CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/01

Paper 1 (Core)

General comments

This non-calculator paper was the first paper of the new syllabus that the candidates have taken and it seems as if they have been well prepared for this situation. Nearly all candidates were able to demonstrate some understanding of the subject with a number showing full knowledge of the topics tested.

Marks obtained by the candidates ranged from single figures up to full marks with most gaining more than half marks. Candidates should know that when a question is worth 1 mark then perhaps little or no working is required, but that when a question is worth 2 or 3 marks then some method working is necessary; those candidates who showed clear working could often gain 1 or 2 marks even when the answer was incorrect.

Clear working was shown on most papers with very few candidates writing in pencil. It was a pleasure to mark such neat scripts. Candidates should be encouraged to read carefully each question before answering it as it appeared that some had misread the question rather than not understood how to work out the answer.

Particular centres had trouble with certain topics: for example, naming of transformations was one topic that seemed to have not been covered by some Centres, and reading information from a cumulative frequency graph was another topic that all candidates from some Centres could not answer correctly.

Time did not appear to be a factor as most completed the paper, although the last question did appear to be difficult for most of the candidates.

Comments on specific questions

Question 1

Part (a) of this question was answered very well with most candidates being able to list the six factors of 18. The error that some candidates made was to think that 4 was a factor of 18. **Part (b)** was also well answered except that some misread it to find the least common multiple instead of the highest common factor.

Answers: **(a)** 1, 2, 3, 6, 9, 18 **(b)** 6

Question 2

This question tested the numerical skills of the candidates and it was well answered by the majority of the candidates. Very few answered **part (a)** incorrectly but **part (b)** proved to be more difficult for some. Most could find the correct answer to **part (c)** by finding one fifth of the amount and multiplying by two.

Answers: **(a)** 14 **(b)** 35 **(c)** 180

Question 3

This question was very well answered with most candidates able, in **part (a)** to write the express power of 5. Some misread it to ask for the numerical answer to the expression. In **part (b)** a commo was to add the 2 and 3 as well as the powers of x.

Answers: **(a)** 5^4 **(b)** $6x^7$

Question 4

Nearly all the candidates could find the correct answer to this question which required them to read from a graph. Of the others, most could gain 1 mark as the common error was not to give the fraction in lowest terms.

Answer: $\frac{1}{2}$

Question 5

This question on symmetry was well answered by the majority of the candidates. Most could find both the letter with line symmetry and those that had rotational symmetry. Those candidates who did not score full marks could, for the most part, score one through finding one of the correct letters and not making errors on others.

Answers: **(a)** **A** **E** **(b)** **N** **S**

Question 6

This algebraic question proved to be difficult for a number of the candidates. More could score marks on **part (a)** with the common error being not factorising fully the expression. Some included an extra p inside the bracket and candidates should be encouraged to check their answer by multiplying out the bracket before going on to the next question in an examination situation. **Part (b)** was more problematic with many candidates unable to multiply out the second bracket correctly. Some could gain 1 mark if they could then correctly simplify their expression.

Answers: **(a)** $3p(p - 4)$ **(b)** $4x + 9y$

Question 7

It was very pleasing to see the careful work that candidates presented in trying to solve the simultaneous equations. Many found the correct answers and of those who did not a significant number could gain 1 method mark through attempting to equate the coefficients or setting up an equation for a correct substitution.

Answers: $x = 5$ $y = 1$

Question 8

Part (a) of this question proved to be straightforward for most of the candidates who could find the next two terms in the sequence. **Part (b)** seemed to be more difficult for the candidates with many writing down $n + 5$ for the nth term.

Answers: **(a)** 22, 27 **(b)** $5n - 3$

Question 9

Part (a) of this question on transformations proved to be difficult for the majority of the candidate could name the transformation as a translation but then did not read the graph carefully and so ga vector as $\begin{pmatrix}8\\6\end{pmatrix}$. Although in **part (b)** most could say the transformation was a reflection a number found difficult to write down the equation of the line. A concern for the Examiner was that all candidates from specific Centres left this whole question unanswered which led to the conclusion that this part of the syllabus had not been taught.

Answers: **(a)** Translation $\begin{pmatrix}4\\3\end{pmatrix}$ **(b)** Reflection in the line $x = 1$

Question 10

This question on cumulative frequency was not well answered by a number of the candidates. They found it difficult to read the graph and did not seem to know whether to read the vertical or horizontal axis. It was clear from marking the scripts that all candidates from some Centres could gain full marks on this question and others could not score any marks on the question.

Answers: **(a)** 100 **(b)** 20 (19) **(c)** 90

Question 11

This question was well answered by the majority of the candidates. A common error in **part (b)** was to subtract the 70 from 180 and divide by two. In **part (c)** most could find the total sum of the angles in a hexagon and hence find the value of z.

Answers: **(a)** 30 **(b)** 40 **(c)** 150

Question 12

Although most candidates attempted this question the majority tried to work with trigonometry and right angled triangles and did not realise that this was a question on similar triangles. Of those who used similar triangles nearly all scored full marks as the numerical values were easy to manipulate.

Answer: 20

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/02

Paper 2 (Extended)

General comments

This non-calculator paper was the first paper of the new syllabus that the candidates have taken and it seems as if they had been well prepared for this situation. All of the questions on the paper appeared to be accessible to the vast majority of the candidates with most of them attempting all of the questions. They were able to demonstrate their knowledge and ability.

Marks obtained by the candidates ranged from single figures up to full marks with most gaining more than half marks. It was pleasing to see many candidates gaining high marks on this paper. Most had been entered at the correct level although there were a few candidates who perhaps might have benefited from sitting the Core paper.

Clear working was shown on most papers with very few candidates writing in pencil. Where appropriate, method marks could be awarded for correct working seen even when the answer was incorrect.

Time did not appear to be a factor as most completed the paper.

Comments on specific questions

Question 1

This question was answered very well with most candidates scoring full marks. When the answer was incorrect a method mark could be awarded for working indicating the distance multiplied by four. Unfortunately some answers were not in standard form with 1520000 and 15.2×10^5 being common incorrect answers. A few candidates totally misunderstood the question by also multiplying the power of 10 by 4 as well.

