CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/11
Paper 11 (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 sense. As calculators are not permitted for this paper, it is vital that candidates carry out their calculations accurately. Candidates should be reminded of the need to read questions carefully, focussing on key words or instructions.

General comment

Workings are vital in 2-step problems, such as **Questions 9(b)**, **16**, and **17** 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 5**, **9(a)** and **21**. Candidates should note the form their answer should take, for example, **Question 11**, in terms of π and **Question 18**, in standard form.

The questions that presented least difficulty were **Questions 1**, **2**, **5**, **13(b)** and **14**. Those that proved to be the most challenging were **Question 4** volume conversion, **Question 12(a)** range, **Question 12(b)** mean from a frequency table number and **Question 20** equation of a line. 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 by candidates were **Questions 12(b)** and **Question 20** both mentioned before as challenging.

Comments on specific questions

Question 1

Candidates did well with this opening question. Candidates were able to gain one mark of the two for one answer of the three correct. For the candidates who gained one mark, it was mostly for the first box correct, converting $\frac{1}{5}$ into tenths. Some answers seemed to show that candidates were unsure on how to convert the tenths in the second or third box.

Question 2

Here, candidates had to give the coordinates of point *P*. This was done well as stated above. There were some answers where candidates swapped the *x*- and *y*-coordinates or wrote an *x* and *y* inside the brackets along with the values.

Question 3

Wrong answers included drawing in a single radius or even two, which could imply that they thought a sector was required.

Question 4

This conversion caused problems for many candidates. Many did not know that 1 ml is the same as 1 cm^3 as there were answers of the figures 45 from 0.45 up to 450. Virtually all candidates realised the answer should have a 4 followed by a 5.

Question 5

As the side lengths of *B* are 3 times the lengths of rectangle *A*, the answer is 3. Those who wrote 1:3 did not get the mark as that did not complete the statement properly.

Question 6

This question asked for the percentage reduction of a dress so the difference in prices should be found first and then that divided by the original price not the sale price. Some gave 5 as their answer; this is the difference in the two prices and as the method mark was for the full method, this did not get any marks.

Question 7

Some candidates measured from the south anticlockwise which gave an incorrect answer of 56°. Other candidates gave 236° as they took the correct angle from 360°. Even if the correct angle was on the diagram, it could not be given a mark if the candidate went on to give 236° on the answer line as there was only 1 mark for this question. Many other candidates measured the length of the line from *B* to *C* giving an answer of 5 with or without cm.

Question 8

This was not as simple as multiplying three dimensions together to work out a volume and as there was no diagram, the information had to be carefully extracted from the question. So, 140 had to be divided by both 2 and 7. Again, the method mark was for the full method so those that stopped at 2 × 7 = 14 did not get a mark.

Question 9

(a) The range is 4 years, from 5 – 1 = 4. If candidates wrote 1 – 5 or 5 – 1 or 1, 5 they did not get the mark. The range is a single value. This part was more often correct than the next part.

(b) First, candidates had to understand the table. Some did understand the table but wrote out all the ages as a list e.g. 1, 1, 2, 2, 2, 2, 2, 2, 2… and so made the calculation more time consuming and prone to error when they added the ages together as it is much simpler to use the table to get the 5 products – which is why this kind of table exists. In this question, the total frequency is given so there was no need for candidates to add up the frequencies where, again, they could make arithmetic errors. Those candidates who added 1 + 2 + 3 + 4 + 5 and then divided by 5 also got 3 but they did not get any marks as this is a wrong method. Those who wrote median = 3 also did not get any marks. Others added the frequency column to get 20 and divided by 5 also using a wrong method.

Question 10

Sometimes answers showed confusion with the meaning of the two signs with either –6 not included or –3 included or just –5, –4 given as the answer. Occasionally, there was just a 3 on the answer line. This may indicate the candidate thought the question was asking how many integers were implied by the statement.

Question 11

This question required the answer to be left in terms of π so 17π was the answer and not 53.4. If candidates got to 17π and then attempted to multiply this out, they only received one mark.

Question 12

Both parts of this question were not done well by many candidates. **Part (b)** was left blank by a sizable number of the candidates.

(a) For many, the notation seemed to be a barrier to understanding what was required. Many candidates gave just one of the square numbers between 1 and 10 whilst others carried on their list of square numbers beyond 9.

(b) Here, the notation had two elements that had to be understood. The notation translates as, 'How many elements are not in set A'. There was a follow through mark for those candidates who got the previous part wrong but subtracted their number of elements away from 10 correctly.

Question 13

With this pair of questions about understanding the scatter graph, candidates were more successful describing in words what the diagram showed rather than giving the correct name for the type of correlation.

(a) Words such as growing, increasing, direct, irregular, rising or phrases such as temperature and ice creams sold were given. Other candidates picked a point and said at 25 °C 120 ice creams sold. All that is needed in questions to name the type of correlation is positive, negative or none (or zero). There is no need to comment on the strength of the correlation. Candidates should not give two answer.

(b) For the description, candidates must describe the trend and not pick on a single point as comments such as, 'When the temperature is hot a lot of ice creams are sold.' were seen and did not receive the mark.

Question 14

For this question, the first step is to realise that the club lost their last 3 games so 'did not lose' is 7. Some gave answers such as $\frac{7}{11}$ as they incorrectly included the match to be played or added 2, 5 and 3 incorrectly even though the question said how many games had been played. In this question the particular form of the answer was not mentioned so a correct fraction, decimal or percentage were all acceptable.

Question 15

This was not a particularly well answered question. Misunderstanding of the instruction, 'expand', caused some candidates to leave their answer as $k^2k - k^26$ or even $k.k.k - k.k.6$. Some gave the correct terms but used addition instead of subtraction.

Question 16

Here, the concept of average speed was not clear to many candidates. For this question, the time for each section must be calculated then the two times added together. Many realised the second section took 30 minutes but were often unsure about the time for the first section. There was a mark for either the half an hour or $\frac{2}{3}$ of an hour or the number of minutes for either section of the journey.

Question 17

As no scaffolding was given, candidates had to work out how to approach this problem. This question combines geometry with algebra, using geometry to set up an equation and then algebra to solve it. The most common error was to use 180° for the number of degrees in a quadrilateral rather than the correct 360°, but if candidates went on to at least collect up terms for their wrong equation, they did get a method mark.

Question 18

This required an answer in standard form, so a correct value not in standard form only gained one mark. So, the common answer of 15×10^{10} only got one mark and to get both marks this had to be changed to 1.5×10^{11}. Some wrote out each number in full and then got confused with the number of zeros showing that using standard form for very large number is a useful tool to avoid errors.

Question 19

This is the one transformation out of the four on this syllabus where the two shapes are not the same size so it is an enlargement. This is worth three marks so two more pieces of information besides the name must be given. These are the scale factor and the centre of enlargement. Candidates are reminded not to give more than one transformation as the question says to 'describe fully the single transformation'. It is incorrect to add a translation as the position of the centre of enlargement.

Question 20

Candidates find producing the equation of a straight line complex. Here, there was no diagram to aid candidates, but all the information needed was in the question without the need to do any calculations. To write down the equation of a line, $y = mx + c$ the gradient must be found but in this case, it is stated as 3. The c value is the y-coordinate when $x = 0$, and for this line that point, (0, – 1) is given in the question also, so $m = 3$ and c = –1. Some candidates omitted the '$y =$' and gave only $3x - 1$ as their answer, which was awarded one mark.

Question 21

This last question was not found to be particular difficult considering its position in the paper. Candidates had to add the powers getting 7 and this was the required answer. Some gave 5^7 which did not get any marks as question was only worth one mark. Candidates must take note of what is required as the answer. Occasionally 12 or 5^{12} was seen as the answer showing that those candidates did not understand the rules of indices. Very occasionally, this was left blank, maybe because candidates expected the question to be more complex and it did follow **Question 20** which was the question that was most often left blank by candidates.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/12
Paper 12 (Core)

Key messages

Candidates should be encouraged to show their working particularly where there is more than one mark for a question. In one-mark questions it can help them to spot an error when checking their answers. Where there is more than one mark it allows the award of a method mark if the candidate makes an arithmetic error.

On this non-calculator paper poor arithmetic often let candidates down when they knew the correct process. Candidates should be encouraged to check their calculations as a significant number of simple arithmetic errors were made, especially in the easier and more straightforward questions, and these resulted in a loss of marks.

General comments

This paper gave candidates of all abilities the opportunity to demonstrate their knowledge, skills and understanding. The early questions were generally well answered. Many of the later questions were often attempted but not always successfully.

Most candidates were well prepared and strived to achieve their best. A high proportion of candidate responses comprised the answer alone, with no working. Where working was shown, it was sometimes difficult to follow as there was little or no explanation of what was being calculated.

Time did not appear to be a factor as the majority completed the paper with most candidates attempting the final question.

More work is needed to consolidate candidates' understanding of total surface area as shown in **Question 8**, working with bearings in **Question 11** and stating square and triangular numbers in **Question 14**. The responses in answering **Question 19(b)** showed a poor understanding in calculating the mean from a frequency table and candidates were also unsure about interior/exterior angles of polygons in **Question 24**.

Comments on specific questions

Question 1

This question tested rounding numbers to an appropriate degree of accuracy.

The majority of candidates earned the mark here, but it was clear that some confused the rounding to the nearest 10 with rounding to the nearest 100 or 1000.

Question 2

The question was very well answered with the vast majority of candidate scoring the mark. Centres need to take note to ensure that candidates are familiar with all the types of angles. Common wrong answers were obtuse, right and interior angle.

Question 3

This was another question where almost all candidates were able to show a good understanding of what is required to convert a fraction to a percentage, with a large proportion getting full marks. Of those who did not gain full marks, a good number of candidates gave the answer 0.59%.

Question 4

Nearly all of the candidates gave the correct answer of 1. The most common error was 37, coming from incorrectly dealing with the brackets: 9 – 2 = 7 then 7 × 3 is 21, instead of 2 × 3 = 6 then 9 – 6 = 3.

