing side first and then use a trig ratio in triangle *BCD* to find x.

Question 11

(a) (i) Very few candidates gave a completely convincing response to this part. There were a variety of approaches, but many omitted essential stages. The surd equivalent of sin 60° was often not clearly written down. Probably the most successful approach was to use three isosceles triangles with an angle of 120°.

(ii) Most candidates were successful in this part although a few reversed the terms.

(b) This part proved extremely difficult. The most successful candidates found the length of the sides of the triangle *DEF* and then used this together with the 60 degrees in order to find the area of the triangle. Omission rates were relatively high in this part.

(c) This also proved difficult. The best candidates did it well, but middle and lower ability candidates made little correct progress. A few candidates had a correct ratio but did not simplify the answer.

Question 12

(a) (i) Most candidates coped very well with the algebraic nature of this question. The most common error was to make errors in attempting to multiply out the denominator. A few candidates tried to treat it as ‘without replacement’.

(ii) Most gave the initial product of probabilities correctly, but many did not multiply by 2 for the reverse order.

(b) This part saw some very complex algebra from those candidates who did not realise that taking the square root of the initial expression was the correct way to proceed.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/52
Paper 52 (Core)

Key messages

The instruction to use algebra to show that a statement is true cannot be answered by the substitution of particular values.

Marks were given for good communication. So, in completing a table for instance, candidates should give at least one example of how any numbers in the table were calculated.

General comments

Candidates were very successful in this paper and several perfect responses were seen with very many high marks. In particular, the pattern-spotting to find general results was very well done.

Comments on specific questions

Question 1

(a) All candidates knew that the units digit of 163 was 3.

(b) (i) Nearly all candidates understood that the stem of 34 was 30 and most showed the calculation necessary to find stem – units.

(ii) A similar question to **part (i)** resulted in an equally high number of successful candidates.

(c) There was a very high number of successful candidates that correctly simplified a fraction written in terms of the stem and units of the number 42.

(d) While a large number of candidates filled in all 14 cells in the table correctly, some experienced difficulty in working backwards to the start number when given the values of $\text{stem}^2 - \text{units}^2$ and the units. For the last row in the table a few candidates were not careful enough in writing the correct number of zeros in 7 thousand and 49 million.

(e) Nearly all candidates noticed that the start number was equal to $\dfrac{\text{stem}^2 - \text{units}^2}{\text{stem} - \text{units}}$.

Question 2

(a) Very few wrong answers were seen in this table. Those candidates who made errors in the previous table had similar wrong entries here.

(b) The majority of candidates found that $\dfrac{\text{stem}^2 - \text{units}^2}{\text{stem} + \text{units}}$ equalled stem – units. This required more thought than before since candidates had to check through two tables. There were correspondingly fewer correct answers. A few only considered changing the denominator, which was insufficient.

Some candidates gave an answer of start number – 2 × units, which was a correct alternative. Several candidates only answered with a particular number and not a general expression.

Question 3

(a) Most candidates gained full marks for this question, the most common error being numerical slips in calculation.

(b) Looking back to a previous table did not cause any difficulty for candidates and most answers were correct.

Question 4

(a) (i) Several candidates chose a particular start number to check the result but the instruction to use algebra indicated that working based on numerical values was not enough. Those who showed the full algebraic expansion were usually correct.

(ii) Most candidates used the values of stem and units for 185 correctly and wrote (180 – 5) (180 + 5) and $180^2 - 5^2$. More marks would have been scored in showing equality if candidates had gone further and either shown the full expansion of the two brackets or evaluated each expression. Several candidates only evaluated one of the expressions. A common error was to use 185 as the stem instead of 180.

(b) More so than in **part (a)(i)** many candidates chose a start number, often 185, to show the result rather than use algebra as instructed to demonstrate a general result. The minority who did use algebra were usually correct in showing the full expansion of the brackets.

Question 5

(a) Most candidates labelled columns appropriately for the various expressions. A column for $T^2 - U^2$ was also often seen but this was not relevant for testing whether $T - U$ or $T + U$ were factors of $T^2 + U^2$ and frequently led to incorrect deductions. The best candidates showed a column for $\frac{T^2+U^2}{T-U}$ and a column for $\frac{T^2+U^2}{T+U}$. Many candidates only used one column for these, so it was not clear which factors were intended. Some showed by calculation when $T + U$ and $T - U$ divided exactly into $T^2 + U^2$ which was rewarded with a communication mark. Many did not indicate how they had arrived at their conclusions and so could not gain a mark for communication.

(b) The key to this question was to realise that for any multiple of 10 the units digit is 0. Most candidates took a particular multiple of 10 and so lost any generality. This last question was more difficult as it required candidates to work in algebra to show the result.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/62
Paper 62 (Extended)

Key messages

To do well on this paper candidates needed to be prepared to read carefully, and probably more than once, the information both in the stem of the section and at the beginning of each question.

For the investigation they needed to have a sound knowledge of how algebraic factors may be found and of substitution.

For the modelling task candidates needed to be secure with the formulae for time/distance/speed as well as being able to convert units correctly.

General comments

In the investigation candidates showed good ability in expanding brackets and collecting terms. They needed practice in using algebra to explain or 'show that' in some answers.

In the modelling section some answers showed that although the examples had been followed the information given in other parts of the question had not been used. The use of the formulae for motion was good. Some more practice is needed on converting units when two measures are combined such as km/h.

Comments on specific questions

Part A Investigation

Question 1

(a) There were very few errors made in these calculations. The candidates' answers showed that they had understood the information by also being able to work backwards to find the start numbers. There were good examples of checking by some candidates.