Answer: 1.52×10^6

Question 2

This question proved to be difficult for many candidates. A number who scored full marks on all other questions lost one mark in **part (b)** of this question. A number confused the period with amplitude and many did not know how to find the period even when the amplitude was known. For **part (a)** common incorrect answers were 2sin and 3. For **part (b)** incorrect answers were 3 and 3*x*.

Answers: **(a)** 2 **(b)** 120°

Question 3

This question was very well answered with most candidates scoring full marks. There could have been several ways of finding the answers to *y* and *z* but the common error seemed to be not to realise that the angle at the centre was twice the angle at the circumference. 20 and 80 were the usual alternative answers.

Answers: **(a)** 45 **(b)** 40 **(c)** 70

Question 4

This question was well answered with many candidates writing the correct forms for the expressio square root sign in **part (b)** was usually written correctly or brackets were included to indicate that both *y* should be under the sign.

Answers: **(a)** $\frac{1}{3}(p + q)$ or $\frac{p+q}{3}$ **(b)** $\sqrt{xy}$

Question 5

This question proved to be difficult for many of the candidates. In **part (a)** a number did not read the question carefully enough to see that – 4 should not be included. Another error was to exclude zero. Some did not know the prime numbers and included all the odd numbers between 25 and 35 in **part (b),** and very few candidates knew what the absolute value sign meant in **part (c)**.

Answers: **(a)** −3, −2, −1, 0, 1 **(b)** 29, 31 **(c)** −4, 4

Question 6

Part (a) of this question was well answered and it was pleasing to see full working indicating a good understanding of logarithms. The usual wrong answer was log7. **Part (b)**, however, proved to be more problematic with a number of candidates not understanding what was required to score full marks. $\sqrt{56}$ was the common incorrect answer.

Answers: **(a)** log 9 **(b)** $4\sqrt{2}$

Question 7

Part (a) of this question was correctly answered by the majority of candidates who could all follow the pattern of the sequence. **Part (b)** proved to be difficult for some of the candidates and it was interesting to see the different methods that candidates used to find the *n*th term. A method mark could be awarded when the candidate showed correct working to get a constant difference of 2. Some candidates gave ambiguous answers, such as $n = n^2 - 1$

Answers: **(a)** 35, 48 **(b)** $n^2 - 1$

Question 8

This question caused difficulties for those candidates who did not read the question carefully. Nearly all candidates knew the transformations of translation and reflection but a number reflected flag *P* in the line $x = 1$ instead of flag *F*. Some candidates reflected either flag *P* or flag *F* in the line $y = 1$.

Answers: **(a)** Top of flag at (2, 1) **(b)** Top of flag at (3, 3)

Question 9

The solving of the simultaneous equations was very well done by the majority of the candidates. Most used the elimination method and it was pleasing to see full working shown. When the answers were incorrect method marks could be awarded for an attempt made to ready the equations for the elimination method or for attempting to change one equation ready for the substitution method.

Answer: $x = -1$ $y = 3$

Question 10

Again this was a question that was well answered by the majority of candidates. Clear working was shown in most cases and when the answer was incorrect method marks could be awarded for correct steps shown.

Answer: $t = \frac{a+2y}{y}$ or $t = \frac{a}{y} + 2$

Question 11

Part (a)(i) was well answered, although a few candidates reversed the figures and some gave 3 in – 3. **Part (a)(ii)** proved to be difficult for a number of the candidates. The fact that they were asked t the length of the vector and leave the answer in surd form caused some confusion. A number of candida left this part out although they managed to answer the rest of the question. The diagram was given to help the candidates visualise the question and it was stated it was not to scale but a number of candidates did try to draw a grid on the diagram and find the answers from it. Full marks were awarded for $\sqrt{45}$ as well as $3\sqrt{5}$. Some did not see that the answer to **part (a)(i)** would help them find the gradient of the line in **part (b)**. A few candidates confused rise and run, though the vast majority knew that they were looking for a negative gradient. – 2 was the most common wrong answer. A few candidates tried to find the equation of the line. **Part (c)** was very well answered. 3.5 was virtually always found; unfortunately the x coordinate was not always zero. Finding the equation of the perpendicular bisector of the line *AB* was well answered by most of the candidates and follow through marks could be awarded from their **part (b)** if this answer was incorrect. This part was sometimes left unattempted.

Answers: **(a)(i)** $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$ **(ii)** $\sqrt{45}$ **(b)** $\frac{-3}{6}$ or equiv. **(c)** $(0, \frac{7}{2})$ or equiv. **(d)** $y = 2x + \frac{7}{2}$ or equiv.

Question 12

A number of candidates misread **part (a)** of this question and thought it was $16 \times \frac{3}{2}$. A number could get 16 cubed but could not then find the square root of 4096. **Part (b)** caused difficulties for a number of candidates who did not know how to find the value of cos30°. The common incorrect answer was $\frac{1}{4}$. Those who drew a triangle and placed the values in the correct places managed to find the answer.

Answers: **(a)** 64 **(b)** $\frac{3}{4}$

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/03
Paper 3 (Core)

General comments

There were 110 candidates in this pilot Examination and it is pleasing to report that the overall performances were quite successful. Almost all candidates achieved a reasonable number of marks whilst it proved to be very challenging to reach a total of more than 70 out of 96.

There appeared to be adequate working space throughout the paper and candidates had sufficient time to complete the Examination.

The work was usually clear and tidy but concern must be expressed over the lack of working shown by many candidates. The front cover of the paper is quite clear about the need to show relevant working and candidates do have responsibility to show how they arrived at their answers.

The responses to the questions involving the use of graphics calculators were extremely varied. Some Centres had clearly prepared their candidates thoroughly whilst others appeared to have under-estimated the use of such an important tool. Centres are reminded that the syllabus contains a list of requirements for the graphics calculator. Many candidates did not use facilities that give accurate values, especially for points of intersection. Inaccurate answers suggested that candidates had “traced” along graphs and this approach is to be discouraged. Many candidates did not use the statistics capabilities of the calculator in **Question 2(a)** and Centres should be advised that five one mark answers is an indication that a calculator is expected to be used.

