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, show clearly all necessary working and check their answers for sense and accuracy. Candidates should be reminded of the need to read questions carefully, focussing on key words or instructions.

General comments

Workings are vital in 2-step problems, such as **Questions 10**, **19**, and **20** 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 7**, **18** and **21**. Arithmetic errors were also common in **Question 19** and **20** which should have been picked up when candidates checked their work.

The questions that presented least difficulty were **Questions 1, 2(b)**, **8(b)(i)**, **10**, **15** and **16**. Those that proved to be the most challenging were **Question 2(a),** triangular numbers, **Question 8(b)(ii)**, rotational symmetry, **Question 19**, volume of a pyramid and **Question 20**, bearings. In general, candidates attempted the vast majority of questions. The exceptions were **Question 8(b)(ii)**, (a question that has already been mentioned as challenging) and **Question 14**, a stem and leaf diagram, both of which were occasionally left blank by candidates.

Comments on specific questions

Question 1

Candidates did very well with this first question. If a wrong answer was seen, it was likely to be 1296 (36^2) or 9 (a factor of 36).

Question 2

As all the possible values are given for candidates to pick from, this type of question should never be left blank.

(a) Candidates were not confident in picking out the triangle number with 9 being the most frequently given answer. A few candidates did leave this blank.

(b) Conversely, this part was one where virtually all candidates gained the mark.

Question 3

Most candidates could turn this into $\frac{4}{7} \cdot 42$ but then some had problems with cancelling or the multiplication and division.

Question 4

Very little working was seen. If candidates cannot see where the brackets should go in a calculation, they should re-write it using brackets in various places to see what works. The question instruction was to insert one pair of brackets so if candidates used two sets, they did not get the mark.

Question 5

Candidates must be equipped with a protractor for questions such as this, as answers such as 120, or 170 implied that some had to guess the instead of being able to measuring it. Other answers such as 90° and 180° were seen quite often. Other candidate's answers were close but not accurate enough. Some gave the supplementary angle of 40°; this error of giving an acute value when it is clear that this is an obtuse angle should have been picked up when candidates were checking their answers.

Question 6

This was another type of multiple choice question testing angles and perpendicular lines. Diagram C was frequently chosen as the perpendicular lines and Diagram B was often thought to show a reflex angle when each of the four angles were right angles. Occasionally, the same diagram was chosen for both answers.

Question 7

The most common wrong answers here were 48 (the area) or 24 (half the area as if this was a triangle), 192 ($12 \cdot 4 \cdot 4$), or 16 (12 + 4, or half the perimeter). A few used the correct method but made arithmetic errors so were not awarded the mark.

Question 8

(a) Candidates did well here. A few drew a translation of the shape instead of a reflection. Some omitted the base line although all other lines were correct.

(b) Candidates found the first part straightforward but the second part was the one that caused the greatest challenge on the paper along with **Question 20**.

(i) For a large majority, the plotting of point *C* was very straightforward.

(ii) Completing a shape so it has rotational symmetry but not a line of symmetry is something that many found complex. It was clear from the question that line *AB* was in both triangles so *D* had to be found so that the question conditions were fulfilled. Many either plotted *D* at (3, 2) which did not give a shape made from two congruent triangles as there was an overlap, or plotted *D* at (–3, 1) or (–3, 2) which gave two triangles not a single shape.

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(b) Here, the question was about the first and last place on the table and there are four trains which go between them. Candidates had to work out the one that takes the longest time. It is possible to eliminate some of the journeys – the 11 35 takes less time than the 09 35 (by comparing the arrival times) and the 09 00 takes less time than the 11 00 – so, only the fourth and the seventh journeys have to be calculated. This cuts down the places that arithmetic errors could be made. In their working, many candidates showed the journey times as, for example, 2:29 (a time not a time period) instead of 2h 29m. Some candidates gave each train a label above the timetable and used that in the answer space; this was acceptable for full marks.

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The majority of successful candidates broke this down into two stages, first, 180° – 115° to give angle *ACB* then subtracting this angle and 45° from 180° to find angle *x*; some made arithmetic errors so could not get full marks. Some stated 115° – 45° = 70° which is correct, but then went on to take this away from 180°. In this case, as the method continued after the correct value was reached, no marks were awarded. Others assumed that triangle *ABC* was isosceles so angle *x* was 45°.

Question 11

Virtually all answers included the figures 45, but there were a few incorrect place values when candidates did not know how many grams there are in a kilogram or multiplied instead of dividing. Many did not use the fact that 1000g = 1 kg. Candidates should consider the relative masses and realise that expressed in kilograms, a small mass such as 45g is going to be much smaller. The most common wrong answers were 4500 kg and 0.45 kg.

Question 12

This was a well answered question with most giving 2*m*. Some did not use the signs with the correct value. A few treated the addition sign as multiply as their working was $4m^2 - 3m = m$. Others left the expression as $m + m$, as this was without the final step, it could not get the mark.

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A few candidates gave all the factors of 30 but did not apply the second condition that only those factor less than or equal to 10 were needed. Some gave a few elements that satisfied both conditions and as long as there were 4 or 5 elements, this gained a B1. However, a single pair of factors was not enough, for example 5 and 6. Some gave numbers that were outside the range or were not factors for example, 15, 4 or even 12.

Question 14

This is the first time this content has appeared on a Paper 1 and many candidates did not answer this question. Of those that did answer, it was clear that many did not understand how to complete a stem and leaf diagram. Some tried to give intervals in the 0,1, 2, 3 and 4 places, for example, $0 \leqslant \cdot \leqslant 9$ and others tried to draw a bar chart on the diagram. Some put the data in the order in correct lines but did not take off the tens digit so for example the second line was 11, 15, 17. There were a few who missed out filling in the key and a few that made some errors in the placement of a few entries and these candidates generally got some of the marks. Some were completely correct and gained all 3 marks.

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The majority of candidates multiplied 64 by 4 or wrote down 4, 16, 64 to get to 256. A very small number made arithmetic errors giving 276 as their answer. Some just doubled 64 to get 128.

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Some candidates tried to turn this into like terms in order to combine them together, for example, saying the $2x^2 = 2x + 2x$, so gave the answer $9x$. Or, they confused the meaning of the addition sign to give an answer such as $7x^2$ or $10x^3$.

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Bearings are often an area of the syllabus where candidates are not confident, especially as here where no diagram is given. There were many incorrect diagrams drawn where the angle representing the bearing 045 was so large (obtuse in many cases) the diagram could not be a help for the calculation. Those candidates who drew a correct diagram nearly always went on to find the correct bearing for Town *Y* from Town *X*. Very few correct answers did not have a diagram. The calculation is either 180 + 45 = 255, in one step or, using two steps 180 – 45 = 135, followed by 360 – 135 = 225. A frequent wrong method was 360 – 45 = 315. Often the answer was given as 045 or –45.

Question 21

Most of the incorrect answers came from candidates multiplying out the brackets incorrectly with or without trying to incorporate the 5 somewhere. The straightforward approach is to substitute 5 for *x* leading to $7 \cdot 4 = 28$. If the function was multiplied out correctly to $x^2 + x - 2$, this became 25 + 5 – 2 = 28. Some candidates wrote $5 = (x + 2)(x - 1)$ and proceeded to try and solve for *x*. This showed a lack of understanding of function notation. An indication that the question was not looking for a solution of an equation was that there is no '$x =$' on the answer line. Also, as there was only 1 mark available, this question could be answered with minimal workings.

Question 22

(a) Some candidates drew a shape of the correct size but in the wrong place. Some candidates drew a shape that was not similar to *A*. A few candidates drew an enlargement 3 times the size of *A* instead of twice. This was probably because when they found the distance to a point from the centre of enlargement, say, 2 squares, for the point (1, 1) and then went twice the distance beyond instead of just the same distance again. Joining all points and checking the side lengths should have been an indication that they were incorrect.

(b) This time, the shape, *S*, on the grid was the result of a transformation, but some candidates applied the translation to *S* as if it was the object not the image. Some applied the correct reverse transformation for one component correctly, i.e. $\begin{pmatrix} -2 \\ p \end{pmatrix}$ or $\begin{pmatrix} q \\ -3 \end{pmatrix}$, to get back to the image; this gained a mark as it was partly correct. Others mixed up the *x* and *y* component so applied the translation $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$; this did not gain a mark as nothing was correct.

Question 23

As the cumulative frequency column has been calculated (in previous sessions, candidates were asked to complete a cumulative frequency table), the first stage was to plot the points on the grid. In questions like this, the *x* co-ordinate is plotted at the top end of the interval so this first point was (20, 18). Once all points are plotted, a curve should be drawn between the points. This curve can be extended back to the origin. Some candidates used an *x* co-ordinate at the midpoint of each interval or at the bottom end. Some plots were inaccurately plotted as the scale was misapplied but, if all of their points were joined with a smooth curve, this gained a mark. A small number of candidates drew a bar chart or a stick chart from the data.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/12
Paper 12 (Core)

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CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/13
Paper 13 (Core)

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This was another multiply choice question. To find x, sin 37° or cos 53° can be used, but candidates were not given the option of using sin 57° so the only possible answer is x = 30 cos 53°. More candidates choose the second and fourth choices rather than the first, 30 tan 37°.

Question 19

Candidates were not confident of the formula to use even though the formula for the volume of a pyramid was given in formula sheet. This was not a simple case of substitution into the correct formula as the area of the base had to be worked out from the information in the question. Many ignored this stage so their answer was $70\,cm^3$. Others worked 7^2 but then used 30^2 in their formula instead of 30. A few simply multiplied 30 by 7. The area of square base was sometimes seen as $7 \cdot 4 = 28$.

Question 20

Bearings are often an area of the syllabus where candidates are not confident, especially as here where no diagram is given. There were many incorrect diagrams drawn where the angle representing the bearing 045 was so large (obtuse in many cases) the diagram could not be a help for the calculation. Those candidates who drew a correct diagram nearly always went on to find the correct bearing for Town *Y* from Town *X*. Very few correct answers did not have a diagram. The calculation is either 180 + 45 = 255, in one step or, using two steps 180 – 45 = 135, followed by 360 – 135 = 225. A frequent wrong method was 360 – 45 = 315. Often the answer was given as 045 or –45.