(b) This was correctly answered by all candidates.

(c) As with **part (a)**, there were very few errors in this table.

(d) This was usually correctly answered. The occasional error in the table in **part (c)** did not affect this answer.

(e) (i) The one-line expansion was completed very well. Some candidates needed to be careful with the sign of U^2.

(ii) Candidates had no difficulty in writing the sum as the product of the sum and the difference in two brackets. Many followed this by then writing the product of the two integers as asked for in the question. Candidates should be encouraged to check that they have fulfilled the conditions of the question exactly.

Question 2

(a) Candidates approached this question in various ways. Most gained at least 2 of the 5 marks by communicating what they were doing. Many wrote the answers to all of the divisions necessary to make the decision of factor or not factor. Some also collected their results in an explanation in the space underneath the table. Candidates should be encouraged to check their answers in case they have made an arithmetical slip.

(b) Two of the key words in this question were 'Use algebra'. Numerical examples are not acceptable in this context. Most candidates realised and wrote that '$U = 0$' to gain the first mark. After this it was necessary to include results for all of $T + U$, $T - U$ and $T^2 + U^2$.

(c) (i) Candidates expanded the expression on the right-hand side, $(T + U)^2 - 2TU$, correctly to confirm this was equal to $T^2 + U^2$. Candidates should be encouraged not to start with the whole equation as given when they are asked to show that something is true. In this case, they should start with only the right-hand side, then expand and collect terms to obtain the left-hand side.

(ii) Many candidates repeated the information given in the question. Some introduced the result of the divisions being an integer which was another way of looking at factors.

(d) Following the instructions in the question candidates started with the correct expansion of $(T - U)^2$, and some developed this sufficiently to show the statement to be true.

Question 3

(a) This question was very well answered and communication, whether of splitting the start number into a ten and unit or showing the substitution for one of the calculations, was also very well shown.

(b) (i) Communication was also good here and nearly all candidates gained at least one mark.

(ii) This expansion was also well done with very few slips. As in **Question 1(e)(i)**, candidates should be careful with the sign of U^2.

Part B Modelling

Question 4

(a) (i) This question was well answered with most candidates correctly following the example and understanding the use of the rule to find the number of minutes between passengers. Candidates should be encouraged to check their answers for arithmetical slips as well as looking to see if their answers fit the general trend, that is, do their answers for the number of minutes the ferry waits to leave fit with the values already given of between 10 and 14.

(ii) This was a straight-forward mean calculation and was well answered. Candidates should be reminded to always state the units for their answer where applicable.

(iii) Candidates who showed correct working gained a communication mark. They should be encouraged to read and re-read questions to make sure that they fully understand what is being asked in the question.

(b) (i) This 'show that' question was answered well. Since every step must be written down ('shown') candidates should include the finding of 16 leading to $\frac{4}{16}$ as well as the multiplication by 60 to convert the hours to minutes. Candidates should know that working 'backwards', that is, starting with the answer of $t = 15$ and working back to $v = 13$, in this type of question is not usually acceptable.

(ii) A good number of candidates knew that the units for the speeds being in km/h had to be converted to minutes to give time. They also knew or worked out that this meant multiplying the distance by 60. Candidates should read the questions carefully so that they notice when an answer is required in 'simplest form'.

(iii) Some good sketches were drawn, with some indicating the intersection on the t-axis of 80. Candidates should use their calculators to extend the domain/range to look for possible intersections or asymptotes.

(iv) Candidates should be encouraged to use the graphs or tables on their calculators to find values. Most often a calculation was seen rather than an indication on the sketch that the value had been read from the calculator. Many candidates did not appreciate that if the speed was 25 then v was equal to 22 (25 – 3).

Question 5

(a) (i) This part was well answered. Candidates knew not to repeat 64 in the last column and to end it at 99 not 100.

(ii) Some candidates carefully followed the bullet-point instructions at the beginning and the example given and crossed out the final numbers in the number of passengers and number of minutes in Trial 10, leading to the correct number of minutes in the final column of 16. The main misunderstanding was to allow this to go through as 12 passengers leading to a final figure of 19. Careful reading and checking of information, right from the beginning, should be encouraged.

(iii) Candidates often correctly found the mean of their figures in **part (a)(ii)** and the difference between this and the mean they had found in **Question 4 (a)(iii)**. Some candidates did not identify this latter mean as their answer to that question and used their answer to **Question 4(a)(ii)** instead.

(iv)(a) Statements that included, in some way, the fact that grouping was more realistic/more likely made perfectly good answers. Many answers were about accuracy despite the second model being about groups (different in number) as opposed to the first model using single persons.

(iv)(b) The acceptable answers on the mark scheme were varied and any mention of one of these alongside any other suggestions was perfectly acceptable. Increasing the number of passengers as opposed to the number of passenger groups was a popular answer that changed but did not improve the model.

(b) Most candidates followed through their model from their answer to **Question 4(b)** as indicated in the question and also rearranged their equation to isolate v correctly. Many did not use their mean from **Question 5(a)** either by omitting it or choosing the wrong value such as their answer to that question, which was a difference between means.

Question 6

(a) Candidates put together at least three terms of the model, some forgetting the 16 or their 14. They must remember to check and change the units where necessary, in this case by multiplying the distances by 60. Candidates showed accurately the use of a common denominator for their algebraic fractions.

(b) Many candidates showed correct substitution of their k and 40 for v into the given model and were able to make a correct conclusion following their answer and the information given.