There were also cases of premature approximation in working leading to final answers being out of an accuracy range. There were cases of answers being given to less than 3 figures, again with the loss of an accuracy mark.

Weaker candidates found the “multi-topic” questions such as 10 and 11 very challenging.

Comments on specific questions

Question 1

(a) This was very well done with most candidates scoring full marks.

(b) The set notation proved to be more challenging than the descriptions in **part (a)** and many gave the number in *W* only in **part (i)**. There was a range of incorrect answers in **part (ii)**, indicating a misunderstanding or a lack of knowledge of the complement notation.

(c) This was usually correct, although $\frac{1}{89}$ was a common error.

(d) This was generally successful although quite a number of candidates gave the answer as a fraction with denominator 2000.

Answers: **(a)(i)** 55 **(ii)** 7 **(iii)** 11 **(b)(i)** 82 **(ii)** 38 **(c)** $\frac{89}{100}$ **(d)** 1780

Question 2

(a) Many candidates did this question without using their graphics calculator. This probab more incorrect answers, especially in the calculation of the mean in **part (iii)**.

The mode was usually correct.

The median and mean were less successful with the usual errors of ignoring the frequencies or treating the frequencies as the values of data. The common error for the range was to give the lowest and the highest value. It appeared that many candidates did not know about quartiles.

(b),(c) The pie chat and bar chart were almost always successful. Quite a number of candidates drew an angle of 68° as a result of reading 2° from 70° in the wrong direction. A few candidates did not use a straight edge when drawing their bar chart.

(d) Most candidates were successful in this straightforward percentage calculation.

Answers: **(a)(i)** 7 **(ii)** 7.5 **(iii)** 7.9 **(iv)** 3 **(iv)** 9 **(b)** pie chart completed with angles of 72° and 36° and labels. **(c)** bar chart with heights 5, 2, 2, 1 **(d)** 30%

Question 3

(a) This was generally well done although some candidates divided by 11 instead of 6.

(b) This part was also well done with most candidates carrying out the question in the usual way of dividing by 11 and then multiplying by 6, showing their working clearly. Other candidates worked backwards by using the answer of 66 kg and showing that the total mass was 121 kg. This usually earned both marks but was occasionally incomplete and lost one mark.

(c) A percentage change proved to be much more difficult than the percentage question in **2(d).** Many candidates found the difference as a percentage of the final quantity and others found the original quantity as a percentage of the final quantity. There were very few correct answers.

(d) An alarming number of candidates multiplied by 100 instead of 1000 and a few others divided by 1000. Others left their answer as an ordinary number, overlooking the instruction about standard form. This part proved to be much less successful than expected.

(e) There was varied success in this part. Quite a number of candidates omitted their working, taking the risk of losing both marks if their answer was incorrect or incorrectly rounded. Although it is easy to put the numbers into a calculator it is also easy to write down the calculations 100 ÷ 7 in **part (i)** and 100 ÷ 14.5 in **part (ii)**, each gaining a method mark, regardless of the answer. A very common error in **part (ii)** was 6.89 from 6.896…. The correct 3 figure answer was 6.90 and so 6.9 was accepted.

Answers: **(a)** 150 cm **(c)** 4.76% **(d)** 6.3×10^4 **(e)(i)** 14.3 seconds **(ii)** 6.90 m/s

Question 4

Quite a number of candidates did not attempt this question suggesting a lack of experience in using graphics calculators.

(a) This was quite well done. A few drew their line either too far below the 2 on the *y*-axis or with a gradient of much more than $\frac{1}{2}$. The sketches were marked generously but it is hoped the quality will improve in the future.

(b) There were very few correct answers to this part. Inaccurate answers suggested that candidates traced along their graphs rather than use the intersection function on their calculators. Others gave answers from their sketch when the question asked for 4 decimal places. Accurate answers to fewer decimal places were given credit.

(c) It was anticipated that candidates would give some indication on their sketch. Howev... e their explanation below the written question, which was perfectly acceptable. A few ... sketch the line and seemed to lack the knowledge about no intersections implying no solutio...

Answers: **(b)** –1.2808, 0.7808

Question 5

Some candidates appeared to find all the information, at the beginning of the question, difficult to deal with. The greatest confusion was the attempts to use trigonometry because lengths and angles were given.

(a) This was generally well done by the candidates who understood that the base and height were both given.

(b) Those who were successful in **part (a)** usually went on to correctly find the area of the trapezium, either by adding the second triangle or by starting again with the full shape.

(c) Many candidates lost a mark by giving angle *ADB* and not angle *ADC*, suggesting weaknesses with this notation for angles.

(d) Fortunately the above error described in **part (c)** did not occur in this part and most candidates were successful.

Answers: **(a)** 42 cm^2 **(b)** 63 cm^2 **(c)** 105° **(d)** 35°

Question 6

(a) Most candidates plotted the 7 points correctly.

(b) This was generally successful although quite a number thought there was no correlation and yet a later part was about a line of best fit.

(c) **Part (i)** was almost always correct. In **part (ii)** it was extremely rare to see the point representing the mean values, $(\bar{x}, \bar{y})$, plotted for drawing the line of best fit. As well as being on the syllabus it was hoped that **part (i)** would remind candidates that this point was required. The mark scheme allowed straight lines with a negative gradient that were close to the point, but it is hoped that in future Examinations candidates will plot the point.

Answers: **(b)** negative **(c)(i)** 3

Question 7

(a) **Part (i)** was generally well done although a number of candidates did not use the formula given on page 2 of the question paper. As in **Question 3(e)**, a large number of candidates did not show any working. Almost all candidates multiplied correctly in **part (ii)**.

(b) Many candidates only gave the curved surface area of the cone in **part (i)**. The word total was printed in bold and there were 3 marks for this part, indicating that more than a single calculation would be required.

In **part (ii)** very few candidates divided by 10 000, the majority dividing by 100.