Question 21

Most of the incorrect answers came from candidates multiplying out the brackets incorrectly with or without trying to incorporate the 5 somewhere. The straightforward approach is to substitute 5 for *x* leading to $7 \cdot 4 = 28$. If the function was multiplied out correctly to $x^2 + x - 2$, this became 25 + 5 – 2 = 28. Some candidates wrote $5 = (x + 2)(x - 1)$ and proceeded to try and solve for *x*. This showed a lack of understanding of function notation. An indication that the question was not looking for a solution of an equation was that there is no '*x* =' on the answer line. Also, as there was only 1 mark available, this question could be answered with minimal workings.

Question 22

(a) Some candidates drew a shape of the correct size but in the wrong place. Some candidates drew a shape that was not similar to *A*. A few candidates drew an enlargement 3 times the size of *A* instead of twice. This was probably because when they found the distance to a point from the centre of enlargement, say, 2 squares, for the point (1, 1) and then went twice the distance beyond instead of just the same distance again. Joining all points and checking the side lengths should have been an indication that they were incorrect.

(b) This time, the shape, *S*, on the grid was the result of a transformation, but some candidates applied the translation to *S* as if it was the object not the image. Some applied the correct reverse transformation for one component correctly, i.e. $\begin{pmatrix} -2 \\ p \end{pmatrix}$ or $\begin{pmatrix} q \\ -3 \end{pmatrix}$, to get back to the image; this gained a mark as it was partly correct. Others mixed up the *x* and *y* component so applied the translation $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$; this did not gain a mark as nothing was correct.

Question 23

As the cumulative frequency column has been calculated (in previous sessions, candidates were asked to complete a cumulative frequency table), the first stage was to plot the points on the grid. In questions like this, the *x* co-ordinate is plotted at the top end of the interval so this first point was (20, 18). Once all points are plotted, a curve should be drawn between the points. This curve can be extended back to the origin. Some candidates used an *x* co-ordinate at the midpoint of each interval or at the bottom end. Some plots were inaccurately plotted as the scale was misapplied but, if all of their points were joined with a smooth curve, this gained a mark. A small number of candidates drew a bar chart or a stick chart from the data.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/21
Paper 21 (Extended)

Key message

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.

Some candidates do not have a clear understanding of the demands of some questions.

Candidates need to realise that it is easier to factorise a quadratic equation in order to solve it on a non-calculator paper than use the formula in **Question 10**.

General comments

Candidates were well prepared for the paper and demonstrated excellent algebraic skills. Some candidates lost marks through careless numerical slips, especially when attempting to use the formula to solve the quadratic in **Question 10**. Candidates should choose the most suitable method to solve a quadratic equation. Candidates should make all of their working clear and not merely write a collection of numbers scattered over the page. Candidates should always leave their answers in their simplest form.

In **Question 9b**, candidates were not familiar with the notation. In **Question 16**, many candidates found the perpendicular bisector when the line clearly had to pass through the point *B*.

Comments on specific questions

Question 1

Nearly all candidates answered this question correctly showing a good understanding of 'bidmas'. Common wrong answer of 58 resulting from working from left to right.

Question 2

Most candidates answered this well although a number of them mixed up factors and multiples. Although 91 was an unsurprising common wrong answer in **part b**, there were also many other smaller odd numbers given here showing a lack of understanding of primes.

Question 3

Virtually all candidates answered this question correctly but the common errors were including –3 or not including 1.

Question 4

There were bo problems with understanding the question, but careless arithmetic errors were seen here.

Question 5

Many candidates did not deal confidently with the mixed fraction here and the usual errors of flipping the first fraction were seen.

Question 6

This question proved difficult for many candidates. They seemed unfamiliar with this type of sequence and tried to treat it as a quadratic or cubic.

Question 7

The majority of candidates used the correct formulas. Errors were seen when candidates forgot to halve the sphere and mixed up the use of the radius squared or cubed. Some candidates seemed unfamiliar working with pi and used a decimal value, complicating working out further.

Candidates should try to show all working in a clear and organised way.

Question 8

Most strong candidates could handle this fractional power correctly.

Question 9

There were mostly correct answers to **part (a)**. However, **part (b)** was inaccessible to many candidates. Many candidates who started the question correctly made mistakes squaring –5.

Question 10

The majority of candidates tried to solve the quadratic using the formula and made mistakes when unable to deal with the negative coefficient of *b*. Algebraic attempts were more successful although some candidates were challenged to factorise a quadratic with a term of $4w^2$.

Question 11

This question was straightforward for many candidates and working out was clear.

Question 12

There were many correct answers for **part (a)** but candidates were made errors in **part (b)** where the common incorrect answer of 36° was seen many times.

Question 13

This question was well attempted by many candidates and most picked up at least one mark in **part (a)** for identifying $\sqrt{5}$. Many started **part (b)** correctly but had problems multiplying surds. Unfortunately many candidates did not simplify their answer as requested in the question.

Question 14

Candidates were most successful when they divided by 2π initially. Squaring caused some problems with many ending up with only $2\pi^2$. Candidates work here was sometimes very difficult to follow.

Question 15

Many candidates were able to use the rules of indices correctly.

Question 16

Candidates did start by finding the gradient of *AB* although numerical slips were often seen here. Most of the candidates then attempted to find the negative reciprocal of their gradient. Unfortunately many candidates then found the midpoint of *AB* and used this to find the intercept instead of using point *B*. Candidates should be encouraged to read the question more carefully.

Question 17

Most candidates attempted to factorise the top or bottom but it was rare to see both done correctly and then cancelled correctly. Many candidates did not recognise the difference of two squares in the denominator.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/22
Paper 22 (Extended)

Key message

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 must simplify their answers where required.

Some candidates do not have a clear understanding of the demands of some questions, namely 'change the subject' when the variable occurs twice in the question.

General comments

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

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

Candidates should always leave their answers in their simplest form.

Comments on specific questions

Question 1

Nearly all candidates answered this question correctly showing a good understanding of square numbers. The common wrong answer was giving a square number that was not in the given list.

Question 2

Most candidates answered this question correctly. Answers of 32000 and 0.0032 were seen.

Question 3

Although many candidates answered both parts correctly, there were a significant number of candidates who rounded the given numbers and then gave a number in standard form. Both parts were set deliberately to test that candidates would leave the significant 0s in their answer.

Question 4

Candidates worked with the exterior angle and scored full marks. There were some examples of careless arithmetic errors.

Question 5

Although the majority of candidates gave excellent solutions, a significant number thought that the average velocity could be found by finding the two velocities and then finding their average.

Question 6

This question proved a good source of marks for many candidates. Again, careless arithmetical errors were seen.

Question 7

This question proved to be too challenging for the majority of candidates. Many candidates thought that the answer must relate to 30°, 45° etc. Other candidates gave their answer as tan(0.75) instead of 0.75. Some candidates simply gave their answer as 6.

Question 8

Most candidates scored full marks. The common error was in dividing 2.1 by 6.

Question 9

There were some correct answers but the question proved to be too difficult for many. The common incorrect approach was to look at the difference between 16 and 20 and try to find the mean of their difference, giving an incorrect answer of 2.

Question 10

This question proved to be a good discriminator with the full range of marks being seen. Nearly all candidates tried to find the gradient of *AB* and then tried to find the negative reciprocal of their answer. Careless errors were seen when finding the midpoint of *AB*. Candidates then substituted their answers to try to find the equation of the required line with varying degrees of success.

Question 11

This question was straightforward for many candidates and working out was clear. The common error was in not fully factorising the expression.

Question 12

There were many correct answers for **part (a)** but some candidates correctly simplified the two surds but then omitted to simplify their answer. The common error made by candidates in **part (b)** was not cancelling throughout by 7 and hence giving an unsimplified answer which scored 2 marks out of 3.

Question 13

This question was well attempted by many candidates and most picked up at least one mark. Unfortunately many candidates did not solve their simplified equation with the common incorrect answer being 8.

Question 14

This question was a good discriminator. Unfortunately many candidates gave their final answer with x on both sides of their equation. Candidates were most successful when they rearranged the equation before eliminating fractions. Candidates work here was sometimes very difficult to follow.

Question 15

Many candidates realised that the archer needed two hits and one miss, but the majority of these candidates failed to realise that the miss could occur on any of the three attempts, which gave a final answer of $\frac{18}{125}$.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/23
Paper 23 (Extended)

Key message

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

There appeared to be a lack of knowledge regarding proof of congruent triangles.

General comments

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

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

Candidates should always leave their answers in their simplest form. Many candidates lost marks through incorrect simplification of a correct answer.

Some candidates do not have a clear understanding of the demands of some questions.

Comments on specific questions

Question 1

Many candidates answered this question correctly showing a good understanding of 'bidmas'. Common wrong answers of –16 and 0.9 were regularly seen.

Question 2

(a) Most candidates answered this part well with candidates quoting 83 and 89, although 87 was an common wrong answer.

(b) This part proved to be more challenging with many candidates quoting 49.

Question 3

Many candidates answered both parts of this question correctly showing a good understanding of symmetry.

Question 4

There were no problems with understanding the question but careless arithmetic errors were seen. Some candidates argued that you would buy two tins per day and hence giving an answer of 14. Although this was not the intended interpretation, this logic scored full marks if clearly stated.

Question 5

(a) Virtually all candidates gave the correct answer.

(b) This part proved to be more challenging. Many candidates were able to partially factorise the expression but many were unable to complete the question correctly.

Question 6

This question proved difficult for many candidates. They seemed unable to find three distinct answers but many scored one mark with answers of 40 and 70.

Question 7

The majority of candidates started the question correctly by finding a total of 150 but then were unsure as to how to deal with the mean of the 11 numbers.

Question 8

(a) Most candidates answered this part correctly.

(b) This part proved to be more challenging. A popular incorrect answer related to the fact that the fraction cancelled easily to a simpler fraction.