Question 5

Candidates found this a challenging question, with 5, 1 or $\begin{pmatrix}5\\0\end{pmatrix}$ as the most common incorrect responses. A significant number of candidates did not realise that it is simply the horizontal distance and spent more time finding the distance between two points.

Question 6

It was apparent that many candidates did not know how to find the cube root. The most common wrong answers were 8 and 4^3, but some candidates worked out 64 × 64 × 64. Some left this question blank.

Question 7

Candidates were able to access this question, with many identifying the correct method and showing the correct working out for finding the interest received after two years. Candidates who did not gain full marks in this question usually considered the total amount of investment after two years ($440) rather than just the interest. Candidates should be encouraged to read the question carefully. Some candidates left this question blank.

Question 8

This question tested the candidates' understanding of surface area of a cube. Many candidates did not answer this question well because they confused surface area with volume.

Question 9

A sizeable group of students scored the mark for this question. Some candidates divided the speed by the time instead of multiplying to find the distance travelled.

Question 10

This was a well answered questions with many candidates gaining full marks. The vast majority managed to correctly change one year and three months into 15 months. Many candidates had an arithmetic error multiplying 15 by 500 and only gained the method mark.

Question 11

It is apparent that many candidates find bearings a difficult topic. Centres need to take note to ensure that candidates are familiar and can use a protractor to measure angles correctly. Some candidates answered with the length of the line *AB* or gave a compass direction.

Question 12

This question showed the lack in understanding of how to present the translation of a point in vector form. Most candidates were able to obtain the 6 and 3 steps. However, they incorrectly presented their answer as $\begin{pmatrix}3\\6\end{pmatrix}$ or $\begin{pmatrix}\frac{6}{3}\end{pmatrix}$.

Question 13

This is a familiar question and candidates generally performed well and often got the mark. Those who did not very commonly wrote $v^3 = v \times v \times v$ but then had an answer of 3 or $3v$.

Question 14

Whilst some candidates were able to write down a list of square numbers, many were unable to identify the triangular numbers and they confused triangular numbers with dividing by 3. The most common wrong answers were 3, 9 and 64.

Question 15

Although a good number of fully correct solutions were seen, this question showed that some candidates were not able to convert $\frac{500}{10000}$ into decimals. Many candidates only scored the method mark for stating the probability as a fraction.

Question 16

This question showed a major misconception for many candidates who wrote $f(10)$ and then substituted $x = 10$ and gave 2 as a final answer.

Question 17

This was a well answered questions with most candidates gaining both marks. Candidates used different methods to solve for *x*. Most candidates expanded the brackets, some candidates halved 20 then took away 3, some candidates solved by inspection showing that 2 × 10 = 20 then $x + 3 = 10$. It was pleasing to see that candidates were showing their working out in this question.

Question 18

This question was accessible to all candidates and a good proportion gave the correct answer for an integer in **part (a)**.

In **part (b)** most candidates could not identify the irrational number. A high proportion incorrectly picked $\frac{20}{7}$.

Question 19

This question tested the candidates understanding of averages. The numbers used in the question were easy to use and add.

Part (a) was the most successfully answered part with candidates realising the need to spot the most frequent number, although some used the frequency 2, 8, 7, 2, 1 and ignored the fact that it is part of a frequency table.

Part (b) was well attempted, with only a few blank responses seen. Some candidates who realised that the sum of all the numbers is required, got one mark only because they could not process the sum or the division by 5 correctly. Some did not gain any marks because they had added the frequencies only and divided by 5.

Question 20

This is a familiar question and candidates generally performed well. Only a few confused the lowest common multiple (LCM) with the highest common factor (HCF) listing the common prime factors 2, 2, 3 or gave 12 as their answer.

Question 21

Candidates generally found this question difficult. Many scored only the method mark for $2y^2 \div 6y$ or $\frac{1y^2}{3y}$.

The question asked to fully simplify and $\frac{1y}{3}$ was only awarded the method mark.

Question 22

The probability tree diagram question was meant to test the candidates' understanding of probability without replacement. The first empty space was usually answered correctly for picking up the first bead. However, when candidates tried to answer the probability of picking the second bead, they still used 20 beads in the bag. The most common wrong answers were $\frac{13}{20}$ and $\frac{7}{20}$ for the second pick.

Question 23

Although this style of testing Venn diagrams has been seen before, many candidates still found it difficult to correctly complete the Venn diagram. They were mostly successful completing the eight students who play cricket only. They were not as successful completing the number of students who did not play any sport and the common wrong answers were 2 or 30.

Question 24

Candidates found this question difficult. It was apparent that many assumed the sum of interior and exterior angles of polygons to be 360° instead of 180°. Some candidates gained credit for starting the process and writing down 10° without realising that they are only one step away from finding the correct answer.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/13
Paper 13 (Core)

There were too few candidates for a meaningful report to be produced.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/21
Paper 21 (Extended)

Key message

Candidates need to show clearly 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 be encouraged to check their answers are sensible, by using suitable methods; for example substitution and reversing calculations.

Candidates are reminded to read questions carefully, focussing on key words or instructions.

General comments

Candidates were well prepared for the paper and demonstrated very good algebraic skills. Some candidates lost marks through careless numerical slips, especially when working with negative numbers. Candidates should make all of their working clear enabling them to access method marks in multi-step problems. Candidates should remember to leave their answers in their simplest form.

Comments on specific questions

Question 1

(a) Many candidates found this question difficult and were unable to round a large number to the nearest ten thousand. Many different answers were seen but a small number of candidates gave an incorrect answer of 50 000.

(b) Again, candidates were challenged by this question. Some candidates misinterpreted the question and rounded the value correct to two decimal places. Other errors were to omit the final zero and give an answer of 0.004, or to give an answer of 0.00402 possibly from thinking that zero did not count as a significant figure.

Question 2

(a) This question proved to be challenging for many candidates and 91 was a common incorrect answer.

(b) Candidates were more successful finding a common multiple but a small number forgot that they were choosing from the listed numbers and gave an answer of 12.

Question 3

Most candidates got at least one diagram correct and the most common error was drawing only one vertical line of symmetry on the pentagon.

Question 4

There were many very good attempts at drawing the compound bar chart. Most candidates used the scale correctly and labelled their bars. A small number of candidates seemed completely unfamiliar with a compound chart and simply superimposed all three bars.

Question 5

This question was answered well and many candidates scored full marks. The most common error was to make a mistake in multiplying out the brackets. Candidates should be encouraged to check their solution by substitution to enable them to correct mistakes of this type.

Question 6

(a) This straightforward conversion into standard form was found challenging, with a common incorrect answer of 5.86×10^5 being given.

(b) (i) This proved very demanding for the majority of candidates with most numerical answers of 0.25 being seen.

(ii) Following on from the previous part, there were very few correct answers and the incorrect expression of $a - b$ was seen often.

Question 7

(a) The majority of candidates were able to find the correct relative frequency but a small minority gave an answer of 112. There were occasionally some answers of $\frac{112}{400}$ where the frequency table had been misinterpreted.

(b) (i) The correct answer of a large sample size was not seen very often and many candidates simply commented on the fact that a lot of people went to university.

(ii) Although the majority of candidates attempted the correct calculation, there were frequent numerical slips seen.

Question 8

This question was confidently attempted but not well executed. The negatives caused many problems especially if candidates tried to equate the x terms. Candidates should be encouraged to choose the easiest variable to eliminate. In this case it is preferable to multiply the second equation by 2 and add the equations in order to eliminate y. The common mistake made by many candidates was not to multiply all parts of an equation by 2, 3 or 5.

Although the substitution method could be used here, it was most successful when the second equation was rearranged to give $y = 7 - 5x$ thus avoiding substituting expressions involving complicated fractions.

There was very little evidence of candidates checking their solution in both equations, which should be encouraged.

Question 9

Although standard attempts were seen here, many candidates did not read the question carefully. Some missed the inverse proportion, or the square, or used the square root.

Question 10

It was rare to find a completely correct solution and candidates seemed unfamiliar with this kind of problem. Most were able to correctly work out the area of the sector but candidates rarely attempted to use $\frac{1}{2}ab\sin\theta$ to find the area of the triangle.

Question 11

This question proved to be a good discriminator. Candidates needed to use Pythagoras' theorem correctly in order to rearrange and find x^2. The use of brackets should be encouraged in order to multiply out surds correctly. Candidates often tried to do too many steps at once resulting in mistakes being made.

Question 12

Candidates found both parts of this question difficult and many regarded the origin as a region.

Some candidates gave two different letters in their answer.

Question 13

Candidates struggled to start this question and it was rare to see the roots used correctly to form $a(x + 2)(x – 3)$. Those who tried to substitute in points often made mistakes or only used one point.

Question 14

Good understanding of laws of logs seen throughout this question.

(a) The common wrong answer was 64 arising from 4^3.

(b) Candidates used $a\log x = \log x^a$ successfully but more errors occurred when adding or subtracting logs.

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 be familiar with the shape of basic graphs as referenced in the syllabus document. Candidates would not be expected to draw an exact graph of a function on a Paper 22.

Candidates are recommended to use exact fractions rather than conversions to inaccurate decimals.

Candidates need to know the connection of trigonometric ratios in the four quadrants.

Candidates should draw a sketch when answering bearing questions.

General comments

Candidates were well prepared for the majority of 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

This question was well answered by the majority of candidates. The main error occurred with candidates completing the calculations in the wrong order and giving an answer of 70.

Question 2

The majority of candidates only earned one mark for this question. They realised that the order of rotational symmetry was 2, but thought that there were either 2 or 4 lines of symmetry.

Question 3

(a) This question was correctly answered by nearly all of the candidates, giving an answer of 64. A few candidates gave a different correct answer.

(b) Although there were many correct answers of 97 given, there were a large number of candidates who gave their answer as 91.

Question 4

Many candidates gave the correct inequalities. The common errors were including –3 in their range and excluding 2.

Question 5

Nearly all candidates scored full marks for this question. It was pleasing to note how well candidates were able to work carefully with fractions.

Question 6

This question was testing the candidates' ability to understand the modulus function. It was clear that this is a concept many were unfamiliar with. Many candidates omitted one or more of the three integers.