In **part (iii)** many divided by 7. Those who did divide 7 by their answer to **part (ii)** did not realise that their answer was clearly too small. As answers to **part (iii)** were invariably incorrect, it was vital to show some working as there was the method mark for the division of 7 by the answer to **part (ii)** seen.

Answers: **(a)(i)** 37.7 cm^3 **(ii)** 283 g **(b)(i)** 75.4 cm^2 **(ii)** 0.00754 m^2 **(iii)** 928

Question 8

Candidates who were unable to attempt much or any of **Question 4** also had problems with this question.

(a) Those with good calculator skills produced a good sketch here. One particular weakness was not setting the *y* values from –6 to 7.

(b) Some candidates used the appropriate facility of their graphics calculators whilst others substituted the values into the equation. **Part (ii)** met with much less success than **part (i)**.

(c) There were very few correct answers here and it appeared that many candidates were unfamiliar with the zero function on their calculators. Inaccurate answers were probably from tracing along the graph.

(d) The above comment for **part (c)** applies here.

(e) This was rarely correct and often omitted. Many were unaware of the need to draw the line $y = 2$ and of those who did very few could go further and use the intersection function on their calculator.

The work seen in **parts (c)**, **(d)** and **(e)** indicated quite a serious lack of experience and knowledge of some of the graphics calculator requirements written in the syllabus.

(f) This final part of **Question 8** was expected to be a discriminator but nevertheless it is disappointing to report that only a very small number of candidates appeared to understand the concept of the range of a function. Most omitted this part and others gave –6 to 7 as the answer.

Answers: **(b)(i)** 1 **(ii)** 3.04 **(c)** –0.879, 1.35, 2.53 **(d)** (2, –0.333) **(e)** –1.43
(f) –5.67 to 6.33

Question 9

All parts of this question were generally well done. Most candidates appeared to have reasonable knowledge of the basic angle properties of the circle. **Part (b)** was usually correct although answers of radius or tangent were occasionally seen.

Answers: **(a)(i)** 55° **(ii)** 110° **(b)** diameter

Question 10

A surprising number of candidates had problems with some or all parts of this question and yet each part looked at separately was straightforward as was the information on the diagram.

(a) This was quite well done. Some candidates attempted to use $y = mx + c$ in some way, missing the simple equation of a vertical line.

(b) There seemed to be a lack of knowledge about gradient. This part was often omitted or answers such as column vectors were given. The different forms of rise/run were not often seen and of those who reached this far, quite a few used incorrect values of *LM* and *LK*.

(c) This was quite well done, although the answer (4, 3) was quite frequent.

(d) Quite a number of candidates did not realise that this was a Pythagoras question and, as in **part (b)**, incorrect values of *LM* and *LK* were often used.

(e) As the method was given in the question, this part was a little more successful, although the comment in **parts (b)** and **(d)** also applied here.

Answers: **(a)** $x = 1$ **(b)** $-\frac{4}{7}$ **(c)** (4.5, 4) **(d)** 8.06 **(e)** 29.7°

Question 11

(a) This was well done. A number of candidates only scored one mark by having a final answ
or 0.8

(b) This was generally well done.

(c) This was quite well done by the stronger candidates but many tried, unsuccessfully, to multiply by 5 at the beginning rather that reduce the equation to $2x = 8$. No candidate appeared to make use of the answer to **part (b)**

(d) There were very few correct answers to this part.

The question was occasionally omitted but the most frequent problem was using a value from **part (c)**, indicating a misunderstanding of "in terms of *x*". As in **part (c)**, the answer to **part (b)** was not used.

Answers: **(a)** $\frac{4}{5}$ **(b)** 4, 5 **(c)** 20 **(e)** $2\left(\frac{2x}{5}-1\right)$ or $\frac{4x}{5}-2$ or $\frac{4x-10}{5}$

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/04
Paper 4 (Extended)

General comments

It is pleasing to report on the success of the first Paper 4 for this new course.

The performance of the candidates was generally of a high standard and even the weaker candidates were able to accumulate a reasonable number of marks to make the Examination a positive experience.

It is pleasing to report that most candidates were well prepared in the use of the graphical calculators and were aware of what constitutes adequate or necessary working. In addition to this, very few lacked knowledge of required uses of the calculator and very few used more advanced features than the syllabus requires. This is particularly pleasing as the latter runs risks of losing marks through lack of working. To simply write down a calculator function used e.g. "equation solver" followed by an answer does not constitute adequate working. For the sketching of graphs, the basic shapes of graphs were usually accepted and then credit was given if the curves or lines were in a reasonable position in relation to the axes. Labelling of intercepts with axes and intersections of graphs were not strictly required but candidates who did indicate these usually produced very good sketches and such annotations probably led to more correct answers. Very few candidates chose to use their calculators to solve equations that could be solved by algebraic methods and this was particularly evident in the quadratic equation question where almost all candidates used the formula. More specific comments will be made in the comments on individual questions but two common problems were **(a)** not setting up suitable domain and range on the calculator display and **(b)** tendency to trace along graphs when much more accurate facilities were available.

Regarding the more traditional aspects of the paper, most candidates presented their work clearly and to an appropriate level of accuracy. A small number of candidates did not show much or any working and it must be pointed out that such a strategy is taking unnecessary risks. Candidates generally adhered to the rubric requiring three significant figure accuracy or exact, unless otherwise indicated. Exact simplified surds and multiples of π are also acceptable for full marks on this paper.

Although this paper requires the use of a calculator, individual questions will appear which do not require a calculator. In order to ensure adequate syllabus coverage across Papers 2 and 4, it is not appropriate for the whole of Paper 4 to be dedicated to the use of a graphics calculator.

All candidates appeared to finish comfortably in the $2\frac{1}{4}$ hours.

Use of extra sheets for rough work is not recommended as this encourages candidates to write only the answers in the booklet with the rough work not handed in. If extra sheets are needed, e.g. when a candidate wishes to correct a question, then they must be handed in with the booklet. The use of extra sheets was extremely rare.

The comments received from Centres participating in this pilot Examination have been most encouraging and constructive. Future papers and mark schemes will benefit from such input.