(c) Most candidates answered this part correctly.

Question 9

(a) Nearly all candidates scored the first mark but then many candidates were unable to cope with negatives in an inequality, with a final answer of $x > -2$ being seen as frequently as the correct answer.

(b) This part was well answered as the mark was a follow through from **part (a)**. Some candidates made mistakes in their notation in excluding the end-point.

Question 10

This question discriminated between candidates. The majority of candidates correctly eliminated fractions but then did not deal with *a* occurring twice in their equation and gave an answer with *a* on both sides of their answer.

Question 11

In this question candidates had the correct approach and made reasonable attempts at expanding the brackets. Difficulties arose in the simplification of their surd expressions and careless arithmetic mistakes were regularly seen.

Question 12

(a) There were many correct answers for this part.

(b) Again, there were many correct answers. However, some candidates interchanged the correct answers in **parts (a)** and **(b)**.

(c) Candidates must read the question carefully. Although there were many correct solutions, a significant number of candidates gave the equation of a line passing through *B.* In addition, there were careless errors in finding the gradient of the perpendicular.

Question 13

This question proved to be beyond all candidates and full marks were not seen. It was clear that candidates were unsure how to construct a logical argument for congruence.

It was expected that candidates would state which sides and angles were equal and the reason for them being equal and then give a correct conclusion about the triangles being congruent.

Question 14

Only the best candidates were successful in this question. The majority of candidates substituted the co-ordinates of *P* into the given equation but then could not proceed any further. Candidates' work here was sometimes very difficult to follow.

Question 15

(a) The majority of candidates were able to answer this part correctly, although a height drawn at 4.4 was commonly seen.

(b) Again there were many correct answers.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/31
Paper 31 (Core)

Key messages

In order to be successful in this paper, candidates need to have covered the whole of the Core syllabus content. Candidates need to read all questions carefully and answer what is asked for. Answers need to be given to the level of accuracy required in the paper or to 3 significant figures.

General comments

Some candidates lost marks because they did not show their working out. Candidates who show their working out could be awarded marks for correct working even if an answer is not correct.

Some questions relied on the candidate having a graphics calculator to find the answer. This is an essential part of the course and candidates needed to know how to use the graphics calculator correctly.

Some candidates didn't use a straight edge for drawing straight lines. In this paper, a ruler was needed for drawing a line of best fit and lines of symmetry.

Some questions relied on the candidates knowing the correct mathematical terminology. Candidates needed to be familiar with these terms.

Comments on specific questions

Question 1

(a) The majority of the candidates managed to write $\frac{2}{5}$ correctly as a decimal. A few candidates reversed the fraction and wrote 2.5 for their answer.

(b) Most of the candidates managed to work out the percentage correctly. Some candidates showed no working and wrote 56% as their final answer. This was not given to 3 significant figures, so these candidates were not awarded the mark.

(c) Many candidates scored full marks for this calculation by showing the full answer. Some were awarded a method mark for working out 26.939 correctly but made a mistake when subtracting it from 68.52 or for truncating the answer.

(d) Nearly all candidates knew that 1 and 17 were the factors of 17. A few wrote 8.5 for their answer and some others wrote a multiple of 17 rather than a factor.

(e) The vast majority of the candidates could write the fraction in its simplest form. Only a few wrote the answer as a decimal rather than as a fraction.

(f) All candidates managed to write down the next 2 terms of the sequence.

(g) Many candidates manged to calculate the simple interest correctly. Some candidates gave the total amount at the end of 4 years but most of these were awarded a mark for showing their working out. A small number of candidates incorrectly used the compound interest formula in this part.

(h) The majority of candidates found the correct number of cupcakes. A few wrote the answer as 7.69 or 7.7 and most of those candidates were awarded a mark for showing their working out.

Question 2

(a) Nearly all the candidates managed to complete the frequency table correctly.

(b) (i) Many candidates knew how to find the range. Some wrote 36–42 which was not enough for the mark to be awarded. Some candidates took the range from the frequencies and wrote 3 for their answer.

(ii) Most managed to find the mode correctly. Only a few candidates wrote 4 as their answer instead of 36.

(iii) Many candidates wrote the correct median. A number of the candidates wrote 39 for their answer which was the middle of the top line in the table. A few candidates mixed up the median and mean.

(iv) The mean was the least well answered part of this question. Some candidates knew to multiply out the numbers by the frequencies and then divide by 15. However, many candidates just added up the top line and divided by 7 to get 39 as their answer.

(c) All the candidates who had the frequency table completed could draw the correct bar chart. A few others were awarded follow through marks for drawing the correct bar chart for their table.

Question 3

(a) Many candidates wrote the correct answer. A common answer was 6020 and a few candidates wrote 60 025.

(b) Although there were many correct answers seen for this part, some candidates did not complete the mapping diagram.

(c) Most of the candidates wrote 37 for their answer. A few candidates wrote 41 or 43 which were also correct answers. A small number wrote 39 for their answer, or a prime number not in the correct range.

(d) There were many correct answers seen for the value of *a*.

(e) The majority correctly wrote the number to the nearest 10. Some wrote the answer to the nearest hundred or thousand.

(f) Many candidates managed to write the number correct to 2 decimal places. Some candidates wrote the answer to one decimal place and others moved the point.

(g) (i) This part was not very well answered. Many of the candidates wrote 346 for their answer.

(ii) Many candidates knew how to write the number in standard form. A few wrote a negative power of 10 instead of a positive power.

Question 4

(a) Most of the answers for this part were correct. A few candidates wrote the co-ordinates the wrong way around but only lost one mark for this repeated error.

(b) There were few correct answers for the length of *AB*. The most common answers were 4.5 or 4. The answer of 4.5 was most likely obtained by measuring the length of *AB* instead of calculating it. Some candidates showed their working out of Pythagoras' Theorem and were awarded both marks if they gave their answer to 3 significant figures but only one mark if they wrote 4.5 as their answer.

(c) There were many correct answers for the midpoint of *AB*. A few candidates wrote the co-ordinates the wrong way around and lost the mark.

(d) Some candidates knew how to find the gradient of the line. A few wrote $\frac{1}{2}$ instead of 2. Some other candidates did not know how to find the gradient and either wrote an equation or did not answer the question.

(e) Few candidates managed to write the correct equation of the line. The most common answer was $y = 3$.

Question 5

(a) Approximately half of the candidates found the correct answer. Many candidates wrote 10 for their answer, possibly thinking the difference between 5 and 2 is 3 and so 7 + 3 = 10.

(b) The majority managed to reduce the ratio to its simplest form. Only a few candidates wrote 2 : 30 and some others wrote multiples of the ratio.

(c) There were many correct answers seen for the sale price. Some candidates worked out the 15% correctly but then forgot to subtract it from the original price. These candidates were awarded one mark for the working out.

Question 6

(a) Most candidates drew the correct line of symmetry in the isosceles triangle. In the rectangle, some candidates wrongly included diagonals. Some candidates only drew one line of symmetry and others omitted the question altogether.

(b) There were many correct answers for the area. Those candidates who did not score full marks managed to gain one or two marks, usually for the area of the rectangle and/or circle.

Question 7

(a) The majority of candidates managed to plot all 4 points correctly. A few misplotted a point or omitted a point.

(b)(i) Most candidates found the correct mean age.

(ii) Most candidates found the correct mean length.

(c) Few candidates managed to score full marks for the line of best fit. Many did not draw the line through the mean point or drew it out of tolerance. Many candidates only joined up the points or drew a curve and were awarded no marks. A line of best fit needed to pass through the mean point and be drawn with a straight edge.

(d) Those who drew a straight line for **part (c)** usually managed to find a correct estimate for the length.

Question 8

(a) Few candidates managed to find the correct height of the tower. Some candidates managed to find 30.2 but then forgot to add on the 1.8 to find the correct height. Some candidates thought that 36×1.8 would give them the correct answer.

(b)(i) There were quite a few different answers here. Some candidates found the correct answer of 90. Other common answers were 19 and 71.

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

(c) Very few candidates managed to find the correct length of *OA*. Some candidates tried to use tan 19 to find the answer and others omitted this part of the question.

Question 9

(a) Many candidates wrote 4 in the correct place. A few candidates wrote 20 and some did not place any answer on the dotted line.

(b) This part was not very well answered. Many of the candidates did not appear to be familiar with the notation. Quite a few candidates wrote 1 for the answer instead of 3.

(c) (i) Most of the candidates found the correct probability. A few wrote $\frac{4}{20}$, $\frac{7}{16}$, $\frac{4}{16}$ or just 7 as their answer.

(ii) For this part there were more correct answers.

(d) The shading was not particularly well done with many variations of the wrong shading. Some candidates shaded the intersection, others the outside part, and others *B* and the outside part.

Question 10

(a) Approximately half of the candidates were awarded full marks for the sketch. Some lost a mark if their curve crossed the *y*-axis close to 20. Other candidates lost a mark if their *x*-axis intercepts were not close to 2 and 4 or if their turning points were not in the correct quadrants. A few candidates' graphs were entirely incorrect or not drawn at all.

(b) Those candidates who managed to draw the correct graph also managed to find the correct co-ordinates.

(c) Most of the candidates who managed to draw the correct graph managed to find the correct co-ordinates. Some candidates seemed to use the 'trace' function on their calculator instead of the 'intersect' function which did not result in accurate answers.

(d) Few of the candidates who answered this part were awarded full marks. This was usually the result of not giving their answers to 3 significant figures.

(e) Quite a number of candidates found the correct number of times that the line crossed the curve. A few wrote the point of intersection instead.

Question 11

(a) (i) All but a few candidates found the correct answer. A few subtracted 3 from 6 and wrote 3 for their answer.

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

(iii) Few correct answers were seen. A few candidates removed the inequality sign and others wrote an answer of -4 or similar. Some candidates were awarded a method mark for writing $-y > 3$.

(b) Few candidates managed to expand and simplify the brackets correctly. The most common mistake was to omit the square and $15y - 21y - 20y + 28$ was frequently seen as an intermediate answer. Some other candidates wrote -28 or added $-21y$ and $-20y$ incorrectly. A few candidates did not know how to expand the brackets.