Question 7

This question proved to be challenging for many candidates. Candidates are strongly recommended to draw a sketch for any bearings question, marking on the information given in the question. Candidates who used a sketch nearly always scored full marks. The common error was to subtract 110 from 360.

Question 8

Candidates are expected to know the shape of graphs that are mentioned in the syllabus and a simple sketch was required. A number of candidates thought that the graph was a straight line. Many candidates plotted points and then drew an accurate graph.

Question 9

Nearly all candidates realised that the ratio of 40:360 was required. This gained the method mark. Many of these candidates then used the circumference of the circle to find the correct answer. The common error occurred when candidates used the area of the circle

Question 10

(a) This part was correctly answered by nearly all of the candidates.

(b) Candidates found this part more demanding. The most common incorrect answer was 25.

(c) The majority of candidates gave a correct answer, with $A \cup B'$ being the answer most frequently seen. Some candidates gave answers that were also correct, but far more complicated, for example, $(A \cup B)' \cup A$. All answers that defined the region correctly gained the mark.

Question 11

Nearly all candidates gave the correct answer.

Question 12

This question was correctly answered by the majority of the candidates, showing a very good understanding of powers and indices.

Question 13

Many candidates scored full marks. Candidates realised that the question needed the use of the alternate segment theorem. Some candidates found the third angle in the triangle as 40 and then found the value of *x*, others found the third angle on a straight line and then gave the answer as 63.

Question 14

The majority of candidates scored full marks. The common error was candidates writing $\sqrt{80}=2\sqrt{20}$, and then being unable to simplify $5\sqrt{5}+2\sqrt{20}$.

Question 15

Although the majority of candidates scored full marks, there were many solutions that included the line $3(x+1)=3x+1$, which led to an incorrect final answer.

Question 16

This question was generally well answered. The majority of candidates factorised the first two terms and then the last two terms, before completing their solution. A few candidates factorised terms 1 and 3 and then terms 2 and 4, with an equal degree of success.

Question 17

This question tested the understanding of powers. Candidates who realised that $27=3^3$ were able to make progress with their solution. Some candidates were unable to simplify $3^{3(x+2)}$ correctly.

Question 18

Many candidates scored full marks. Candidates were expected to use the difference of two squares to factorise the numerator and then factorise the quadratic in the denominator. The common error occurred when candidates unable to factorise the denominator correctly.

Question 19

Candidates need to give their answer in the simplest form, as stated in the rubric on the first page of the question paper. Although many candidates scored full marks, a significant number, having started the question correctly by applying the rules of logs, then gave their answer as an unsimplified fraction such as $\frac{864}{576}$.

Question 20

There were very few correct answers to this question. Candidates need to be familiar with the trigonometric ratios of angles in the 4 quadrants, and their connection to angles in the first quadrant.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/23
Paper 23 (Extended)

There were too few candidates for a meaningful report to be produced.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/31
Paper 31 (Core)

Key messages

Candidates should practice answering 'show that' questions and understand that you cannot use the information that you are asked to 'show' in their answer. Perhaps the candidates could think about how they would find the length (or whatever they are asked to 'show') and proceed from there.

In order to be able to answer all the questions, the candidates must have a graphical calculator and know how to use it.

The candidates should be encouraged to show all their working out especially for follow through marks. Many marks were lost because working out was not written down.

Marks were also lost when the candidates did not write their answers correct to the required level of accuracy.

Candidates should be familiar with correct mathematical terminology.

General comments

Most candidates attempted all the questions so it seemed as if they had sufficient time to complete the paper. There was also a wide range of marks that indicated that the questions were at the correct standard for Core candidates.

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 also need to read the questions carefully and answer what is asked in the question.

Candidates should bring the correct equipment to the examination. Many appeared not to have a ruler with them to draw a straight line. It also appeared as if some candidates did not have a graphical calculator.

Comments on specific questions

Question 1

(a) Most candidates wrote the number correctly. The most common error was 6003 instead of 60 003.

(b) The majority of the candidates found the correct square root.

(c) Many candidates found the correct answer. Some candidates did not use their calculator correctly and gave 6.876 as their answer.

(d) Most candidates gained either one or two marks for writing down the factors of 10. Some only wrote 2 and 5. A few seemed to be confused about factors and multiples and wrote 1, 10, 20, etc.

(e) For the first part, 965.3 was a common wrong answer. More candidates found the correct 3 significant figure answer in the second part and many also found the correct answer to the nearest 10.

Question 2

(a) (i) The majority of the candidates wrote the correct next two terms of the sequence. A few continued the sequence the wrong way and wrote 19 and 15 for their answer.

(ii) Many candidates wrote + 4 or similar. Some found the *n*th term for the sequence and this was accepted on this occasion. A few wrote '$n + 4$' but this answer was not accepted.

(b) Most candidates scored some marks for this part. Some put –2 as a natural number and quite a number of candidates wrote $\sqrt{3}$ as a rational number.

Question 3

(a) Nearly all candidates correctly worked out how much Kate was paid that month.

(b) Some candidates found the correct amount of interest. Many added this amount to the original investment but were awarded one mark for finding the interest correctly.

(c) Fewer candidates managed to work out the compound interest correctly. Most used the same method that they had used for the simple interest.

Question 4

(a) (i)(a) Nearly all of the candidates managed to work out the total number of decorations.

(b) Many candidates gained both marks for finding the total amount correctly. Some candidates gained one mark for showing partially correct working.

(ii) Many candidates found the least amount that had to be paid and some gained one mark for writing 24 or 25.

(b) (i) The majority of the candidates found the correct amount for the 12 praline balls.

(ii) Most candidates found the correct change. A few wrote $0.4 instead of $0.04.

(iii) Here too most candidates found the correct ratio. The most common wrong answer was 6 and 6.

Question 5

(a) (i) Writing the formula from the sentence proved challenging for many candidates. Some gained one mark for writing the expression $1.50n$ or $3 + 1.5n$ but omitting the C =.

(ii) Many candidates found the correct cost even if they did not have the formula correct in the first part.

(iii) Here too, the correct number of kilometres was often found. The most common wrong answer was 25 instead of 23.

(b) (i) The majority of candidates drew the correct bar chart. A few had difficulty with the heights of 125 and 175.

(ii) Nearly all candidates found the correct company.

(iii) Most candidates wrote the correct probability. Many candidates also reduced their answer to its lowest term. Only a few wrote the probability the wrong way around and wrote 5 as their answer.

Question 6

(a) There were many answers given for the name of the triangle but only 'isosceles' was correct.

(b) Some candidates managed to find all five angles correctly. Some gained three marks for having the first three correct and others gained one mark for having only z correct.

Question 7

(a) Nearly all the candidates found the correct probability. A few wrote $\frac{15}{29}$.

(b) (i) Fully correct answers for the tree diagram were not often seen. Some candidates just wrote the numbers 16, 14, 15, etc. on the branches instead of probabilities. Others gained one mark for having the first branches correct but then wrote the same probabilities for the second piece of fruit as for the first.

(ii) Very few candidates worked out the correct probability for taking 2 cherries.

Question 8

(a) (i) Most candidates solved the equation correctly. Only a few wrote $\frac{3}{7}$ or $-\frac{3}{7}$.

(ii) There were many correct answers seen in this part.

(b) Nearly all candidates found the correct value. A few gained one mark for substituting correctly and showing their working.

(c) Fewer candidates simplified the expression correctly. Some subtracted the a and b. Others tried to multiply the terms together.

(d) Few candidates managed to gain both marks for this simplification. Many gained one mark for correctly cancelling the as or the bs but not both. A common wrong answer was a^2b.

(e) Some candidates were able to multiply the fractions and write their answer in its simplest form. Many candidates wrote $\frac{3p}{10}$ as their final answer and gained one mark for cancelling the 4 and the 8 correctly.

Question 9

This question proved difficult for many candidates and some omitted it completely.

(a) Few candidates found the shaded area correctly. A few gained one mark for writing the correct formula for either the larger circle or the smaller circle. Quite a number of candidates subtracted the 3 from the 15 and then used the formula for the area of a circle with 12 as the radius.

(b) A few more candidates were awarded follow through marks here for multiplying their answer to **part (a)** by 2 to find the volume.

(c) Very few candidates knew that they had to find the cube root of their answer to **part (b)**. The most common mistake was to divide their answer to **part (b)** by 3.

Question 10

(a) Not many candidates know how to answer 'show that' questions. Many tried to use the 72° to show that the sum of the angles in a triangle is 180° or that the sum of the angles round a point is 360°.

It is not correct to use the 72° as this is what they have to show. All that was need was to write $\frac{360}{5} = 72$.

(b) The candidates also found this 'show that' question difficult although more managed to score the mark here. Once again it was common to see the answer used in the calculation.

(c) (i) Few candidates used trigonometry in this part to calculate *OM* even although they were told to do so in the question. Some candidates tried to use Pythagoras' Theorem instead and wrongly used 3 for *BM*.

(ii) Those who used 3 for *BM* just wrote 6 for the length of *BC* but this gained them no marks. There were few correct answers seen and many candidates omitted this part.

(iii) Many candidates omitted this part too. There were only a few correct answers for the area of the pentagon seen.

Question 11

(a) Many candidates wrote down the correct modal class. A few candidates wrote $1 < w \leqslant 4$ and others wrote $6 < w \leqslant 32$.

(b) Many candidates completed the cumulative frequency table correctly. Some candidates wrote 0, 20, 40, 60, 80, 100 and others wrote various other incorrect values. A few candidates just rewrote the frequency table.

(c) Most of the candidates who wrote the table correctly managed to plot the cumulative frequency curve accurately too. Some of the other candidates gained one or two follow through marks if they plotted their points correctly and drew a curve that was increasing.

(d) Not many candidates knew how to use their cumulative frequency curve to find the median, interquartile range or other values and so few correct answers were seen.

Question 12

(a) Many candidates managed to sketch the cubic graph reasonably well. Some either drew a straight line or omitted the question. It was not clear that all candidates had a graphical calculator.