Comments on specific questions

Question 1

(a) This was generally well done, with the majority of candidates calculating the $110 from the information given in the stem of the question. Some candidates worked backwards but still usually produced a complete explanation.

(b) This was generally well done with almost all candidates understanding the difference between interest and amount.

(c) This part was also well done, usually with the use of 1.04^3. The third mark in this question was for rounding correctly to 2 decimal places. A fairly common error was to have 67.50 or 67.5 as a final answer and a few candidates treated the question as simple interest.

Answers: **(b)** $57.50 **(c)** $67.49

Question 2

A surprising number of candidates did not use a graphics calculator in this question, doing a considerable amount of working for only a few marks. One mark for each part should have encouraged the use of a calculator. This is on the syllabus and candidates are expected to input the data accurately and should have ways of quickly checking that this has been done. **Parts (a)**, **(b)** and **(d)** were simple reading from the calculator and **part (e)** was a simple calculation also from the calculator display. **Part (c)** was a simple answer from the table given in the question.

Regardless of the above comments, almost all candidates scored highly in this question, although most lost a mark or two in a variety of ways.

Answers: **(a)** 37.2 **(b)** 37 **(c)** 36 **(d)** 36 **(e)** 2

Question 3

(a) This was quite well done although a number of candidates did not appear to be very familiar with the four term situation for factorising and others only partially factorised with answers such as $2(x+2y)+p(x+2y)$. $x(2+p)+y(4+2p)$ was not considered to be partially factorised as the two sets of brackets were not the same.

(b) This was generally well done and usually by using the formula. A few candidates used their graphics calculator and gave a sketch as their working, which was the more expected method. A few candidates used this method but omitted the sketch and thus were not awarded full marks. A very small number of candidates indicated that they had used equation solver and simply wrote down the answers, thus losing the method marks. The use of facilities on the calculator not on the syllabus may tend to result in only answers being written down and the spirit of this syllabus is to work with the listed functions and show the appropriate working that goes with them, which is usually a sketch. In this question there were 4 marks available and this should have indicated that some form of communication more than just the answers was required.

(c) This question proved to be a good discriminator and many candidates either mis-read the question or showed a poor understanding of variation.

The mis-read was to use the square of *w* and not the square root. A common error was to add something, usually 1 to a correct value, instead of using a constant. So, instead of $4=k\sqrt{9}$, $4=\sqrt{9}+1$ was frequently seen, leading to an answer of $\sqrt{36}+1=7$. A common slip in the working was $3k = 4$ leading to $k=\frac{4}{3}$.

Answers: **(a)** $(x+2y)(2+p)$ **(b)** –2.16, 1.16 **(c)** 8

Question 4

(a), (b) Both of these parts were generally well done. A small number of candidates seemed to find t notation a problem as they could not do these two parts but succeeded in **part (c)**.

(c) This was generally well done, almost always by using a Venn diagram, as was anticipated. It was pleasing to see this approach as the question did not indicate any particular method. Incorrect answers tended to be from other more abstract methods of adding and subtracting numbers or using a variable and building up an equation.

Most candidates were able to interpret the information form the way it was presented in the question.

Answers: **(c)** 4

Question 5

This graphical calculator question on unfamiliar graphs was very well done by most candidates.

A number of candidates did not set their screen to the values given on both axes. This basic skill proved to be vital for success in this question and should be noted for future.

(a) **Part (i)** was well done and the only occasional error was a gap in the curve in the region of the origin.

Part (ii) was also quite well done, although some candidates were not familiar with the absolute value function.

The four marks in **part (a)** were given for reasonable shapes and reasonable positions relative to the axes. There were no marks for labelling or annotating intersections with axes in this particular question. The quality of the sketches was not always of the expected standard, for example, the inflexion at the origin was often not horizontal or the pair of straight lines in **part (ii)** looking more like a single curve, but marking was generous in this regard.

(b) This was generally well done, with a few candidates, rather surprisingly, solving the equation algebraically. This was possible in this case but normally the zero facility on the calculator would be the only viable method.

(c), (d) These parts were generally well done by candidates fully prepared to use the appropriate functions on their calculators.

Quite a number of candidates appeared to use the tracing approach in **parts (b)**, **(c)** and **(d)** and lost all six marks. Others failed to interpret a value close to zero or three on the calculator as being exactly zero or three for the actual values. For example, something like 1.05.. $\times 10^{-39}$ may be the best the calculator can give but the candidate must realise the actual value is zero and write zero as the final answer.

In conclusion this question proved to test many calculator skills in a reasonably challenging way and it is pleasing to report that many candidates gained high marks.

Answers: **(b)** 0, 4 **(c)** (3, –27) **(d)** –2.33, 4.41

Question 6

(a) This was quite well done, although a few candidates calculated the average of the speeds rather than the average speed.

The information on the times was given in hours to avoid the converting of minutes into hours as **part (b)(i)** partly covered this skill. Mixed numbers were used as the fractional parts were simple and candidates certainly handled these correctly.

(b) **Part (i)** was generally well done, although some candidates multiplied distance by speed, some divided speed by distance and others converted hours into minutes by multiplying by 100.

For some reason, quite a number of candidates gave a whole number of minutes as though the question was asking for this. However, it was decided exceptionally to accept a 2 figure answer here. Some candidates approximated in their working, ending up with answers out of range.

The reverse percentage calculation in **part (ii)** proved to be a good discriminator and the calculation of 5% of 12.6 and subtracting this from 12.6 was extremely common. 12.6 ÷ 0.95 was also seen.

Answers: **(a)** 9.88 km/h **(b)** 47.6 mins **(c)** 12 km/h

Question 7

This was very well done. In **part (a)(i)**, most candidates gained full marks, the only common error being only going as far as $\frac{y+1}{2}$.

The sketches in **part (ii)** were usually correct with a straight line being close to (–1, 0), (0, 5) and (1, 1).

In **part (b)(i)** the common error was $\frac{1}{x^3}$. In **part (ii)** the candidates who had **part (i)** correct usually scored both marks for the sketch. These two marks were for a correct shape and then for intersecting the graph of $y = x^3$ between x = 0.5 and 1.5. **Part (iii)** was successfully done with many candidates aware of this symmetry even though it is not a requirement of the syllabus.