(c) (i) Most candidates managed to find the correct value for *P*.

(ii) Rearranging the formula was not particularly well attempted. Some candidates just swapped the *P* and *T*, others divided *P* by 2 but not the 6. Some wrote $P + \frac{6}{2}$ without putting brackets round the *P* + 6. Some other candidates substituted 10 for *P* and wrote 8 as their answer.

(d) Many candidates managed to add the fractions. A few gained a method mark for having the correct common denominator. A few candidates just added the numerators and denominators and $\frac{3y}{8}$ was a common incorrect answer.

Question 12

(a) There were many correct answers seen for the tree diagram. Only a few candidates did not know how to complete it correctly.

(b) There were not many correct answers seen for this part. The most common mistake was to add $\frac{2}{7}$ and $\frac{1}{20}$ instead of multiplying them.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/32
Paper 32 (Core)

Key messages

In order to be successful in this paper, candidates need to have covered the whole of the Core syllabus content. Candidates need to read all questions carefully and answer what is asked for. Answers need to be given to the level of accuracy required in the paper or to 3 significant figures.

General comments

Some candidates lost marks because they did not show their working out. Candidates who show their working out could be awarded marks for correct working even if an answer is not correct.

Some questions relied on the candidate having a graphics calculator to find the answer. This is an essential part of the course and candidates needed to know how to use the graphics calculator correctly.

Some candidates didn't use a straight edge for drawing straight lines. In this paper, a ruler was needed for drawing a line of best fit and lines of symmetry.

Some questions relied on the candidates knowing the correct mathematical terminology. Candidates needed to be familiar with these terms.

Comments on specific questions

Question 1

(a) The majority of the candidates managed to write $\frac{2}{5}$ correctly as a decimal. A few candidates reversed the fraction and wrote 2.5 for their answer.

(b) Most of the candidates managed to work out the percentage correctly. Some candidates showed no working and wrote 56% as their final answer. This was not given to 3 significant figures, so these candidates were not awarded the mark.

(c) Many candidates scored full marks for this calculation by showing the full answer. Some were awarded a method mark for working out 26.939 correctly but made a mistake when subtracting it from 68.52 or for truncating the answer.

(d) Nearly all candidates knew that 1 and 17 were the factors of 17. A few wrote 8.5 for their answer and some others wrote a multiple of 17 rather than a factor.

(e) The vast majority of the candidates could write the fraction in its simplest form. Only a few wrote the answer as a decimal rather than as a fraction.

(f) All candidates managed to write down the next 2 terms of the sequence.

(g) Many candidates manged to calculate the simple interest correctly. Some candidates gave the total amount at the end of 4 years but most of these were awarded a mark for showing their working out. A small number of candidates incorrectly used the compound interest formula in this part.

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(b) (i) Many candidates knew how to find the range. Some wrote 36–42 which was not enough for the mark to be awarded. Some candidates took the range from the frequencies and wrote 3 for their answer.

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(iii) Many candidates wrote the correct median. A number of the candidates wrote 39 for their answer which was the middle of the top line in the table. A few candidates mixed up the median and mean.

(iv) The mean was the least well answered part of this question. Some candidates knew to multiply out the numbers by the frequencies and then divide by 15. However, many candidates just added up the top line and divided by 7 to get 39 as their answer.

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(c) Most of the candidates wrote 37 for their answer. A few candidates wrote 41 or 43 which were also correct answers. A small number wrote 39 for their answer, or a prime number not in the correct range.

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(g) (i) This part was not very well answered. Many of the candidates wrote 346 for their answer.

(ii) Many candidates knew how to write the number in standard form. A few wrote a negative power of 10 instead of a positive power.

Question 4

(a) Most of the answers for this part were correct. A few candidates wrote the co-ordinates the wrong way around but only lost one mark for this repeated error.

(b) There were few correct answers for the length of *AB*. The most common answers were 4.5 or 4. The answer of 4.5 was most likely obtained by measuring the length of *AB* instead of calculating it. Some candidates showed their working out of Pythagoras' Theorem and were awarded both marks if they gave their answer to 3 significant figures but only one mark if they wrote 4.5 as their answer.

(c) There were many correct answers for the midpoint of *AB*. A few candidates wrote the co-ordinates the wrong way around and lost the mark.

(d) Some candidates knew how to find the gradient of the line. A few wrote $\frac{1}{2}$ instead of 2. Some other candidates did not know how to find the gradient and either wrote an equation or did not answer the question.

(e) Few candidates managed to write the correct equation of the line. The most common answer was $y = 3$.

Question 5

(a) Approximately half of the candidates found the correct answer. Many candidates wrote 10 for their answer, possibly thinking the difference between 5 and 2 is 3 and so 7 + 3 = 10.

(b) The majority managed to reduce the ratio to its simplest form. Only a few candidates wrote $2:30$ and some others wrote multiples of the ratio.

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(a) Most candidates drew the correct line of symmetry in the isosceles triangle. In the rectangle, some candidates wrongly included diagonals. Some candidates only drew one line of symmetry and others omitted the question altogether.

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(a) The majority of candidates managed to plot all 4 points correctly. A few misplotted a point or omitted a point.

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(ii) Most candidates found the correct mean length.

(c) Few candidates managed to score full marks for the line of best fit. Many did not draw the line through the mean point or drew it out of tolerance. Many candidates only joined up the points or drew a curve and were awarded no marks. A line of best fit needed to pass through the mean point and be drawn with a straight edge.

(d) Those who drew a straight line for **part (c)** usually managed to find a correct estimate for the length.

Question 8

(a) Few candidates managed to find the correct height of the tower. Some candidates managed to find 30.2 but then forgot to add on the 1.8 to find the correct height. Some candidates thought that 36×1.8 would give them the correct answer.

(b) (i) There were quite a few different answers here. Some candidates found the correct answer of 90. Other common answers were 19 and 71.

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

(c) Very few candidates managed to find the correct length of *OA*. Some candidates tried to use $\tan 19$ to find the answer and others omitted this part of the question.

Question 9

(a) Many candidates wrote 4 in the correct place. A few candidates wrote 20 and some did not place any answer on the dotted line.

(b) This part was not very well answered. Many of the candidates did not appear to be familiar with the notation. Quite a few candidates wrote 1 for the answer instead of 3.

(c) (i) Most of the candidates found the correct probability. A few wrote $\frac{4}{20}$, $\frac{7}{16}$, $\frac{4}{16}$ or just 7 as their answer.

(ii) For this part there were more correct answers.

(d) The shading was not particularly well done with many variations of the wrong shading. Some candidates shaded the intersection, others the outside part, and others *B* and the outside part.

Question 10

(a) Approximately half of the candidates were awarded full marks for the sketch. Some lost a mark if their curve crossed the *y*-axis close to 20. Other candidates lost a mark if their *x*-axis intercepts were not close to 2 and 4 or if their turning points were not in the correct quadrants. A few candidates' graphs were entirely incorrect or not drawn at all.

(b) Those candidates who managed to draw the correct graph also managed to find the correct co-ordinates.

(c) Most of the candidates who managed to draw the correct graph managed to find the correct co-ordinates. Some candidates seemed to use the 'trace' function on their calculator instead of the 'intersect' function which did not result in accurate answers.

(d) Few of the candidates who answered this part were awarded full marks. This was usually the result of not giving their answers to 3 significant figures.

(e) Quite a number of candidates found the correct number of times that the line crossed the curve. A few wrote the point of intersection instead.

Question 11

(a) (i) All but a few candidates found the correct answer. A few subtracted 3 from 6 and wrote 3 for their answer.

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

(iii) Few correct answers were seen. A few candidates removed the inequality sign and others wrote an answer of -4 or similar. Some candidates were awarded a method mark for writing $-y > 3$.

(b) Few candidates managed to expand and simplify the brackets correctly. The most common mistake was to omit the square and $15y - 21y - 20y + 28$ was frequently seen as an intermediate answer. Some other candidates wrote -28 or added $-21y$ and $-20y$ incorrectly. A few candidates did not know how to expand the brackets.

(c) (i) Most candidates managed to find the correct value for *P*.

(ii) Rearranging the formula was not particularly well attempted. Some candidates just swapped the *P* and *T*, others divided *P* by 2 but not the 6. Some wrote $P + \frac{6}{2}$ without putting brackets round the *P* + 6. Some other candidates substituted 10 for *P* and wrote 8 as their answer.

(d) Many candidates managed to add the fractions. A few gained a method mark for having the correct common denominator. A few candidates just added the numerators and denominators and $\frac{3y}{8}$ was a common incorrect answer.

Question 12

(a) There were many correct answers seen for the tree diagram. Only a few candidates did not know how to complete it correctly.

(b) There were not many correct answers seen for this part. The most common mistake was to add $\frac{2}{7}$ and $\frac{1}{20}$ instead of multiplying them.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/33
Paper 33 (Core)

Key messages

In order to be successful in this paper, candidates need to have covered the whole of the Core syllabus content. Candidates need to read all questions carefully and answer what is asked for. Answers need to be given to the level of accuracy required in the paper or to 3 significant figures.

General comments

Some candidates lost marks because they did not show their working out. Candidates who show their working out could be awarded marks for correct working even if an answer is not correct.

Some questions relied on the candidate having a graphics calculator to find the answer. This is an essential part of the course and candidates needed to know how to use the graphics calculator correctly.

Some candidates didn't use a straight edge for drawing straight lines. In this paper, a ruler was needed for drawing a line of best fit and lines of symmetry.

Some questions relied on the candidates knowing the correct mathematical terminology. Candidates needed to be familiar with these terms.

Comments on specific questions

Question 1

(a) The majority of the candidates managed to write $\frac{2}{5}$ correctly as a decimal. A few candidates reversed the fraction and wrote 2.5 for their answer.

(b) Most of the candidates managed to work out the percentage correctly. Some candidates showed no working and wrote 56% as their final answer. This was not given to 3 significant figures, so these candidates were not awarded the mark.