(b) Most candidates who sketched the correct graph also found the correct coordinates. It appeared that some candidates were using the 'trace' function rather than the 'calculate' function and so their answers were not sufficiently accurate.

(c) Many candidates sketched the line correctly.

(d) There were many good attempts to find the intersection points. Some candidates did not write their answers correct to 3 significant figures and so lost marks. Some candidates wrote the coordinates instead of only the values for *x* but, if their coordinates were correct, they were awarded 2 marks.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/32
Paper 32 (Core)

Key messages

To succeed in this paper, it is essential for candidates to have completed the full syllabus coverage. Sufficient working must be shown and full use made of all the functions of the graphics calculator that are listed in the syllabus.

General comments

Candidates were well prepared for this paper and, in general, showed a sound understanding of the syllabus content. Presentation of work continues to improve, although some candidates are still reluctant to show their working and just write down answers. An incorrect answer with no working scores zero whereas an incorrect answer with working shown may score some of the method marks available, Calculators were used with confidence by some, although it does appear that others do not have a graphical calculator, as the syllabus requires. Candidates had sufficient time to complete the paper. Few did not attempt every question.

Comments on specific questions

Question 1

(a) All sections of **part (a)** were answered well. In **part (a)(iii)**, a number of candidates, worked out the formula for the *n*th term of the sequence rather than giving the more straightforward answer of ‘add 2’. Both are acceptable answers.

(b) The repeated subtraction of six to find the next two terms was correctly performed by most.

(c) A surprising number of candidates did not substitute 1, 2 and 3 into the given formula to find the first three terms of the sequence.

Question 2

(a) Candidates showed a high level of competence when dealing with the money calculations in **part (a)**.

(b) (i) Similarly, in **part (b)(i)**, candidates showed clearly they knew how to cancel a fraction down into its simplest form.

(ii) Although many could correctly find a percentage of an amount and a fraction of an amount, the majority did not know how to proceed with the two values calculated.

(c) As in **part (a)**, most coped well with this money problem.

Question 3

(a) Coordinate work is well understood, with many fully correct answers to **parts (i)** and **(ii)**. A small number wrote the values the wrong way round, i.e. (y, x). In **part (iii)**, many struggled with writing down the equation of the line.

(b) Common wrong answers for the mathematical name of the shape were parallelogram and rhombus. There were mixed fortunes when finding the sizes of the angles in the diagram, the value of z causing most trouble.

Question 4

(a) A common wrong answer here was $6p$.

(b) Solving the equation was done well with only a few getting an answer of 2 from (9 – 1) ÷ 4.

(c) Factorising was done well with most identifying both common factors.

(d) The correct symbol was usually provided, although some did not show the working necessary to gain the mark.

(e) This part proved more of a challenge. Some used the wrong symbol and many were just not sure what was required.

Question 5

(a) and (b) There were many completely correct tables and diagrams. Candidates showed accuracy both in their calculations and their drawings.

(c) The probability was often correctly given as a fraction, decimal or percentage.

Question 6

(a) Many found one of the two areas correctly. Some omitted to give, or gave incorrectly, the units of their answer. A few others mixed up area and perimeter.

(b) Although many correctly found the length *BC*, often they went on incorrectly to try to find the perimeter. Most wrong answers involved finding the perimeter of the rectangle and the perimeter of the triangle separately and then adding the two together. Some did not recognise the need to employ Pythagoras' Theorem to find *BC*.

(c) Many overlooked the request to use, or could not use, trigonometry to find the required angle. There were many incorrect answers, with no working to support them.

Question 7

(a) There were very few errors seen in writing the number in words.

(b) Most knew the scale factor required in the conversion. Many, however, omitted to change their answer into standard form.

(c) (i) Even when the correct scaling of 3600 was used, many did not know how to give their answer to two significant figures.

(ii) The correct calculation of distance divided by time was invariably used. Errors in performing the calculation and errors in the two values employed meant many were unsuccessful here.

Question 8

(a) Many misunderstood the question and found the perimeter of the square. Those that knew to use the formula for the circumference of a circle often forgot to halve their answer to give the arc length of a semi-circle. Some correctly worked out the perimeter of the shape but then added the perimeter of the square.

(b) Rotation symmetry is not well known. Few gave a correct answer.

(c) In general, the four lines of symmetry were correctly drawn on the diagram. Some candidates only drew two lines.

Question 9

In general, candidates scored quite well on this question. Many found the transformations required but often did not describe them in enough detail. For the rotation, either 'clockwise' or '90' was sometimes missing. For the reflection, the *x*-axis was often not identified correctly, $x = 0$ being a common error. For the translation, the vector was occasionally written as a coordinate. For those who recognised the possibility of the transformation being an enlargement, few could identify the centre of enlargement or the scale factor.

Question 10

(a) Few managed to complete the cumulative frequency table correctly. The most popular entries were 0, 20, 40, 60 and 80.

(b) Most knew to plot points using a time value and a corresponding cumulative frequency value for each coordinate pair. Candidates correctly joined points either with a curve or straight lines.

(c) Candidates had difficulty finding the median, and particular difficulty in finding the interquartile range, from the graph.

(d) Many were unsure of how to tackle this part. Some correctly found the cumulative frequency values for 50 and 100 minutes but then did not know how to proceed.

Question 11

(a) Both sections of **part (a)** were answered well. Most candidates use their graphical calculator with knowledge and understanding.

(b) This part was less well done. Candidates had trouble with drawing the graph where the two branches were often connected through the *y*-axis. Few could identify the equations of the asymptotes of the graph.

(c) Answers to **part (c)** were more successful although many gave them as coordinate points and not just the *x*-value of the points. Some lost marks due to their answers not being given to the required accuracy.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/33
Paper 33 (Core)

There were too few candidates for a meaningful report to be produced.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/41
Paper 41 (Extended)

Key message

Candidates are expected to answer all questions on the paper so full coverage of the syllabus is vital. The recall and application of formulae and mathematical facts to apply in familiar and unfamiliar situations is required, as well as the ability to interpret mathematically and problem solve with unstructured questions.

Communication and suitable accuracy are also important aspects of this examination and candidates should be encouraged to show clear methods, full working and to give answers to three significant figures or to the required degree of accuracy specified in the question. Candidates are strongly advised not to round off during their working but to work at a minimum of 4 significant figures to avoid losing accuracy marks. Candidates should be aware that it is inappropriate to leave an answer as a multiple of π or as a surd in a practical context unless requested to do so.

The graphics calculator is an important aid and candidates are expected to be fully experienced in the appropriate use of such a useful device. It is anticipated that the calculator has been used as a teaching and learning aid throughout the course. The syllabus contains a list of functions of the calculator that are expected to be used and candidates should be aware that the more advanced functions will usually remove the opportunity to show working. There are often questions where a graphical approach can replace the need for some complicated algebra and candidates need to be aware of such opportunities.

General comments

The candidates were well prepared for this paper and there were many very good scripts, showing all necessary working and a suitable level of accuracy. Candidates were able to attempt all the questions and to complete the paper in the allotted time. The overall standard of work was good and most candidates showed clear working together with appropriate rounding.

A few candidates needed more awareness of the need to show working, either when answers alone may not earn full marks or when a small error could lose a number of marks in the absence of any method seen. This is particularly noticeable in ‘show that’ style questions when working to a given accuracy. There could be some improvements in the following areas:

- Handwriting, particularly with numbers.
- Candidates should not overwrite answers.
- Care in copying values from one line to the next.
- Care in reading the question.

The sketching of graphs continues to improve and there was more evidence of the use of a graphics calculator supported by working, which is in the spirit of the syllabus. Candidates need to be aware that in drawing graphs points should be plotted accurately. There was, however, evidence of the use of functions in the calculator that are not listed in the syllabus. These functions often lead to answers given by candidates without any working and this must be seen as a high-risk strategy.

The most accessible topics were those on transformations, linear functions, frequency diagrams, sequences, cosine and sine rules, curve sketching and quadratic equations. The most challenging topics were compound functions, asymptotes on graphs, 3D spatial awareness for Pythagoras and trigonometry, Venn diagrams, combined probability, compound/simple interest and bearings. There were mixed responses in other questions as will be explained in the following comments.

Comments on specific questions:

Question 1

(a) This was quite a challenging first question which many candidates found difficult. The stronger candidates were very successful in interpreting the two multiplying factors for compound interest. Some candidates found a total from investing $1500 for 5 years at a rate of 3% per year and for investing $1500 for 6 years at a rate of 2% per year and then adding these two amounts together. These candidates did not realise that their answer was much too large. A few candidates worked out the amount after 11 years at a rate of 3% per year.

(b) This reverse simple interest question was also found to be very challenging with some candidates using compound interest and some treating the final amount as the interest earned. There was much complicated working seen when the straightforward method was to subtract the principle from the amount, then divide by 11 and then work out this value as a percentage of the original $1500.

(c) This part, to find the rate of compound interest from a given amount after a given number of years, was a higher-level question but candidates tended to be more successful, probably because they were more familiar with this situation. Almost all candidates earned the first mark for setting up a correct equation with the index 11. Most candidates then went on to take the eleventh root to earn the second mark. The final mark was a little more challenging as candidates had to realise that this root of 1.025 led to the rate of interest being 2.5%. A few candidates divided by 11 instead of taking the eleventh root. A few other candidates unsuccessfully used logarithms to solve the equation.

Question 2

(a) (i) Many candidates gained this mark but several candidates ticked the first four boxes.

(ii) This mark was given to the majority of responses but some only ticked the first three boxes here.

(iii) The best answered part of **part (a)** with most gaining the mark.

(b) (i) The more able candidates gained full marks here but many lost the B1 for the direction of rotation given in the opposite direction, that is, clockwise. Very few understood that rotation is positive in the counter-clockwise direction and that 90 degrees on its own gains the mark. Most gave (0, 0) for their centre of rotation and some gave the origin correctly. However, a few gave O or just centre which did not gain credit. A few candidates missed the word single in the question and gave two transformations (usually rotation and translation) which gained no marks.

(ii) Many scored both marks here but some stretched their image with the *y*-axis invariant or $y = c$ invariant to gain the B1. The most common award of the B1 was for a translation of $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$.