Answers: **(a) (i)** $\frac{x+1}{2}$ **(b)(i)** $\sqrt[3]{x}$ **(iii)** reflection in line $y = x$.

Question 8

(a) Both parts were very well done. Although both answers were exact, candidates almost always gave their answer to **part (ii)** correct to 3 significant figures, perhaps being influenced by this paper allowing the use of a calculator. A few found a second angle and then worked out the height.

(b) This part was less successful, as bearings are often found to be difficult and **part (ii)** certainly demonstrated this. Occasionally trigonometry was used to find other angles and the line *PB* was sometimes thought to be an East – West line.

Answers: **(a)(i)** 120° **(ii)** 6.50 or $\frac{15\sqrt{3}}{4}$ km^2 **(b)(i)** 040° **(ii)** 280°

Question 9

(a) This was very well done. Most candidates gained the marks by sketching a cubic curve turning points in the correct quadrants. Since there were only two marks, the annotation intersections with the axes was not required. Most candidates were able to choose suitable values of *y* to give a good sketch but a few did have a gap in the curve where the minimum point should have been drawn. It is reasonable to expect candidates to be able to choose suitable *y* values to produce a good fit, whether it be by trying values from experience or by using a zoom facility.

(b) This was quite well done. This question was one reason for not giving *y* values on the grid, to avoid candidates giving these values as the range. Giving the inaccurate –11 to 4 was often seen. The stronger candidates were successful and the only common error was an answer of 15.3, probably the result of confusion with the "range" in statistics.

Weaker candidates tended to omit this part.

Answers: **(b)** –11.1 to 4.24

Question 10

(a) This was very well done. Almost all candidates scored full marks.

(b) This was generally well done.

However, quite a number of candidates ignored the statement in bold about the use of the answers from **part (a)**. They contrived to have probabilities out of 29 and 30, giving the impression that they were not familiar with the concept of using previous results to predict future results.

The tree diagram was given to show all the possible outcomes and some candidates made use of it by marking various parts of the diagram. It also probably helped many candidates in realising that the outcome in **part (ii)** could happen in two ways.

Part (i) was usually correct.

In spite of the tree diagram and the above comment, the common error in **part (ii)** was to only give the probability of win and then draw.

In **part (iii)**, most candidates used the efficient way of subtracting the probability of the complement from 1. Those who added the probabilities of all the possible outcomes often omitted one or more of these.

Answers in the form of fractions, decimals and percentages as well as a mixture of these were equally acceptable.

Answers: **(a)(i)** $\frac{14}{28}$ **(ii)** $\frac{5}{28}$ **(iii)** $\frac{9}{28}$ **(b)(i)** $\frac{196}{784}$ (0.25) **(ii)** $\frac{140}{784}$ (0.179) **(iii)** $\frac{703}{784}$ (0.897)

Question 11

This was quite well done, especially **part (a)** and **part (b)(iii)**.

(b) In **part (i)** a common error was to have the ratio of non-corresponding sides, usually 6 : 2.5.

In **part (ii)**, an alarming number of candidates had the ratio of the areas equal to the ratio of the lengths of the sides. A few candidates used very long methods by using the angle given in the next part in a trigonometry calculation. Such methods usually scored the method mark but invariably lost the accuracy mark as the answer was exact. Candidates should be reminded that any data given later in a question is not needed until that part and should only use it earlier as a last resort.

In **part (iii)**, most candidates used the sine rule efficiently and correctly. The in... included in this question because the use of trigonometry represented a large switch... content and, on this occasion, it was decided not to test the ability to recognise the correct...

Answers: **(a)** similar **(b)(i)** 5 cm **(ii)** 11.2 cm^2 **(iii)** 21.8°

Question 12

A straightforward question, generally well done and only the weaker candidates had any problems in any parts of this question.

(a) The only occasional error was confusion between radius and diameter.

(b) The error seen in **part (a)** was much less frequent in this part.

(c) Some candidates found a fraction of a cylinder instead of simply multiplying their answer to **part (b)** by 3.

(d) It was pleasing to see correct collections of areas in this part and omissions of parts were quite rare.

Multiples of π were accepted but rarely seen.

Answers: **(a)** 6.28 or 2π cm **(b)** 37.7 or 12π cm^2 **(c)** 113 or 36π cm^3 **(d)** 166 or $30\pi + 72$ cm^2

Question 13

(a) This was very well done with most candidates plotting all ten points correctly.

(b) This was very well done. The strength of the correlation was not required on this occasion as it would have been difficult to decide on acceptable descriptions.

(c) This was very well done, although quite a number of candidates did not use the graphics calculator very efficiently, probably the result of not reading through the whole question before starting.

(d) This was much less successful than the earlier parts of the question, with **part (i)** suggesting a lack of experience with this calculator function. In **part (ii)** very few candidates plotted the point representing the mean values, in spite of the values being asked for in **part (c)**. It was decided to allow a reasonably accurate line without the point plotted for one of the two marks. It is hoped that this part of the syllabus is noted and covered more fully in future. **Part (iii)** was quite well done, often by candidates who had not completed **parts (i)** and **(ii)**. The wording of the question was to give a prediction in the context and so only an integer was accepted.

Answers: **(b)** positive **(c) (i)** 179.9 cm **(ii)** 53.2 **(d)(i)** $p = 0.386h - 16.2$
(iii) 52 or 53 or 54.

Question 14

(a) This was very well done. It was pleasing to see good accurate drawing of the three straight lines. There were very few errors and the only one of note was $y = \frac{1}{2}x$ for $y = 2x$.

(b) This was also very well done. Candidates had little difficulty in identifying the correct region.

(c) This was generally well done although the weaker candidates struggled with this more discriminating question. A surprising number of candidates did not recognise the symbols for real numbers or natural numbers.

(d) This was quite well done, although as in **part (c)**, this proved to be a good discrimina… Many of the correct answers were obtained without the need to draw the line 2… However, those who did draw the line were probably more successful in finding the correct… numbers. Non-integer answers were sometimes seen.