(c) Many candidates scored full marks for this calculation by showing the full answer. Some were awarded a method mark for working out 26.939 correctly but made a mistake when subtracting it from 68.52 or for truncating the answer.

(d) Nearly all candidates knew that 1 and 17 were the factors of 17. A few wrote 8.5 for their answer and some others wrote a multiple of 17 rather than a factor.

(e) The vast majority of the candidates could write the fraction in its simplest form. Only a few wrote the answer as a decimal rather than as a fraction.

(f) All candidates managed to write down the next 2 terms of the sequence.

(g) Many candidates manged to calculate the simple interest correctly. Some candidates gave the total amount at the end of 4 years but most of these were awarded a mark for showing their working out. A small number of candidates incorrectly used the compound interest formula in this part.

(h) The majority of candidates found the correct number of cupcakes. A few wrote the answer as 7.69 or 7.7 and most of those candidates were awarded a mark for showing their working out.

Question 2

(a) Nearly all the candidates managed to complete the frequency table correctly.

(b) (i) Many candidates knew how to find the range. Some wrote 36–42 which was not enough for the mark to be awarded. Some candidates took the range from the frequencies and wrote 3 for their answer.

(ii) Most managed to find the mode correctly. Only a few candidates wrote 4 as their answer instead of 36.

(iii) Many candidates wrote the correct median. A number of the candidates wrote 39 for their answer which was the middle of the top line in the table. A few candidates mixed up the median and mean.

(iv) The mean was the least well answered part of this question. Some candidates knew to multiply out the numbers by the frequencies and then divide by 15. However, many candidates just added up the top line and divided by 7 to get 39 as their answer.

(c) All the candidates who had the frequency table completed could draw the correct bar chart. A few others were awarded follow through marks for drawing the correct bar chart for their table.

Question 3

(a) Many candidates wrote the correct answer. A common answer was 6020 and a few candidates wrote 60 025.

(b) Although there were many correct answers seen for this part, some candidates did not complete the mapping diagram.

(c) Most of the candidates wrote 37 for their answer. A few candidates wrote 41 or 43 which were also correct answers. A small number wrote 39 for their answer, or a prime number not in the correct range.

(d) There were many correct answers seen for the value of *a*.

(e) The majority correctly wrote the number to the nearest 10. Some wrote the answer to the nearest hundred or thousand.

(f) Many candidates managed to write the number correct to 2 decimal places. Some candidates wrote the answer to one decimal place and others moved the point.

(g) (i) This part was not very well answered. Many of the candidates wrote 346 for their answer.

(ii) Many candidates knew how to write the number in standard form. A few wrote a negative power of 10 instead of a positive power.

Question 4

(a) Most of the answers for this part were correct. A few candidates wrote the co-ordinates the wrong way around but only lost one mark for this repeated error.

(b) There were few correct answers for the length of *AB*. The most common answers were 4.5 or 4. The answer of 4.5 was most likely obtained by measuring the length of *AB* instead of calculating it. Some candidates showed their working out of Pythagoras' Theorem and were awarded both marks if they gave their answer to 3 significant figures but only one mark if they wrote 4.5 as their answer.

(c) There were many correct answers for the midpoint of *AB*. A few candidates wrote the co-ordinates the wrong way around and lost the mark.

(d) Some candidates knew how to find the gradient of the line. A few wrote $\frac{1}{2}$ instead of 2. Some other candidates did not know how to find the gradient and either wrote an equation or did not answer the question.

(e) Few candidates managed to write the correct equation of the line. The most common answer was $y = 3$.

Question 5

(a) Approximately half of the candidates found the correct answer. Many candidates wrote 10 for their answer, possibly thinking the difference between 5 and 2 is 3 and so 7 + 3 = 10.

(b) The majority managed to reduce the ratio to its simplest form. Only a few candidates wrote $2:30$ and some others wrote multiples of the ratio.

(c) There were many correct answers seen for the sale price. Some candidates worked out the 15% correctly but then forgot to subtract it from the original price. These candidates were awarded one mark for the working out.

Question 6

(a) Most candidates drew the correct line of symmetry in the isosceles triangle. In the rectangle, some candidates wrongly included diagonals. Some candidates only drew one line of symmetry and others omitted the question altogether.

(b) There were many correct answers for the area. Those candidates who did not score full marks managed to gain one or two marks, usually for the area of the rectangle and/or circle.

Question 7

(a) The majority of candidates managed to plot all 4 points correctly. A few misplotted a point or omitted a point.

(b)(i) Most candidates found the correct mean age.

(ii) Most candidates found the correct mean length.

(c) Few candidates managed to score full marks for the line of best fit. Many did not draw the line through the mean point or drew it out of tolerance. Many candidates only joined up the points or drew a curve and were awarded no marks. A line of best fit needed to pass through the mean point and be drawn with a straight edge.

(d) Those who drew a straight line for **part (c)** usually managed to find a correct estimate for the length.

Question 8

(a) Few candidates managed to find the correct height of the tower. Some candidates managed to find 30.2 but then forgot to add on the 1.8 to find the correct height. Some candidates thought that 36×1.8 would give them the correct answer.

(b)(i) There were quite a few different answers here. Some candidates found the correct answer of 90. Other common answers were 19 and 71.

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(a) Many candidates wrote 4 in the correct place. A few candidates wrote 20 and some did not place any answer on the dotted line.

(b) This part was not very well answered. Many of the candidates did not appear to be familiar with the notation. Quite a few candidates wrote 1 for the answer instead of 3.

(c) (i) Most of the candidates found the correct probability. A few wrote $\frac{4}{20}$, $\frac{7}{16}$, $\frac{4}{16}$ or just 7 as their answer.

(ii) For this part there were more correct answers.

(d) The shading was not particularly well done with many variations of the wrong shading. Some candidates shaded the intersection, others the outside part, and others *B* and the outside part.

Question 10

(a) Approximately half of the candidates were awarded full marks for the sketch. Some lost a mark if their curve crossed the *y*-axis close to 20. Other candidates lost a mark if their *x*-axis intercepts were not close to 2 and 4 or if their turning points were not in the correct quadrants. A few candidates' graphs were entirely incorrect or not drawn at all.

(b) Those candidates who managed to draw the correct graph also managed to find the correct co-ordinates.

(c) Most of the candidates who managed to draw the correct graph managed to find the correct co-ordinates. Some candidates seemed to use the 'trace' function on their calculator instead of the 'intersect' function which did not result in accurate answers.

(d) Few of the candidates who answered this part were awarded full marks. This was usually the result of not giving their answers to 3 significant figures.

(e) Quite a number of candidates found the correct number of times that the line crossed the curve. A few wrote the point of intersection instead.

Question 11

(a) (i) All but a few candidates found the correct answer. A few subtracted 3 from 6 and wrote 3 for their answer.

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(b) Few candidates managed to expand and simplify the brackets correctly. The most common mistake was to omit the square and $15y - 21y - 20y + 28$ was frequently seen as an intermediate answer. Some other candidates wrote -28 or added $-21y$ and $-20y$ incorrectly. A few candidates did not know how to expand the brackets.

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(ii) Rearranging the formula was not particularly well attempted. Some candidates just swapped the *P* and *T*, others divided *P* by 2 but not the 6. Some wrote $P + \frac{6}{2}$ without putting brackets round the *P* + 6. Some other candidates substituted 10 for *P* and wrote 8 as their answer.

(d) Many candidates managed to add the fractions. A few gained a method mark for having the correct common denominator. A few candidates just added the numerators and denominators and $\frac{3y}{8}$ was a common incorrect answer.

Question 12

(a) There were many correct answers seen for the tree diagram. Only a few candidates did not know how to complete it correctly.

(b) There were not many correct answers seen for this part. The most common mistake was to add $\frac{2}{7}$ and $\frac{1}{20}$ instead of multiplying them.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/41
Paper 41 (Extended)

Key messages

Candidates are expected to answer all questions on the paper so full coverage of the syllabus is vital.

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 3 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.

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. There is 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 often replace the need for some complicated algebra and candidates need to be aware of such opportunities.

General comments

The candidates were very well prepared for this paper and there were many excellent 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 very 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, particularly in 'show that' style questions. There could be some improvements in the following areas:

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

The sketching of graphs does continue to improve although the potential use of graphics calculators elsewhere is often not realised.

Topics on which questions were well answered include transformations, linear functions, trigonometry, histogram, curve sketching and quadratic equations.

Topics that were found difficult were compound functions, reverse percentages, bearings and combined probability without replacement, speed/distance/time.

There were mixed responses in other questions as will be explained in the following comments.

Comments on specific questions

Question 1

Most candidates answered this question well although some still get the mode, median and mean confused.

(a) Nearly all candidates gave a correct answer although some omitted to subtract the lowest value from the highest giving an answer of, e.g. 5 to 11. A few candidates did not order the list of values and simply used the first and last value seen in the list as their values.

(b) This was mostly all correct.

(c) This part was done less well with many giving 7 and 8 as their final answer.

(d) This part caused a few problems for many candidates.

(e) This was not a well answered part with many able to correctly calculate the lower and upper quartiles but then giving a final answer of, e.g. 6.5 to 9.5.

(f) This was nearly always correct.

Question 2

(a) Most scored full marks here and used the efficient method with the multiplier of 1.16 to calculate their final answer. A few calculated 16% of 4.5 kg and then added to find 5.22 kg. A few candidates changed units to grams and scored the special case mark only.

(b) A reasonably well attempted part although many candidates used the selling price in their denominator scoring 0. Several part marks of M1 or M2 were awarded for incomplete answers.

(c) A discriminating part with many candidates unable to link the 5% to $0.06 successfully. Most scored full marks or 0 here with only a couple of responses gaining the M1.

Question 3

(a) This question was answered well with the majority of candidates producing a sketch of two branches with the correct shapes not crossing the *x*-axis. Some candidates lost a mark for the left hand branch not intersecting the *y*-axis with a zero gradient and some did not identify the second branch below the *x*-axis. Most candidates were able to correctly set their graphics calculators to obtain suitable images to sketch.