Question 3

(a) Most candidates scored at least one mark here with many gaining both. The point at (56, 54) was often incorrectly plotted with the *d* and *h* values reversed and a few responses gained no credit for reversing all five plot values.

(b) This was nearly always correct with the occasional negative, zero or linear answers seen.

(c) Many correct answers were seen but a large number of candidates lost a mark for not giving their answer to at least 3 significant figures with $0.59d$ and $0.586d$ often seen.

(d) This was nearly always correct with many candidates picking up the follow-through mark, dependent on their **part (c)** being a linear equation.

(e) A variety of acceptable answers were seen with nearly all the candidates being awarded this mark.

Question 4

(a) Three of the four parts here were able to be answered using the graphics calculator. Many candidates did not use this approach, possibly because they were more used to continuous data in a frequency table. This led to avoidable errors in the answers to the median, the upper quartile and the mean.

(i) The correct answer for the median was frequently seen. Some candidates ignored the frequency column and just gave the median from the list of the six x values.

(ii) The range of 5, found by subtracting 5 from 10, was often correctly stated. A number of candidates gave the answer of 5 to 10 and the answer of 21 (the difference between the highest and lowest frequencies) was also often seen.

(iii) The upper quartile was often correctly answered with the main challenge being the same as the question for the median which entailed taking the frequencies into account.

(iv) There were many correct answers seen with a large number of candidates carrying out a lengthy calculation when the answer would have been readily available on the graphics calculator. A common answer seen was 6.8 without showing any working and this did not earn any credit.

(b) A discriminating part, as the candidates had to comment on knowing the difference between the largest and the smallest actual heights and only a few candidates gained this mark.

Question 5

(a) Many responses scored full marks in this part although a large number of candidates lost a mark for an excessive overlap of the curve at the asymptotes, a few others for their curve touching or crossing the x-axis. Some had reflected their curve about the x-axis scoring no marks and some had set their axes incorrectly on their graphical calculators. However, the graphs were mostly neatly drawn without feathering or very thick lines.

(b) Not a well answered part with only the more able candidates scoring full marks. Many candidates used y instead of x for their equations and some omitted x altogether just giving the values of –1 and 2.

(c) A reasonably well answered part although many candidates lost another accuracy mark for answers not given to at least 3 significant figures; 0.21 was often seen for the x-coordinate.

(d) A discriminating part with very few candidates gaining full marks. Many gained a mark for identifying $x < 0.208$ but usually lost the other marks by the inclusion of the equality of the x value of –1. Some candidates gave the full domain of the function, $-7 \leqslant x \leqslant 7$, scoring no marks. The elegant correct answer of $x < 0.208$, $x \neq -1$ was rarely seen.

(e) Many correct answers were seen although the truncated answer of 3.74 was often seen and some candidates added a negative sign in front of the correct value.

Question 6

(a) Most candidates understood the need to add the frequency values to find the cumulative totals although several still plotted a standard frequency diagram scoring no marks. Many responses scored three marks here, losing a mark for a plotting error usually at (25, 4) whilst others scored two for plotting their points incorrectly horizontally, usually at the mid-points of the frequency groups. Most candidates drew a curve, but a few drew straight line segments.

(b) The candidates that scored well in **part (a)** tended to score full marks here and those that had plotted an incorrect cumulative frequency curve were also able to score full marks on follow-through. Many scored just a single mark for either the correct upper or lower quartile seen. Some responses gave the incorrect answer of 150 using their cumulative values instead of the masses.

(c) The candidates that had managed to draw a correct cumulative frequency curve in **part (a)** usually managed to score both marks here with the range of answers allowed. Those with an incorrect curve usually gained the method mark for correctly calculating the percentage from their curve however the incorrect answer of 26.66… was seen on many responses, from using 80 and 300 only.

Question 7

(a) Most candidates earned full marks in this part by substituting the values of 1, 2 and 3 into the given formula for the *n*th term of a sequence.

(b) (i) Most candidates succeeded in finding the next two terms and the *n*th term of this linear sequence. However, a few candidates gave the term-to-term rule instead of the *n*th term.

(ii) The *n*th term of this sequence was a quadratic expression and this was more difficult. Most candidates scored two of the three marks by giving the next two terms correctly and finding the common second differences for a method mark. The stronger candidates obtained the correct quadratic expression.

(iii) This sequence was found to be more challenging as the recognition that each term was a power of 2 plus 1 was a less familiar situation. The next two terms were usually correct and the *n*th term proved to be a discriminating part. The first differences were powers of 2 which should have led to answer involving powers of 2.

A major concern with this part was that a large number of candidates used cubic or quartic regression functions on the graphics calculators. This is not on the syllabus and candidates need to be aware that credit is unlikely to be given. Many cubic and quartic expressions were seen and they almost always did not give all the terms of the sequence. The most common problem was to give the correct next two terms of the sequence and then find a cubic or quartic expression based on some or all of the given terms of the sequence. However, none of these answers agreed with the next two terms of the sequence.

Question 8

(a) This was not a particularly well answered part with many candidates forgetting to take into account that it was a triangular prism and omitting to divide their volume by 2 leaving a common final incorrect final answer of 264. Several candidates still confuse volume and surface area with wrong answers of 213 seen here.

(b) Overall, few candidates scored the full marks here. Most responses scored at least one method mark for correctly finding three areas, usually the two end triangles and the base. Many candidates still have difficulty in visually breaking the net down into its correct constituents particularly the dimensions of the front face *ADFE*. Those that did employ the correct full method often lost an accuracy mark by rounding the length of *AE/DF* to a 2 significant figure value of 7.2 leading to a final answer of 213.2. A good number picked up the method mark for attempting to use Pythagoras Theorem to calculate the length of *AE/DF*.

(c) This three-dimensional Pythagoras Theorem part was generally very well answered with most responses using a two-step method to calculate the diagonal *AF*. However, many used their truncated value of *AE/DF* which led to a final answer of 13.146… which lost another accuracy mark. The elegant approach of squaring and summing 4, 6 and 11 prior to square rooting was not seen very often.

(d) Many correct answers were seen although many candidates still struggle to identify the required angle and the correct sides to use for their trigonometric equation. A few responses gained the method mark for using their value of *AF* from **part (c)**.

(e) The final part of this question was very challenging with many responses unable to link the information given with their answers to **parts (a)** and **(b)**.

This required initially calculating the linear scale factor by cube rooting the fraction combining 445.5 and 132 to correctly find $\frac{2}{3}$ or 1.5. This then needed to be squared to calculate the scale factor for the surface area. To gain full marks this value then had to multiplied by their answer to **part (b)** to find the correct final answer of $\frac{479}{480}$. Several candidates did score the first method mark for finding the correct linear scale factor.

Question 9

(a) This part was not answered particularly well by the candidates, with many blank responses seen and many others unable to link the linear and quadratic equations together. Many attempted to solve the established quadratic equation which was actually required in **part (b)**.

The straightforward approach was to square $(3x + 1)$ and then substitute this into the equation of the circle and then simplify the terms to get to the given answer without any errors. It is recommended that candidates write out $(3x + 1)(3x + 1)$ in full to ensure they do not lose the term in x when expanding the brackets. A few responses lost the final accuracy mark for omitting the 0 on the final line. Some candidates attempted the longer route of making y the subject in the circle equation and then equating this to $3x + 1$, this method rarely led to full marks being awarded. Several responses did gain either a mark for correctly forming an equation or for the correct expansion of the brackets.

(b) Candidates were now required to solve the given quadratic equation showing full working. They had to score M2 in this part by showing the correct application of the quadratic formula before they could pick up any accuracy marks so any error in the use of the formula was costly. Several responses just wrote down the answers which only scored SC1. A few successfully found the correct x-values but not the corresponding y-values.

Question 10

(a) The calculation of the value in a composite function was generally well answered and almost all candidates demonstrated an understanding of this topic. A large number of candidates chose to find the algebraic expression for $f(g(x))$ which occasionally led to numerical errors. Finding $g(1)$ and then substituting this value into $f(x)$ should be seen as a much simpler approach.

(b) Solving $(x – 3)^2 = 25$ was found to be more difficult than expected. The stronger candidates realised that they could take the square root immediately and the answer space indicated two answers so $x + 3 = \pm5$ was readily available. A few of the candidates using this approach kept the ± until after obtaining 8 and gave – 8 as the other answer. Many candidates used the much longer approach of expanding $(x – 3)^2$ to reach a three-term quadratic equation which then had to be solved.

(c) This was another part in which a large number of candidates used a much longer method than necessary. These candidates found the inverse function and then substituted 4 into this expression. Many were successful but some numerical errors were seen. The stronger candidates realised that if $f^{-1}(4) = x$ then $f(x) = 4$ and this led to the very simple equation $3x – 2 = 4$ to solve.

(d) This was another part in which many candidates did a lot of work for one mark. A few strong candidates understood that $f(f^{-1}(x)) = x$ as long as a function has an inverse. Most candidates worked out $f^{-1}(x)$ and then substituted this algebraic expression into $f(x)$. Candidates should remember that the command words ‘write down’ means there is little working to do. The stronger candidates simplified their answer to reach x but others did not earn the mark as they gave a complicated unsimplified answer.

Question 11

(a) This part required using the cosine rule which is shown in its explicit form for an unknown side on the formula page. Candidates had to rearrange this to calculate the required angle. However, some candidates wrote sine in the place of cosine. Many candidates lost the negative sign in their fraction or found 0.295 which led to the incorrect answer of 72.8…, which often meant only a single method mark was available. Several responses lost the accuracy mark for not showing 107.17 to 107.18 in this 'show that' part.

(b) (i) The sine rule is also given on the formula page so this was a reasonably straightforward part for most candidates. However, many lost the final accuracy mark for not showing an interim value of 44.42 to 44.43 in this 'show that' part.

(ii) Bearings continue to be a real challenge to many candidates. In this one-mark part candidates needed to simply subtract the given answer from **part (b)(i)** from 305. Some possibly did not notice the bearing information at the start of **part (b)** and many blank responses were seen.