Parts (c) and **(d)** required candidates to interpret information from their answers to **parts (a)** and **(b)**. Although Linear programming as a topic is not on the syllabus, interpretation to this extent was considered a reasonable expectation.

Answers: **(c) (i)** 3.2 to 3.4 **(ii)** 3 **(d)** 1, 9 and 2, 7

Question 15

The whole of this rather traditional question was generally well done.

(a) This was usually successful, with most candidates following the division in **part (i)** into the next two parts.

(b) **Part (i)** was found to be the most difficult part of the question as it required the simplification of an equation containing algebraic fractions.

There were many sign errors in otherwise correct equations, probably the result of candidates thinking that $\frac{360}{x}$ was less than $\frac{360}{x+8}$.

Stronger candidates showed good algebraic skills and presented very clear and complete solutions. When it came to multiplying throughout or expressing over a common denominator, brackets were often omitted. Weaker candidates often omitted this part but were still able to attempt **parts (ii)**, **(iii)** and **(iv)**.

Part (ii) was generally well done. It is pleasing to report that sign errors were not too frequent.

Part (iii) was generally well done. A few candidates used the formula, often successfully, but for only one mark.

Part (iv) was also generally well done, although a common error was to divide 36 by x, thus giving the number of blue pencils. It appeared that candidates expected that they had to do a small calculation with the value of x but, as seen here, this is not always the case.

Algebraic techniques are on the syllabus and this type of question is too long for Paper 2. Unlike some other questions, there was a structure to this question to ensure that the relevant algebra would be used and not be replaced by graphical methods.

Answers: **(a)(i)** 30 **(ii)** $\frac{360}{x}$ **(iii)** $\frac{360}{x+8}$ **(b)(ii)** $(x+18)(x-10)$ **(iii)** –18, 10 **(iv)** 10

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/05

Paper 5 (Core)

General comments

This paper presented candidates with a problem to investigate that was unfamiliar to them. While being faced with the unfamiliar in an examination situation might have seemed daunting to many, candidates should realise that marks were awarded by Examiners for communicating their ideas on paper. There was also significant reward for skills in completing patterns.

The candidates' marks for this paper covered the full range and, as well as many candidates who could make little of the investigation, there were some very fine scripts.

An important part of this paper lay in asking candidates to communicate their mathematics. However too many candidates simply wrote down the numerical answers to each question. It is worth noting that candidates could still score marks for communication of a strategy even if the mathematics was not correct. Candidates often organised their work poorly with rough working mingling with answers and more clarity was expected of candidates here.

All candidates appeared to understand the investigation. Most were able to interpret what they found by seeking a pattern. Many who had identified the correct pattern in the table however were unable to extend it correctly and struggled to make sense of the general pattern.

Comments on specific questions

Question 1

All candidates achieved some degree of success in completing the table, with many gaining high marks. Any errors appeared to be random.

Answer:

Number of discs	Last disc		Number of discs	Last disc		Number of discs	Last disc
2	2		9	2		17	2
3	2		10	4		18	4
4	4		11	6		19	6
5	2		12	8		20	8
6	4		13	10			
7	6		14	12			
8	8		15	14			
			16	16			

Question 2

Nearly all the candidates were able to continue the sequence. Many gained further marks for communication by explaining how the sequence was constructed.

Answer: 64, 128

Question 3

This question tested whether candidates had found the correct pattern and were able to apply it. **Pa** **(e)** were graded in difficulty. A common error was to use multiples of two from an incorrect starting For several candidates there were too many errors in their table for them to proceed further.

(a) This question was quite well answered and many realised that, at 33, the sequence of multiples of 2 starts again.

Answer: 2

(b) This question was the counterpart to **part (a)** with successful candidates realising that one went one step back from 32.

Answer: 30

(c) There were a few correct answers here. In general it was solved by candidates working forwards from 64. Of those using incorrect strategies it was possible to gain a communication mark.

Answer: 8

(d) A similar strategy to **part (b)** was required.

Answer: 126

(e) This question was awkward to answer by extending the table and so a clear mathematical strategy was required. Most candidates experienced difficulty with this.

Answer: 144

Question 4

This question tested the candidate's ability to work backwards using the pattern.

(a) This was answered successfully by those candidates who extended the table by three lines. There were quite a few candidates who could answer this correctly while being unable to answer **Question 3**.

Answer: 23

(b) A more mathematical approach was required to gain the answer here and this proved beyond most candidates.

Answer: 44

Question 5

(a) This question was answered correctly by nearly all the candidates. It allowed those who had been unsuccessful in identifying the pattern to explore another idea.

Answer: 10 8 6 4 2 9 5 1 3

(b) Candidates frequently wrote at length about the patterns they observed in removals for clockwise and then anticlockwise directions. Sometimes they tried to make links, often in the form of "reversed orders" but very few noted the requirement to explain **how** they were related

Answer: The corresponding terms add up to 11.

(c) There were few correct answers to this which required candidates to apply what had been observed in **part (b)**

Answer: 325

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/06

Paper 6 (Extended)

General comments

This paper presented candidates with problems to tackle that were in essence unfamiliar to them. In particular, it tested mathematical skills in investigating and in modelling. While being faced with the unfamiliar in an examination situation might have seemed daunting to many, candidates should realise that marks were awarded by Examiners for communicating their ideas on paper. There was also a significant number of marks awarded for skill in completing patterns (investigation) and in using the graphics calculator sensibly (modelling).

Some candidates invested much time and effort in the investigation and were rewarded by high scores. This may have been at the expense of the modelling task and in future candidates should be aware that the number of marks for each section (in this case 24 and 16) is a guide to the time to spend on each (about 55 and 35 minutes).

The candidates' marks for this paper covered the full range and, as well as several candidates who could make little of the investigation in particular, there were some very fine scripts.

An important aspect of this paper lay in asking candidates to communicate their mathematics. However too many candidates simply wrote down the numerical answers to each question. It is worth noting that candidates could still score marks for communication of a strategy even if the mathematics was not correct.