(b) Most candidates only scored 1 mark here, usually for the upper limit. Many lost the mark for the lower limit for not giving their answer to 3 significant figures with, often, only 2 digits being seen. Only a few responses used the correct fractional form of the answer.

(c) Nearly all candidates gave the correct answer, but some did not gain all the marks the minimum point of the parabola not passing through the origin.

(d) (i) Candidates who knew how to use their calculator to solve this equation were generally successful in finding the correct value. Many lost the mark for not giving their answer to 3 significant figures with often only 2 digits being seen and many omitted the negative sign.

(ii) A reasonably well answered part although several had their answers reversed and only scored the special case mark. Some were unable to get their equation into the required form and the final answers were often given as negative values.

Question 4

Usually transformations are a high scoring question for the candidates, however in **part (a)** a few candidates lost all marks for use of combined transformations.

(a) (i) Generally a well answered part although several candidates did reverse the *x* and *y* translations. A few responses gave the allowed correct vector in words. Translocation was seen on a small number of responses and was not allowed.

(ii) There were many good answers. Almost all gave sufficient information, i.e. an angle, direction and centre even though these were not always correct. A few gave the direction correctly as 270° anti-clockwise but none used –90°.

(iii) Well answered with a few using stretch instead of enlargement. Almost all candidates gave sufficient information, i.e. transformation, scale factor and centre of enlargement even though these were not always correct.

(b) A reasonably well answered part although several candidates gave a stretch with *x*-axis invariant or in the incorrect position, the left hand point usually plotted at (2, 1).

Question 5

(a) A very well answered part although a large number of candidates lost the final mark for not giving their answer to the nearest dollar. Most used the efficient method with the multiplier of 0.9 raised to the power of 4 although some performed four calculations which often led to rounding errors. Those that did not score here tended to use 1.1 as their multiplier.

(b) A discriminating part which was not dealt with well by the majority of candidates. Many incorrect responses multiplied $2025 by 1.1^2.

(c) This was a potentially difficult part which was very well answered by most candidates. Most used the efficient method of logarithms although several went down the trial and improvement route. Several correctly calculated 13.3, etc. but then misinterpreted their final answer as 13.

Question 6

(a) This was nearly always correct, but some incorrectly placed a 3 in either the numerator or denominator.

(b) (i) This was also mostly all correct with candidates recognising the need to multiply the two individual fractions for the combined probability. A small number added their probabilities.

(ii) This part was not well answered with most not interpreting the question correctly. Probably the best method to have used was a grid listing all 12 possible outcomes and realising that 8 satisfied the criteria.

(c) Another poorly answered part with very few scoring full marks. Several calculated $\frac{1}{8}$ correctly but then did not subtract this from 1.

(d) Several candidates scored just one mark here for one correct route, but very few went on to multiply by 6 to get the correct final answer. A small number of candidates fortuitously found an equivalent correct answer of $\frac{1}{6}$.

(e) A discriminating part in which very few responses had the correct answer of 6. Many candidates did not recognise that the answer had to be an integer because of the context of the question.

(f) Very few correct answers seen here with only a couple of candidates scoring a method mark for showing their combined probabilities for rolling 1 then 2 or vice versa.

Question 7

This question resulted in a wide range of marks from the candidates:

(a) Most candidates realised that this was not a right-angled triangle and the cosine rule was required. There were many fully correct answers. The formula is on the formula page but a few candidates still used sine in the place of cosine. Angle *ABC* had to be calculated using angles around a point and most gained at least the one mark for 120°. The only real challenge with the cosine rule is to ensure that $(2 \cdot 10 \cdot 12 \cdot \cos 120)$ is a product that needs to be calculated before being subtracted from the two squares. Candidates should be aware that a scientific calculator does this and the efficient approach is to write down $10^2 + 12^2 - 2 \cdot 10 \cdot 12 \cdot \cos 120$ and nothing more. The candidates who go to $100 + 144 - 240 \cos 120$ may possibly incorrectly end up with $4 \cos 120$. Several responses lost accuracy marks for not showing 364 or 19.078… in this 'show that' part.

(b) 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 (26.99…) in this 'show that' part.

(c) Bearings continue to be a real challenge to many candidates. In this case candidates needed to use the implicit cosine rule to find angle *ACD* and then use the knowledge of angles around a point to calculate the required bearing of *D* from *C*.

(d) This was a discriminating part as many candidates were unable to interpret what the question was asking for and so they did not use straightforward trigonometry to solve. A small number found the correct area in **part (e)** and were allowed to use this answer to calculate *BP*.

(e) This was another part where the formula was given and various correct methods were seen. It should be pointed out that context questions require decimal answers and so $30\sqrt{3}$ only scored 1 mark.

Question 8

(a) (i) This was mostly all correct although a few candidates plotted at the mid-points of the intervals so could only gain the final mark.

(ii) This was mostly all correct but several candidates did not read off their lower and upper quartiles values correctly.

(iii) A well answered part with most scoring full marks. Only a small number gave their answer in the range of 185 to 195 thus scoring one mark only.

(b) (i) Another well answered part; candidates appeared to have used the information given in the first interval to correctly calculate the other values, this is traditionally a difficult topic for students.

(ii) There were a lot of correct answers but generally very little working was seen so candidates mainly scored 0 or 2 here.

Question 9

(a) Most scored at least one mark in this part but many lost the final mark for rounding too early in their conversion from minutes to hours.

(b) A discriminating part with many candidates not fully understanding that the problem had to be separated into two time intervals and then calculating the average speed by dividing total distance by the total time.

(c) A challenging part which saw few correct answers. The candidates appeared to struggle with the lack of numerical values in the question and did not successfully convert m/s to km/h. A few lost the final mark for not giving their answer in its simplest form.

(d) (i) This part was initially similar to **part (b)** but required manipulation of algebraic fractions and was not well answered. Many scored a method mark only for setting up the correct fractions but were unable to successfully obtain the correct single fraction. Some did gain the mark for the common denominator seen.

(ii) Very few scored full marks here as this was a follow on part from **(d)(i)**.

(iii) Only a few candidates made the link between this and the previous part and successfully solved the quadratic equation in **(d)(ii)** scoring full marks. Several scored some method marks for the correct use of the quadratic formula. A few responses tried to solve the given quadratic equation equal to 2.

Question 10

(a) (i) and (ii) Almost all candidates gave correct answers to these two parts.

(b) This was almost all correct, although a few candidates did find f(g(1)).

(c) Mostly all correct although +3 was seen on a few scripts.

(d) This was mostly all correct although 9 and 27 were sometimes seen.

(e) A well answered part although several candidates omitted the +3 after correctly multiplying out $2(2x + 3)$.

(f) Nearly all the candidates formed the composite function correctly although several omitted the bracket. The majority went on to square the bracket and arrive at the answer in its simplest form. The most common mistake was to forget to add on the 1 after multiplying the brackets out correctly, giving an answer of 12 rather than 13.

(g) It was not unusual to see candidates correctly write $x = \log_3 y$ but then omit to obtain the inverse function by making y the subject of the equation to arrive at $y = 3^x$. The most common mistake was to write $y = \frac{x}{\log 3}$.

Question 11

(a) Graphs were mostly a completely correct shape, although several candidates lost a mark for the graph not passing through the origin or for an incorrect amplitude.

(b) Most scored the mark for the amplitude but struggled to obtain the correct period. A small number had their ‘correct’ answers reversed.

(c) Generally this part was not answered well, although several did score a mark for one correct value seen.

(d) (i) This graph was mostly a correct shape but those with an obviously incorrect amplitude or not passing through the origin could not be awarded the mark.

(ii) Those that had gained the marks in **parts (a)** and **(d)(i)** usually managed to correctly identify the required area.

(iii) Most candidates scored at least one mark for stretch but very few candidates scored full marks here. The factor was often given as 3.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/42
Paper 42 (Extended)

Key messages

Sufficient working needs to be included to gain method marks in case the final answer is incorrect.

Answers should be given correct to three significant figures unless the answer is exact or the questions states otherwise. Some candidates lost marks through giving answers which were not sufficiently accurate. Candidates should recognise that in order 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.

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

When a questions states 'show that', candidates should start with what is given and work towards the answer, not start with the answer and try to verify it. In such questions it is also necessary to show all the stages in the calculation or proof. If the question asks to show that the answer is a given value correct to 3 significant figures, it is necessary to show that value to at least 4 significant figures.

General comments

The paper proved accessible to almost all the candidates with very few candidates scoring very low marks. Omission rates were very low and there was much very impressive work from a large number of candidates.

Whilst most candidates displayed knowledge of the use of a graphics display calculator, some plotted points when a sketch graph was required.

Most candidates showed all their working and set it out clearly. Answers without working were fairly rare but there were a number who produced answers without justification. Occasionally, working was a jumble of figures which made the award of part marks difficult. Almost all candidates finished the paper.

Comments on specific questions

Question 1

All parts of this question were extremely well answered. The drawing parts were almost always correct. Occasionally, the descriptions gave the wrong mirror line and, even more rarely, rotation instead of reflection.

Question 2

The first three parts of the question were extremely well answered. In **part (b)** a few candidates made sign errors. In **part (c)** most candidates expanded $(x + 2)^2$ but that was unnecessary. **Part (d)** was also well answered but a few made errors in the expansion. **Part (e)** was well answered also, although a number of candidates made sign errors or forgot to go back to the variable *x* after the re-arrangement. Just a few read it as $(f(x))^{-1}$.

Most candidates drew a good sketch in **part (f)(i)** and most almost all of these candidates gave the correct line of symmetry for $y = x^2$ with just a few giving $y = 0$. The inequality in **part (iii)** proved more difficult with many candidates omitting the $2 < x$.

Question 3

All parts of this question were well answered. In **part (a)** a few used a circuitous argument starting by using 128 and then working back to 128. This was not given credit. The most common error in **part (b)** was to not subtract $102.40 from $160. The reverse percentage in **part (c)(i)** was very well answered, although a few candidates worked out 20 per cent of $32.

Question 4

Part (a) caused no real problems for any candidates with just a few making sign errors in **part (iii)**. **Part (b)** received a large number of correct responses with working well set out and easy to follow. When marks were lost, it was almost always because of arithmetical or sign errors.