(c) This was a discriminating part in which only the stronger candidates managed to score full marks. Candidates had to recognise that trigonometry was required within triangle *ABC* to calculate the shortest distance from *B* to the intersection of *AC*. Many used 217 or 108 as their distance unsuccessfully, several others used 2250, not realising that this is a time in the 24-hour clock format. A few candidates earned the special case mark for converting their time to hours and minutes.

Question 12

(a) (i) Many candidates earned a mark for the second Venn diagram but only a small number scored full marks here.

(ii) Very few correct answers were seen.

(b) This part was a discriminating question with only the stronger candidates gaining full marks for all three parts. Many candidates struggled to assess the information given in the Venn diagram. Many had a reasonable knowledge of combined probability but were often unable to find the correct numerators or denominators.

(i) Not many correct answers were seen. Most had the same denominator of 40 for both fractions.

(ii) Very few fully correct answers were seen. Several candidates gained two method marks but here again, many had the same denominator of 22.

(iii) This was a very discriminating part with a combined probability of three events, all with different denominators. Only a very few responses were fully correct although a number of candidates were awarded two method marks.

Question 13

(a) This rearranging the formula question was found to be challenging as the two terms in *x* needed to be combined together. The first two steps, multiplying by the denominator and then expanding brackets were well done by most candidates. The next two steps were not frequently seen as many candidates did not collect the two terms in *x* and this led to answers with *x* = expressions including *x*. Two marks out of four was the most common outcome. The candidate who did collect the two terms in *x* almost always divided by the correct factor and achieved full marks.

(b) (i) Many candidates were able to correctly state the amplitude of the given trigonometric function but not so many with the period. A number of candidates did not appear to be familiar with this topic.

(ii) The transformation of the given trigonometric function by a stretch was much more challenging, indicating again lack of familiarity of this topic. This proved to be a discriminating part with few candidates achieving the correct answer of $9\sin(2x)$. There were many candidates who did not attempt this part and common incorrect answers were $9\sin(6x)$ and $3\text{f}(x)$.

(iii) The transformation of f(x) by a given translation vector was frequently left unanswered and very few fully correct answers were seen. The partial credit was often lost with answers such as $3\sin(2x + 90)$ instead of $3\sin(2(x + 90))$, indicating knowledge of the translation parallel to the x-axis but overlooking the fact that x should increase by 90 in this case rather than $2x$ increasing by 90.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/42
Paper 42 (Extended)

Key messages

Three figure accuracy is required unless otherwise indicated or when answers are exact. This rule applies throughout the paper including reading values from the graphics calculator.

Candidates should recognise that to give a final answer correct to 3 significant figures, it is necessary to work to greater accuracy. Premature approximations in intermediate answers can lead to much greater inaccuracies in final answers.

The use of the diagrams and candidate's own sketches can be helpful and can aid progress through more complex questions. There was evidence of more use of the graphics calculator to help solve algebraic questions.

General comments

The paper was accessible to almost all candidates with very few candidates scoring very low marks. Many candidates did well. The transformations and simultaneous equations were two topics that were done well. The proportion question needed some more understanding of what was required to be written.

Most candidates did show working which was usually clear and logical.

Some candidates lost marks through giving answers which were not sufficiently accurate, usually due to premature rounding of figures used in calculations.

Wider use of the graphics calculator was seen with sketches instead of algebraic solutions in some cases. These would benefit from being suitably annotated to assist the candidate.

Comments on specific questions

Question 1

(a) (i) This was answered well in most cases. Only a few incorrectly started with $88 rather than showing the calculation that was required to end up with $88.

(ii) The majority of candidates did read the question and gave the amount of interest as their answer. Most of the other candidates gave the total amount at the end of the six years. Only a few candidates incorrectly used compound interest instead of simple interest.

(b) (i) Most of the candidates answered this well.

(ii) The majority of candidates answered this well.

Question 2

(a) The sketch of $\sin x$ was generally well done. The height of the curve should be between 1 and –1 which was marked on the y-axis. Only a few candidates missed the points where the graph crosses the x-axis at 180° and 360°.

(b) Finding the local minimum point was well done.

(c) Most candidates did answer this at least partially correctly. There were more who were correct with the amplitude than with the period. A few candidates used 2π rather than 360° which was incorrect as the scale was in degrees.

(d) Many drew a correct graph. A few candidates did not have the curve between 0 and 180 or it was indistinguishable from the sine curve from **part (a)**.

(e) In both parts many candidates were correct. There were candidates who gave the correct boundaries but used x instead of f(x) or g(x) which did not gain the mark. There were also candidates who gave single answers of 1 or 360 to both parts.

(f) This was well done by many candidates.

Question 3

In this question a few candidates found the use of months problematic and they attempted to convert 10 months to years. The great majority of candidates were successful in this topic.

(a) (i) This was generally well answered with sufficient working shown. There were a few candidates whose working was correct but the final answer was not given to the nearest integer. These were either given to the nearest 10 or to 2 decimal places. There were also candidates who were working through month by month.

(ii) This was generally well answered with more candidates using a logarithmic method. A few candidates tried to answer starting incorrectly with $882 \times 1.05 \times n = 2000$ rather than $882 \times (1.05)^n = 2000$. There are still some candidates who use trial and error methods. If this method is used then sufficient trials need to be shown to gain credit for working.

(b) This was generally well answered. When working was clearly shown two method marks could be awarded for seeing $\sqrt[10]{\frac{242}{500}}$ if the final answer was not correct. There were candidates who started with $500 \times \left(1 + \frac{r}{100}\right)^{10} = 242$ which led to an answer of –7. There were a few candidates who did not use an exponential rate.

Question 4

(a) (i) This was well done.

(ii) Most candidates read the graph correctly. A very few gave 100 as the answer.

(iii) Many candidates answered this correctly. In the other cases it would have been helpful to have labelled the values that were found from the graph so that a mark could be awarded for either a correct upper quartile or lower quartile. More annotation on the actual graph might have helped these candidates.

(iv) Many correct answers were seen.

(b) Many correct answer were seen. A few candidates had one incorrect mid-value but still earned a method mark. There were a few cases where no working was seen at all so no credit could be given for a wrong final answer. There was a sizeable minority of candidates who were able to find the mid-points correctly but did not use them correctly to find the mean.

Question 5

(a) (i) The reflection was consistently well done. Only a very few reflected in the wrong axis.

(ii) The translation was well done. For those who did not score two marks one mark was usually available for a partially correct translation either in the vertical or horizontal component.

(iii) Many were able to do a correct rotation. A few rotated about the correct centre but in the opposite direction. There were also some who had the correct angle but around a different centre.

(iv) This part was done correctly by most candidates. Some candidates had difficulty with the scale factor of –2 and some tried a factor of 0.5 instead. There were also a few candidates who did have the scale factor correct but need to improve the plotting of the image vertices.

(v) Many candidates were correct in their descriptions. A very few suggested more than one transformation which gained no credit.

(b) Some of the candidates were able to give two correct answers in these parts. There were some that gave $(x+2)^2$ in **part (i)** and $\frac{1}{2}x$ in **part (ii)** which showed some understanding of the question. Some did not answer at all. There were a few sketches seen that showed candidates trying out their ideas.

Question 6

(a) (i) The majority of candidates were able to answer this part. For others there seemed to be confusion about how to deal with the 2 outside the second vector.

(ii) This was generally well done. Only a few had the signs the opposite way.

(iii) Again, this was well done in most cases. There were a few little sketches seen which helped candidates towards the correct answer.

(iv) Finding the magnitude was done correctly by most candidates. There were a few answers of ±5 which only gained one mark.

(b) (i) Many candidates gained full marks in this part. Of those who did not give a correct answer a large number of candidates did not find the gradient of the perpendicular bisector correctly nor calculate the coordinates of the mid-point.

(ii) There were many correct answers to this part but it was shown that some candidates did not understand that $y = 0$ when a line crosses the x-axis. More working shown could have allowed some candidates to gain a mark.

Question 7

(a) The great majority of candidates answered completely successfully and only a very small number of candidates did not know how to eliminate one of the variables.

(b) There were a large number of completely correct answers; Most candidates showed very good and well organised working including the correct use of the quadratic equation formula. There was also evidence seen of candidates using their graphic calculators, showing a sketch to obtain the solutions. The most common error was in giving both possible answers by those candidates who did not test the values they found. If they had done so, then it would be obvious that the $x = 0.2324\ldots$ gave a negative length for the side of the square. There are some candidates who are not giving answers as required to 3 significant figures.

Question 8

(a) (i) All of this part was well done by almost all candidates.

(ii) Expressing f(g(x)) was generally well done. Many gave $15x-5$ or $5(3x-1)$ correctly as a final answer. A few candidates gave just $3x-1$ or tried to solve their expression.

(iii) This part was well done by the majority of candidates.

(iv) Most candidates were able to give a correct first line of working but many made an error in dealing with the signs.

(v) This question was more challenging and only a minority of candidates were able to give a correct final expression. Of those who did give a correct starting expression, most were then able to complete to the final correct expression. One common error was to add the one as a separate fraction. Another common error was to multiply both the numerator and the denominator of the first fraction by 2. A large number of candidates could not even give a starting expression attempting to work with h(*x*) rather than working in terms of *x*.

(b) (i) This part was correct in most cases.

(ii) Many candidates got this correct.

Question 9

(a) Many candidates had a complete correct set of answers to this part. Of those who did not, the most common error was in finding the general term for the second and third sequences. Some made progress on the second sequence by finding the second differences but seemed unable to proceed further. For the third sequence some gave an incorrect value of 7 or did not seem to know how to derive the general term.

(b) There were many correct answers in this part. There were also some candidates who had little or no understanding of how to tackle the question. Perhaps of all the questions on the paper this is where many candidates showed little organisation in their work with creditworthy expressions or values being scattered somewhat haphazardly across the response. The importance of showing waypoint values or expressions cannot be over-emphasised. For example, after finding $k = 12$ for $y = \frac{k}{\sqrt{x}}$, it is necessary to write $y = \frac{12}{\sqrt{x}}$.

Question 10

(a) The great majority of candidates were able to complete the tree diagram successfully.