Comments on specific questions

Section A Investigation

All candidates appeared to understand the investigation and most were able to interpret what they found by seeking a pattern. Many who had identified the correct pattern in the table however experienced difficulty in extending it correctly and struggled to make sense of it in general terms.

Question 1

All candidates achieved some degree of success in completing the table, with many gaining full marks. The errors seen were rather randomly distributed. From subsequent work it was clear that most candidates had found the pattern. By checking back they could have therefore corrected errors in the table.

Answer:

Number of discs	Last disc		Number of discs	Last disc		Number of discs	Last disc
2	2		9	2		17	2
3	2		10	4		18	4
4	4		11	6		19	6
5	2		12	8		20	8
6	4		13	10			
7	6		14	12			
8	8		15	14			
			16	16			

Question 2

Nearly all the candidates were able to continue the sequence. Many gained a further m communication by explaining how the sequence was constructed.

Answer: 32, 64, 128

Question 3

This question tested whether candidates had found the correct pattern and were able to apply it. **Parts (a)** to **(d)** were graded in difficulty. A common error was to use multiples of two from an incorrect starting point. A few tried to use quadratic regression. For some candidates there were too many errors in their table for them to proceed further. Too often candidates wrote numbers unsupported by any working and so did not gain any communication marks here.

(a) This question was well answered and many realised that, at 65, the sequence of multiples of 2 starts again.

Answer: 2

(b) There were a substantial number of correct answers here. In general it was solved by candidates working backwards from 128.

Answer: 122

(c) This question was awkward to answer by extending the table and so a clear mathematical strategy was required. Many candidates found this difficult. Of those demonstrating incorrect strategies many were, however, able to gain a communication mark.

Answer: 144

(d) Those candidates who had found a correct strategy in **part (c)** were then often successful here. Most used a trial and error method to find that 2^{16} was a useful value, rather than solve $2^n = 100\,000$ using logarithms.

Answer: 68 928

Question 4

This question tested the candidate's ability to go from the numerical pattern of answers to a sophisticated algebraic expression. Unfortunately many did not realise that a general expression was required and only gave 13 or something similar as the answer. Some credit was given to those candidates who gave expressions involving powers of two.

It was possible to gain a communication mark here by explaining the meaning of any variables used.

Answer: $2^n + 5$ where n > 2 (*n* an integer)

Question 5

(a)(i) This question was answered correctly by nearly all the candidates. It allowed those who had been unsuccessful in identifying the pattern to explore another idea.

Answer: 10 8 6 4 2 9 5 1 3

(ii) Candidates frequently wrote at length about the patterns they observed in removals for clockwise and then anticlockwise directions. Sometimes they tried to make links, often in the form of "reversed orders" but very few noted the request to explain **how** they were related.

Answer: The corresponding terms add up to 11.

(b)(i) There were few correct answers to this although several gained the credit here with[illegible] to answer **part (a)(ii)**.

Answer: $x + y = n + 1$

(ii) This question was designed to test understanding of the result in **part (b)(i)**. In spite of that some candidates gained full credit here by carefully writing out all 100 numbers and eliminating every other number in an anticlockwise direction.

Answer: 29

Section B Modelling

Candidates showed they could extract information from the diagram and the text, writing it correctly in mathematical language. Good ability was shown in tackling an unfamiliar context and many explained their methods and strategies clearly. Nevertheless, there were still too many candidates who missed the opportunity of gaining communication marks by merely writing down answers without any explanation.

In **Question 6** an unfamiliar equation had to be solved. The majority of candidates seemed unaware that this could be solved by correct use of a graphics calculator.

Question 1

Most candidates interpreted the situation correctly and scored full marks here.
A common error was to assume that the poles were *each* 4 metres from the central point.
Candidates could though still gain marks for following through with this answer.

Answer: $A(-2, 7.52)$ $B(2, 7.52)$ Lowest point (0, 2)

Question 2

Nearly all the candidates identified the correct model.

Answer: $y = ax^2 + b$

Question 3

Candidates scored well on this question and it was pleasing to see that many explained how they found their answer, either from substituting the relevant point or from knowledge of the vertex of a parabola.

Answer: 2

Question 4

The substitution of a relevant point and the subsequent solving of the equation was answered successfully by many candidates. Some candidates missed gaining a communication mark by simply writing down the answer.

Answer: 1.38

Question 5

Candidates were generally able to answer this question by correct substitution, some using their graphics calculator to find the value from a graph. The most common error was to substitute $x = 0.5$ rather than $x = 1.5$. Another source of error was using 50 rather than 0.5.

Answer: 5.11 m

Question 6

Candidates showed skill in handling this unfamiliar function. Only their general inability to use the graphics calculator to solve an unfamiliar equation hindered higher scores in this question.

(**a**) This was tackled well by most candidates. Some candidates surprisingly replaced w by a number to help them evaluate w^0. In this part most gained credit for communication and showed very clearly how they arrived at the answer. The most common error was an algebraic slip that resulted in $k = 2$.

Answer: 1

(b) Many candidates showed good understanding of the model by arriving at the equation $7.52 = w^2 + \frac{1}{w^2}$. Most then attempted an analytic solution which developed into incorrect algebraic statements. A few though persevered and did in fact manage, after some impressive algebra, to find the solutions to a quartic equation. Candidates were however being assessed on their ability to solve an unfamiliar equation with the graphics calculator.

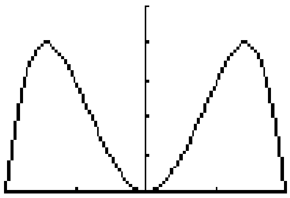
Answer: 2.72

Question 7

There were very few correct answers seen here, mainly because of lack of success in **Question 6(b)**.

(a) Of the candidates who answered this question most drew the two models on one diagram although the question stated that only the graph of the difference should be drawn While only a sketch was required, credit for communication was given if an approximate scale was seen. A few chose to draw accurate graphs on graph paper. The word sketch though implies that graph paper was not necessary and candidates were expected to read the answer from their graphics calculator.

Answer:



(or its reflection in the x-axis)

(b) Candidates were being tested to see whether they could use their graphics calculator in a real situation.

Answer: 0.4 m