Question 5

There were a very large number of all correct responses in **part (a)**. Candidates who made errors were usually successful in the first three parts and then made one or more errors later on.

Part (b) was less well answered with a variety of quadrilaterals suggested, the most common wrong one being trapezium.

Question 6

Most candidates were successful in **parts (a)** and **(b)** but **(c)**, **(d)**, and **(e)** caused some problems even to more able candidates. Many candidates chose to use the sample space, and these candidates were usually more successful. Others decided that multiplying fractions would be the appropriate method, but a common error was to forget that Spinner A had 4 possibilities and Spinner B had 6. In these three parts the most common error was to use an incorrect set of outcomes with some confusion about permutations and combinations, e.g. in **part (e)** that (2, 4) and (4, 2) were both involved whereas (3, 3) could only occur once, and that (1, 5) did not have a matching (5, 1).

Question 7

In **part (a)(i)**, most factorised the expression correctly although a few divided by 2. In **part (ii)**, most candidates realised that the crucial values were $-\frac{1}{2}$ and 6 but some gave one or both of the inequality signs the wrong way round. In **part (b)** the most common method was the use of the formula with just a few drawing sketches and a very small number using the completing the square method. Most candidates gave the correct answers to the required 2 decimal place accuracy. A number of candidates ignored the instruction to show all your working and gave answers with no justification, presumably using the solve function on their calculator.

Question 8

In **part (a)**, almost all completed the numerical entries in the diagram but a number of candidates omitted the $56 - y$ for the bottom entry. More able candidates did **parts (b)(i)** and **(ii)** correctly but many struggled with these two parts producing either incorrect equations or just producing a wrong number. The mark for **part (b)(ii)** was often achieved on a follow through basis as most knew that the final two answers needed to add up to 56.

Question 9

A large majority of the candidates were able to show that the volume of the prism was 7392 cm^2. The most common method was to find the volume of the cuboid and the volume of the triangular prism. A smaller number first found the area of the front face. **Parts (b)**, **(c)** and **(d)** were well answered by most candidates. The need to find the cube root of the volume scale factor did not prove a problem for most. In **parts (c)** and **(d)** the most common errors were to use incorrect fractions in the volume formulae for sphere and cone.

Part (e) proved to be challenging for many candidates, with finding working with surds difficult. The most common error was to omit the brackets in $(4r)^2 + r^2$ leading to $\sqrt{5r^2}$ instead of $\sqrt{17r^2}$. A number of candidates could not complete the simplification, leaving the r^2 inside the square root.

Question 10

Most candidates found the correct mean in **part (a)**. Errors included using the start of the interval instead of the mid-point, using the width of the interval, and considering the mid-interval values to be 50.5, 110.5 etc. Just a few added the mid-interval values and divided by 6.

About three-quarters of the candidates correctly identified the correct interval in **part (b)**.

Part (c) was generally well-answered. A number used 22 instead of 28 as the initial frequency and some treated the events as independent.

The usual error in **part (d)(i)** was not to give the final frequency density correct to 3 significant figures. The histogram in **part (d)(ii)** was usually well drawn with just a few misreading the scale or drawing the first and last bars with heights of 0.6 and 0.889.

Question 11

Much of the trigonometrical work in this question was very impressive. The main cause of loss of marks was not working to sufficient accuracy. To give answers correct to three significant figures it is necessary to work to at least four figures.

In **part (a)** most used the correct cosine rule but many went straight to 9.05 without showing a more accurate answer.

In **part (b)(i)**, most candidates recognised that it was necessary to use two applications of Area = $\frac{1}{2}$ $bc \sin A$ but, here too, inaccuracy often occurred.

In **part (b)(ii)**, most candidates recognised the need to start off with the cosine rule to find *BC*. This could then be followed by the use of the sine rule or a further use of $\frac{1}{2}$ $bc \sin A$ or the cosine rule. A few candidates thought that they could get to the answer in one step using an incorrect application of the sine rule.

Question 12

There were some excellent graph sketches. The best were those clearly showing their asymptotes in order to give a good diagram. Not doing this sometimes led to the overlapping of branches. This good level of understanding was also seen in **part (b)** where there were many all correct answers. If there was an error, it was usually in the horizontal asymptote.

Parts (c) and **(d)** were answered well by the majority of candidates, but there were occasional errors in accuracy and signs in **part (c)**.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/43
Paper 43 (Extended)

Key messages

Candidates need to read the rubric on the front cover and the questions carefully.

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 be aware of the uses of the graphics calculator listed in the syllabus. There were cases where some complicated algebra could have been replaced by using the calculator and sketching to show the working. There were also cases where candidates used more advanced functions on the graphics calculator and this resulted in loss of marks as little or no working was seen.

General comments

The paper was found to be accessible, giving candidates the opportunity to demonstrate their knowledge and application of their knowledge. All candidates appeared to have adequate time to complete the paper.

Most candidates showed necessary working and earned marks when answers were incorrect.

The use of the graphics calculator was generally well-managed and almost all candidates were able to earn marks in curve sketching and interpreting graphs.

Topics found to be very accessible were simple and compound interest, statistics, curve sketching and interpretation of the graphs, drawing and describing most transformations, mensuration, Venn diagrams and functions.

Topics found to be more challenging included ranges and inequalities from sketches of graphs especially when asymptotes were involved, describing a stretch, describing an enlargement with a negative factor, vectors, similar areas, probabilities from a Venn diagram, area of a segment, setting up an algebraic equation and simplifying it to a required quadratic equation and logarithms.

Comments on specific questions

Question 1

(a) This was a straightforward compound interest question and was well answered. There were two areas where care was needed. One was the multiplying factor being 1.035 and not 1.35 for an increase of 3.5%. The other was to make sure the answer was in the tens of thousands and a number of candidates lost the final mark with an answer of 1377 instead of 13770.

(b) This was a reverse compound interest and was generally well answered. The challenge was to realise that the percentage rate of interest of 3% required a division by 1.03^2 and not a multiplication by 0.97^2.

(c) Although this was a simple interest question, it was found to be more challenging than **part (b)** as candidates had to include the principal when setting up an expression equal to the given amount.

$\frac{Q \cdot 4 \cdot 5}{100} = 20400$ was frequently seen instead of $Q + \frac{Q \cdot 4 \cdot 5}{100} = 20400$. A number of candidates calculated 20% of 20400 and added or subtracted it from the given 20400.

Question 2

(a) The mode was almost always correctly answered.

(b) The range was usually correctly answered with candidates finding the range of the number of goals. A common error was to find the range of the frequencies.

(c) The median was usually correctly given with candidates correctly looking for the 50th and 51st values. A few candidates ignored the frequencies and gave an answer of 3.5.

(d) There was a good understanding of inter-quartile range with the correct answer usually seen. A few candidates gave the answer 50 from 75 – 25.

(e) The mean was usually correctly answered. As in **part (c)** some candidates ignored the frequency and found the mean to be 3.5 whilst some others found the mean of the frequencies with the answer of 12.5.

Question 3

(a) The sketch of the cubic function was almost always correct.

(b) Most candidates gave the three x values for the three zeros. Some included the y co-ordinate of 0 indicating a misunderstanding of a zero on a graph. The level of accuracy expected when reading from the graphics calculator should be no different to elsewhere in the paper. A common answer was –0.69, 1, 2.19 and this lost the first mark as this answer of –0.69 is not to 3 significant figures.

(c) The co-ordinates of the local maximum were usually correctly given.

(d) Answers needed to be correct to three significant figures as in other parts of the paper. Candidates needed to read from their calculator carefully as a rather common error was to omit the negative sign of the y co-ordinate.

(e) This proved to be a discriminating question. Candidates had to use the y co-ordinate of each turning point to find a particular range which would give three solutions of a given equation. The stronger candidates were successful, but others gave values of x and a few did not attempt this question.

Question 4

(a) Almost all candidates plotted the five points correctly.

(b) Almost all candidates gave the correct type of correlation.

(c) The equation of the line of regression was generally well answered with candidates using the appropriate function on the graphics calculator. Some candidates gave the equation of their line of best fit.

(d) Most candidates successfully substituted 56 into their answer to **part (c)**.

(e) This part required an interpretation of how to change the regression line. Most candidates realised that they had to add 5 to their equation in **part (c)**.

Question 5

(a) The object triangle was almost always correctly reflected. A few candidates reflected in the line $x = 1$ and a few others reflected in a line parallel to $y = 1$.

(b) The object triangle was almost always correctly rotated. The candidates who did not earn full marks here usually gained one mark with a 90° clockwise rotation about an incorrect point.

(c) A large number of candidates gave a combination of transformations rather than describing fully a single transformation. There were many candidates who correctly gave the enlargement and its centre whilst the scale factor was more challenging, with answers of –2 and $\frac{1}{2}$ often seen.

(d) Many candidates recognised the transformation as a stretch and usually correctly gave the factor of 3. The invariant line needed to be clearly stated and needed to include the word 'invariant'. A stretch from the *y*-axis or along the *x*-axis were typical answers which did not earn the mark for the invariant line.

Question 6

(a) The co-ordinates of the required point were often correctly given. Many candidates found the midpoint of a line, which was given in the question.

(b) (i) This straightforward vector, in terms of **a** and **b**, was usually correctly answered.

(ii) This was a much more challenging vector geometry question and proved to be one of the most discriminating parts of the paper. There were few fully correct answers with the main reason being through confusion over the direction of vectors. The most frequent route seen was $\mathbf{b} + \frac{3}{7}\overrightarrow{CB}$ instead of $\mathbf{b} + \frac{3}{7}\overrightarrow{BC}$. The more efficient approach was to take the route $\mathbf{a} + \overrightarrow{AC}$ and candidates using this route were much more successful.

Question 7

(a) (i) Almost all the candidates calculated the volume of the hemisphere correctly. A few found the volume of a sphere and a few others found the curved surface area of the hemisphere.

(ii) Almost all the candidates calculated the volume of the cone correctly.