(b) There were many correct answers, but a minority of candidates attempted to use the probabilities in unusual and unexpected ways.

Question 11

(a) A large majority of candidates gave well-organised working and gave an acceptable answer. Of these better candidates, the most usual cause of losing a mark was a loss of accuracy in the values which were required to give the total area. In particular, a common problem was in rounding the value obtained for length *BP*. These candidates seemed not to understand the effect of multiplying a prematurely rounded answer by a large number.

Of those who had a reasonable attempt at this question, but who did not obtain a correct answer, the most common mistakes were in not using the cosine rule to find *BP* or finding the area of the triangle *BCP* assuming that triangle *BCP* was right-angled.

(b) (i) In this part most candidates were able to correctly show the required angle on the diagram. Those who lost the mark did so either because the angle was not clearly marked or that it was not marked at all.

(ii) There were many correct answers or at least correct methods seen. The same problem of accuracy arose as in **part (a)**. Those candidates who rounded the length of *AC* prematurely did not give a sufficiently accurate answer for the required angle.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/43
Paper 43 (Extended)

There were too few candidates for a meaningful report to be produced.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/51
Paper 51 (Core)

Key messages

A general algebraic result cannot be found by only looking at numerical cases.

Candidates should not score out working without replacing it as that often counts towards communication.

A result cannot be shown by first assuming that it is true.

General comments

Much evidence of accurate substitution into formulae was seen.

Comments on specific questions

Question 1

All candidates could write down the correct values of the square numbers.

Question 2

(a) Practically all candidates wrote down the correct values of the square numbers.

(b) Most candidates showed that $9^2 + 40^2 = 41^2$. The better candidates showed this by writing two separate calculation, each equalling 1681.

Question 3

The large majority of candidates could fill in the table of 3-square sets correctly. Any errors or omissions were usually in the row 23, 264, 265, where two elements had to be found. Many candidates could have improved their score by indicating how they found the missing numbers. This was done by some candidates who wrote differences beside their results in the table to show the patterns used and by others who, for instance, wrote $\sqrt{23^2 + 264^2} = 265$, making use of the large space to the right of the table.

Question 4

Most candidates were able to match rows in the table to produce a 4-square set. Their working was usually set out as in the example provided. Several candidates did not understand the significance of the common elements of, for instance 5^2, in making the four-square set and candidates are well-advised to follow any given example closely. Some candidates spoiled their sets by writing each of the numbers squared.

Question 5

(a) Most candidates showed that they knew how to check whether a set of numbers was a 4-square set. It was important to show two calculations, each of them giving 324, and some candidates should have given a fuller explanation.

(b) The large majority of candidates did not know how to approach this question and there was a large number offering little response. A common error was to write $(ka)^2$ as ka^2.

Some candidates tried a numerical method but then made statements about a reverse argument. It is important to realise that substituting numbers will not prove a general result.

(c) (i) Nearly all candidates were able to find a common factor. A very small number of candidates gave a multiple.

(ii) Few candidates interpreted **part (b)** correctly and so were unable to proceed with this question, which required dividing each element of the 4-square set by the highest common factor.

Question 6

(a) (i) This question, requiring substitution into a formula, was answered successfully by most candidates.

The better candidates showed the substitution clearly.

(ii) In this question the substitution led to an equation to be solved. Several candidates would have gained a further mark by showing this equation clearly. Some candidates assumed that c was always 1 less than d, although this required further explanation at this stage in the paper.

(b) (i) While most candidates could fill in the table correctly by spotting the pattern, the communication of that pattern was often absent. This could have been done by showing differences in the table.

There were some candidates who made use of the formulae at the start of **Question 6** and were rewarded with a communication mark for showing their substitution.

(ii) The great majority of candidates saw the correct relationship between c and d and wrote an appropriate equation.

(c) Many candidates substituted 2 and 4 into the given equations, which gave decimal answers. Only a few went further and commented that these values were not integers thus contradicting the fact that in a 4-square set each number is a positive integer. A few candidates wrote '4 square sets' using their decimals, suggesting that this was a suitable set.

(d) (i) The common error in this question was to assume that $a^2 + b^2 = 45$ when that was what had to be deduced. The successful candidates left the expression $a^2 + b^2$ in the formula and made an equation, which could be rearranged to give the required result. A few undid the formula first and realised that calculating $2 \times 23 - 1$ was required. Some candidates calculated $23^2 - 22^2$ but did not always give sufficient reasons why this gave the value of $a^2 + b^2$.

Some candidates interpreted the question as a requirement to find the values of a and b.

(ii) Most candidates realised that c was 22, being 1 less than 23.

Several candidates were able to solve the problem of finding the only two squares that add up to 45.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/52
Paper 52 (Core)

Key messages

Many candidates might have improved their mark by reading questions carefully.

Algebra reduced to numerical work: cannot show an algebraic result by taking numerical examples.

General comments

Many candidates made good use of the dotty paper on the second page and were successful in systematically determining the number of connectors. Many candidates drew very accurate ruled diagrams. Numerical calculation was often set out well to gain communication arks.

Comments on specific questions

Question 1

(a) The large majority of candidates were able to complete the diagram showing all the connectors for a 3 by 3 square of dots. Some candidates chose to draw a diagram showing the missing connectors in the space below the question. There were candidates who copied the diagram onto the dotty grid but spoilt it by mixing it together with other patterns. A few candidates did not answer this question, probably because they had not read the instruction on the last line.

(b) (i) Nearly all candidates correctly drew all the horizontal and vertical connectors.

(ii) Nearly all candidates correctly drew all the diagonal connectors, with many careful ruled diagrams being seen.

(c) Most candidates scored full marks for correctly counting the number of connectors of two dots in grids of different sizes. In this respect good use was made of the dotty paper on page 2 of the examination paper. The numerical patterns were spotted by many candidates and allowed some candidates to recover after any incorrect counting.

(d) (i) Candidates, who noticed the square numbers, were often able to write down the correct expression $(n - 1)^2$ for diagonal connectors of two dots on an n by n grid. Some candidates could have improved their mark by communicating why this was correct, for instance by providing numerical confirmation or by identifying square numbers. The working space in this question gives a hint that more than just the answer was required.

(ii) Many candidates were able to find the expression for horizontal connectors from the pattern in the table. The better candidates communicated that pattern numerically with several examples. Others used a difference method to show that n^2 was present.

(e) The successful candidates correctly substituted 15 into their expressions for the numbers of connectors. Not all candidates realised that these values had to be doubled to reach the final total. Candidates, who did not get to the correct final answer, were usually awarded communication marks for writing out their substitutions.

Question 2

(a) The number of connectors of three dots in a 4 by 4 diagram was generally answered correctly. The most common error was to omit doubling what had been counted when using symmetry.

(b) Many fully correct answers were seen for the table of connectors of 3 dots. As in **Question 1(c)** use was made of the dotty paper on page 2 of the examination paper. However, in this question, the successful candidates made use of the numerical patterns in the table, which were a more reliable source for the correct answers.

(c) (i) Most candidates correctly substituted 20 into the given formula to get the correct answer.

(ii) Successful candidates substituted a value for n into the given expression and made an equation in a by using the corresponding value for the number of horizontal connectors: $9 + 3a = 3$ was quite common and led to $a = -2$. Such an equation and a subsequent step to solve it were awarded communication marks.

Several candidates did not relate the given expression to the number of connectors and instead wrote, for example, that $9 + 3a$ was equivalent to $3a = -9$.

Although only the coefficient of n was required, several candidates started from $an^2 + bn + c$ and used the method of simultaneous equations, which was much more difficult. This method proved unsuccessful because an incorrect assumption that $3a + b = 3$ was made.

Many candidates did not read that the final expression had to be written down.

Question 3

(a) Many candidates found the correct number of connectors of four dots on grids of different sizes. This was done by careful counting rather than looking for patterns. Several candidates made use of the dotty paper on page 2.

(b) (i) Several candidates successfully related the answer to this question about four diagonally connected dots to the expressions that had been seen in **Question 1(d)(i)** and **Question 2(c)(i)**. Other approaches were usually not successful.

(ii) If candidates did not have a pattern in the answers to **Question 1(d)(ii)** and **Question 2(c)(ii)** they were unlikely to gain credit in this question about four horizontally connected dots.

(c) Very few candidates showed sufficient algebraic skills to tackle this question, which required correctly expanding brackets twice and simplifying the sum of two expressions. Many candidates used numerical data, which then could not show a general result. Other candidates lacked useful expressions in **part (b)**, which were necessary for this question.

(d) Some candidates realised that the given expression $4n^2 - 4n + 18$ had to equal 180. They were able to show that $n = 9$ worked for this expression and thereby gained a mark for communication as well as for the final answer.

Other candidates continued the sequence of totals that they had seen in **part (a)**.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/53
Paper 53 (Core)

There were too few candidates for a meaningful report to be produced.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/61
Paper 61 (Extended)

Key messages

Communication is key on this paper. Candidates should be aware that 'show that' questions need to be answered in full, with every step of working written down. Similarly there may be marks for showing method in other questions so it is important to show thinking even if the candidate is not sure if their answer is correct.

General comments

Most candidates attempted all the questions which helped them to gain a few marks for answers they felt they did not know. A good knowledge of using ratios particularly in similar triangles was shown by the majority of candidates. The curve sketching was also accurate. It would be useful to work on algebraic methods such as rearranging and squaring terms.

Comments on specific questions

Section A – Investigation: Pythagorean sets of four

Question 1

(a) This first question asked for the value of the square of *PR* and all the information was given. Most candidates were able to answer this correctly although some felt the need to write the square root and very few took this further by finding the square root. Candidates need to check that they are actually answering the question that was asked.

(b) In this part candidates were again asked for the square, this time of *PS*. Some brought forward their answer from **part (a)**, whilst others squared that answer thinking they had found *PR* rather than PR^2. It is important to read carefully what is being asked or given and not to make assumptions such as, in this case, it is *PS* that is being asked for and the answer to **part (a)** was *PR* not PR^2.

Question 2

(a) A repeat of Pythagoras' Theorem, this time algebraic, was very well answered.

(b) Most candidates managed to show this successfully, by stating d^2 in terms of *c* and *PR* and then substituting the answer from **part (a)** for c^2. Those who tried to start from the given equation in d^2 were unsuccessful.

Question 3

This question was also well answered, the only wrong answers followed small arithmetical mistakes.

Question 4

(a) Many candidates did not realise that the first step was to equate d^2 to $(a + c)^2$, which made the second step to expand this bracket. Those who knew what to do, did it accurately.

(b) Candidates must be very careful to write down exactly what they are thinking in an explanation answer. Many candidates wrote about 'it' rather than *b,* being squared. Others wrote *b* divided by 2 when actually it was b^2 being divided by 2 not *b*.

Question 5

The first three marks were for the three bullet points for the method given in the question. Some candidates saved time by realising that although the first step said to choose any even integer for *b*, the last part said to choose $b = 8$. Candidates should be aware that when, for example, a step says 'calculate' as in 'calculate *ac*' then it is necessary to write down $ac = \ldots$ Many candidates used the longer $d^2 = a^2 + b^2 + c^2$ from **Question 2(b)** to find *d* rather than $d = a + c$ from **Question 4(a)** and found at least one of the Pythagorean sets of four.

Question 6

(a) Candidates calculated *d* using the squares of the first three numbers and only arithmetical slips led them to choose the incorrect set of four. It is worthwhile reminding candidates to check answers especially what appear to be the simplest ones.

(b) Work needs to be done on squaring and factorising. The first line, involving squaring each term to give, for example, $(ka)^2$ was very rarely seen. When it was seen the squaring of each term resulted in ka^2 rather than k^2a^2.

(c) Some candidates divided by 2 and 3 separately rather than by 6.

Question 7

Candidates should be advised to read questions very carefully, especially when the introduction is quite long. The last statement in this question was that *a* is 2 and many candidates missed this fact.

Section B – Modelling: Reflecting a laser beam

Question 8

A straightforward ratio to complete, followed by a rearrangement. Most candidates could compare the similar triangles and multiplied by 4 correctly.

Question 9

(a) This part told the candidates to use the method given in **Question 8** so that they were able to compare the diagrams and the working and make the necessary change – replace 6 by $6 - x$. Candidates should be encouraged to look for helpful tips that might make answering the question easier.

(b) As always with sketching, candidates should know that if the curve cuts an axis then there is probably a communication mark for indicating the value at the intersection. Also, apart from the correct shape, there is likely to be a mark for tending to but not crossing asymptotes, even if the asymptotes are not drawn. Finally, where appropriate, the curve should extend to the furthest negative and positive points labelled on the axes.

(c) (i) Most candidates wrote down the correct equation.

(ii) Candidates need to read questions carefully. In this case they were told to refer to the path of the laser beam. Consequently those who did this were much more likely to be awarded the mark. The answer was in fact in two parts and candidates were expected to explain that since the beam reflected vertically upwards it could not reach the wall.

Question 10

(a) A further step on comparing similar triangles. Candidates had to use the method previously shown with the information that this time was not all explicitly available. A good tip here is to label the diagram with all the information. For example when *RB* is labelled 15 then it becomes more obvious that '*TB*' is $15 - x$.

(b) This graph had two intercepts, one on each axis and a communication mark for each one.

(c) Candidates should always think about using their graph to answer questions that follow a sketch. Although this answer could have been worked out algebraically by substituting 6 for h it was quicker and easier for candidates to read this value from the graph. A communication mark was awarded for showing this by drawing the $h = 6$ line on their graph.

Question 11

(a) When the question asks 'show that' it is important that the candidate writes down every step of the working on a separate line, including the final answer. For example, in this answer it was necessary to multiply $6 + x$ by 10 which means that the candidate should write down $10(6 + x)$ before multiplying out to give $60 + 10x$.

(b) (i) Most candidates substituted $x = -1$ into the model in **part (a)**. Some worked the numerator as $14 - 1 = 13$ rather than $14 \times -1 = -14$.

(ii)(a) Mostly well answered.

(ii)(b) Candidates used either the model in **part (a)** or the one in **Question 10(a)**. Most saw that they needed the additional change in height and so concluded with the correct answer rather than stopping at (–) 7 or 17.

Question 12

(a) An algebraic version of the first question in the modelling section. Candidates need to work just as well with letters as with numbers.

(b) Candidates who attempted this question gained at least one mark. They should be encouraged to read the questions carefully and not to simplify unless told to do so.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/62
Paper 62 (Extended)

Key messages

Candidates should be aware that 'show that' questions need to be answered in full, with every step of working written down. Marks will only be awarded if the candidate demonstrates how the answer would have been found if they had not known it. Candidates should also be able to explain comparisons and support their reasons with working or sketching.

General comments

A good knowledge of working with sequences was necessary to do well in this investigation. An understanding of how the equations are formed from the general quadratic expression would have helped many candidates to appreciate that they could not use the standard equations for a sequence that does not begin with $n = 1$. Working with simultaneous equations and logarithms was good and communication was especially good on these questions.

Comments on specific questions

Section A – Investigation: Connecting dots

Question 1

(a) Well answered, this question tested whether the candidates had understood the introduction and explanation about what this investigation was about. It is important to read and, if necessary, reread the information given.

(b) Most candidates spotted the repeat patterns and noticed the square numbers.

(c) (i) Many candidates found the correct answer straightaway by looking at the pattern. Most did not show how they got to this answer, omitting to mention square numbers as the basis of the pattern.

(ii) This was more difficult than **part (i)** of this question and many candidates relied on using formulae having recognised it was a quadratic sequence, rather than spotting the pattern. Three substitutions given as three examples was quite sufficient for the communication mark.

(iii) The follow-through marking enabled candidates who had made a mistake in the previous parts to gain the mark for recognising that for the total number of connectors, the number of connectors of the diagonals and of the horizontals needed to be doubled.

Question 2

(a) Many candidates reached the correct answers by drawing on the diagram provided. Candidates should be encouraged to support or check their answers by drawing whenever it is appropriate.

(b) As before, most candidates recognised the pattern and the square numbers as well as the equality between horizontals and verticals and between Up and Down diagonals. Candidates should be encouraged to look for patterns and shown how to recognise them.

(c) (i) Almost without exception this question was answered correctly.

(ii) This was a little more difficult, and some candidates did not notice that the 1 by 1 row was missing. These candidates approached the problem in the same way as they would have done a standard sequence starting with term 1. Use of equations made from using a quadratic solution was a popular choice of method. This only worked if the candidate evolved the equations from first principals because of the missing 1 by 1 term.

(d) A follow-through answer again with the mark awarded for those who recognised this as well as recognising that both expressions needed to be doubled.

Question 3

(a) Following the patterns here proved a little more of a problem than previously and fewer candidates got all of the numerical answers correct. The algebraic answers were still correctly found by many with all equivalent expressions being accepted.

(b) This follow-through question was not as well answered as the previous ones. Some candidates had found it difficult to find the algebraic expressions without the support they had been given in **Questions 1** and **2**. Others worked them out from the numerical patterns and some extended the patterns from the previous algebraic expressions.

Question 4

(a) Most candidates realised the connection between k and m. Some misunderstood the question and took the 'relationship' to infer that they needed to explain using proportionality.

(b) (i) 'Show that' questions demand that every step should be shown from the start to the correct given answer. The substitution of 5 and 2 in the first line was straightforward and many candidates then wrote at least one further line of working before equating to 72. Those who just equalled their substitution line to 72 did not achieve this mark.

(ii) Some candidates found at least one new pair (excluding 5, 2). Many omitted to answer this question, presumably preferring to start the Modelling section.

Section B – Modelling: Breeding deer

Question 5

(a) (i) This section started with two 'show that' questions. For this first part it was necessary to show how to get 20% and then how to get the total for the end of the first year by subtracting the 20%. It was necessary to show the working needed to find the 20% and not just to write down the value.

(ii) In this part it was necessary to show that $1.8P_n$ could be found by subtracting 20% of P_n and adding to P_n. Some candidates thought this was more complicated than it actually was.

(b) (i) Most candidates knew what to do to calculate the number in the herd. This question clearly stated that the values were to be rounded to the nearest even integer. Many rounded to the nearest odd integer and some gave their answers to 1 decimal place.

(ii) The missing points were usually plotted accurately.

(c) Many candidates used the fact that the power of 0 meant b^0 was equal to 1, so that they found a correct answer for a immediately. It was not difficult to follow this using the second equation to get the correct value for b. Candidates need to know the values of the powers of 0 and 1.

Question 6

(a) (i) To show that c is 20 the values of $P = 20$ and $n = 1$ had to be substituted into the equation. Then the candidates needed to show that anything multiplied by 0 is 0 so that the equation reduced to $20 = c$.

Many candidates also substituted the values of *a* and *b* from the previous model. Candidates need to understand that the constants will usually change between models so this assumption should not be made.

(ii) Most candidates used the correct values for the given years to write down two equations. Although the question only asked the candidates to write down these equations many candidates simplified them. These candidates were not penalised if they made an error in their simplification.

(b) (i) Very good work on solving simultaneous equations was clearly shown by most candidates, who reached the correct final answer.

(ii) Many candidates did not answer this question. Of those who attempted it, many did relate it to the points plotted for the first model, so establishing a comparison between the two.

(c) In giving explanations candidates should try to be as explicit as possible. The new model virtually matched the original one for the first four years, so it was necessary to point out that after this time it gave too low a prediction.

Question 7

(a) (i) Candidates needed to show that they knew that 1 to any power is 1. This gave them the correct answer straightaway.

(ii) Candidates used logarithms to find the value of *b*. Some used logs to base 10 and others to base 3. Both methods were used successfully and working out was also usually clearly shown.

(b) Two distinct reasons were needed this time. One about values for years that either matched or did not and one about the gradient/shape of the curve representing the model. There could also have been the fact that the model had 0 deer at the start, which would have been impossible. There was also a communication mark, rarely awarded, for a sketch or working shown.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/63
Paper 63 (Extended)

There were too few candidates for a meaningful report to be produced.