(iii) The total mass of the object was almost always correctly answered.

(b) The surface area of the compound shape was more challenging and required candidates to realise that Pythagoras' Theorem was needed to find the slant height of the cone. There were many fully correct answers demonstrating good application of knowledge. A few candidates used the height of the cone as the slant height.

(c) This similar area question provided a challenge to most candidates. The stronger candidates were successful, but many candidates found the increase in the slant height of the cone but left the radius of the hemisphere and the base of the cone unchanged.

Question 8

(a) The Venn diagram was usually correctly completed.

(b) The number of elements in the particular subset was usually correctly stated.

(c) This question of probability from a Venn diagram proved to be challenging. The stronger candidates were able to recognise the two probabilities and correctly calculated their product.

(e) This part was even more discriminating requiring candidates to recognise that elements were being chosen from a particular subset and not the universal set. In addition to this the sum of two products was required. Success in this part was limited.

Question 9

(a) Most candidates recognised the need to use the cosine rule to calculate *BC*. As this question required candidates to show a value correct to 2 decimal places, candidates had to show an answer to at least 3 decimal places. The mark scheme allowed two of the three marks if the square of *BC* was seen and many candidates did score two marks with answers such as 161.95 followed by 12.73. If candidates only showed the cosine rule calculation then they scored one mark. Using 12.73 in a calculation did not earn any marks.

(b) This 'Explain why' question proved to be challenging. Many candidates simply showed a calculation and stated words such as double or half or perpendicular, all without reason. A statement about the angle at the centre of a circle being double the angle at the circumference was required.

(c) The radius of the circle was usually correctly calculated using either right-angle triangle trigonometry or the sine rule or the cosine rule.

(d) The area of the shaded segment of the circle was a challenging question, requiring the subtraction of the area of a triangle from the area of a sector. There were many fully correct answers showing good application of two types of area. Many candidates earned some credit for one of the two areas correctly calculated. Some candidates did not appear to recognise the method for calculating the area of a sector with a given angle at the centre and other candidates overlooked the efficient $\frac{1}{2} \cdot r^2 \sin 116$ for the area of the triangle.

Question 10

(a) This expression for the width of a rectangle in terms of *x* was found to be straightforward.

(b) **Part (a)** was designed to help with the setting up of the given quadratic equation in this part. The stronger candidates showed each step clearly and earned full marks. Many candidates appeared to be unsure of this 'show that' question and solved the equation. This part was also occasionally omitted.

(c) The solving of the quadratic was generally successful and three methods were seen with the use of the formula being the most popular. Some candidates used their graphics calculator and showed a simple sketch indicating two positive intersections with the *x*-axis. Others factorised successfully.

(d) Almost all candidates who had correct values of *x* in **part (c)** gave correct answers for the length and the width of the rectangle.

Question 11

(a) (i) This indices question was successfully answered by many candidates. Two basic errors were seen quite frequently. One was to reach $\frac{a^9}{a^3}$ and then give the answer as a^3. The other error was to divide both terms of the numerator by a^3

(ii) This part was much more challenging, testing knowledge of the base of a logarithm. There were some correct answers but the more frequent incorrect answers were 1 or $x\log_5 5$.

(iii) This part was very similar to **part (ii)**, testing knowledge of the base of a logarithm. The frequent incorrect answers were $\frac{1}{2}$ or $x\log_9 3$.

(b) Candidates were much more familiar with this logarithmic equation and many candidates earned full marks. Many others gained one mark by showing one rule of logarithms. One error seen was, after a correct first step of reaching $\log 1000 - \log 25$, then giving an answer of $\log 975$.

Question 12

(a) The sketch was usually correctly drawn with most candidates gaining full marks. The intersection with the *y*-axis was negative and some candidates lost a mark by drawing this branch through the origin. There were also large overlaps of the branches seen occasionally.

(b) Most candidates demonstrated an understanding of asymptotes. The two vertical ones were usually correctly stated with the horizontal one proving to be more challenging.

(c) (i) The straight line was almost always correctly sketched.

(ii) The *x* co-ordinates of the three points of intersection were usually correctly answered, although occasionally to only two significant figures.

(iii) The solving of inequalities when asymptotes are involved is always a very demanding question. This part involved the need to look at three points of intersection and the two vertical asymptotes. There were three ranges of *x* satisfying the inequality and two involved the vertical asymptotes. Very few fully correct answers were seen whilst a number of candidates did give the simplest part of $x < -2.21$. Many attempts involved complicated algebra rather than using the sketch.

Question 13

(a) This numerical substitution into a function was almost always correctly answered.

(b) The substitution into an inverse function was often correctly answered. The efficient method of changing $x = \mathrm{f}^{-1}(7)$ into f(*x*) = 7 was seen less frequently than finding $\mathrm{f}^{-1}(x)$ and then substituting –7. An error seen was $\mathrm{f}^{-1}(x) = \frac{1}{\mathrm{f}(x)}$ and this error was seen again in **part (e)**.

(c) The numerical substitution into a compound function was well answered.

(d) The algebraic form of a compound function was also well answered with very few candidates treating it as a product of two functions. One unusual error seen was to write $2x(1-2x)+5$ instead of $2(1-2x)+5$

(e) The inverse of a function was well answered. A few candidates lost a mark with a sign error in their working.

(f) This simplification into a single algebraic fraction was more discriminating but there were many fully correct answers. The common error was to reach the correct answer of $\frac{4x+13}{2x+5}$ but to then incorrectly reduce it to $\frac{2x+13}{x+5}$.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/51
Paper 51 (Core)

Key messages

Showing working remains an essential skill for success in this paper. This will be even more vital from next year on, as thorough communication will be required for full marks.

In this particular paper it was important to be aware of the limits of the numerical display on the calculator and know what the calculator's convention for standard form meant.

General comments

Many showed good understanding of repeated decimal notation, in spite of some candidates perhaps meeting it for the first time,

There was much good work seen in finding equivalent fractions although many candidates lost marks through lack of care in reading the question.

Comments on specific questions

Question 1

(a) (i) The large majority of candidates were able to complete the equivalent fractions without error. Some gave no response or entered figures into the wrong fraction. Candidates should take their time at the start of the paper and not rush ahead. Communication was credited to the few candidates that showed their method for finding equivalent fractions.

(ii) Practically every candidate completed the prime factorisations correctly by entering 2 and 5 in the appropriate boxes.

(iii) The large majority of candidates could convert the fractions to decimals. The most common error was seen from those candidates whose calculator switched 0.006 to standard form. Standard form should be correctly written as 6×10^{-3} rather than the abbreviated calculator notation.

(iv) Many good responses to this question were seen. Candidates had to find a fraction that terminated, with numerator 1 and denominator between 30 and 99.

(b) (i) As in **part (a)(ii)** nearly all candidates entered the 2 and 5 correctly in the boxes to complete the prime factorisations of powers of 10.

(ii) The entries given in the middle column made it clear that answers of the form $2^x \times 5^y$ were required. Most candidates understood that but there were several that did not simplify their answer sufficiently. Other candidates did not use prime numbers to complete that column and answers containing 10 or 25 were seen. This question guided candidates to spot that the number of decimal places and the largest power were equal.

(iii) Candidates who had noticed the relationship in **part (ii)** had no difficulty in writing down the larger power as giving the number of decimal places in a fraction whose decimal terminates. Others tried

to find the answer by evaluating $2^{14} \times 5^7$, which led to a standard form that was unsuitable for finding the answer.

(iv) Many candidates noticed that 2 and 5 were the prime factors required. A large number of different answers were seen, often involving numbers that were not prime.

Question 2

(a) (i) Most candidates could find the correct equivalent fractions when given the denominators. As with **Question 1(a)(i)** there were several who omitted a fraction, sometimes not noticing the first fraction of $\frac{1}{3}$. A little more care in reading would have led to fewer errors of this sort. A few candidates gained credit for communicating how they found a numerator, for instance by writing 99 999 ÷ 41.

(ii) The notation for repeated decimals was new for some candidates and was therefore defined in the stem to **Question 2**. Many candidates used the notation successfully, but allowance was made for those who did not use it. A very large number of candidates wrote that the decimal for $\frac{1}{111}$ was 9.009… without the qualifying $\times 10^{-3}$. Candidates whose calculator was set to converting such fractions to standard form were at a disadvantage. It is recommended that calculators only display standard form as an answer when there are at least four figures on the denominator.

(iii) The large majority of candidates could rewrite a number composed of 9s as the correct power of 10 minus 1. Some candidates assumed that the last column had to contain a sequence and so gave an incorrect answer for the fourth cell in the last column. More careful reading would have avoided this error.

(iv) Since many calculators only display up to the ninth decimal place there were many answers where the candidate's fraction showed nine decimals, but often these did not repeat, for example $\frac{1}{17}$. Candidates need to realise that, when the calculator display goes no further than nine decimal places, the decimal does not have to terminate or start repeating.

(v) Successful candidates used the pattern seen in **part (a)(iii)** to write the correct answer. Many candidates tried other formulations involving *k* but this did not lead to a helpful result.

(b) (i) In this question it was first necessary to find the repeat length of decimal form of $\frac{1}{407}$. As seen earlier in **part (a)(ii)** there were many candidates whose calculator gave an answer in standard form and this was frequently misunderstood. Decimals answers of 2.457… or similar for $\frac{1}{407}$ were often seen.

(ii) This question was similar to **part (i)** with the difference that 7 × 37 = 259 was not given and so had to be stated by the candidates. A majority of candidates omitted this step. For the same reasons as in **part (i)**, answers of 3.861… for $\frac{1}{251}$ were frequent. Another common error was seen in finding the lowest common multiple of 3 and 6. Some candidates interpreted the LCM as a common factor or gave 18 as the answer, in line with what had worked in **part (i)**.

Question 3

(a) The question asked candidates to add the decimal forms**.** A large number of candidates instead added the fractions before converting to the decimal form. A more careful reading of what was required was necessary.

(b) Very many candidates completed this table correctly and in full, with most using the dot notation successfully. A few omitted showing that the 3s in the decimal parts continued. The fourth column required breaking down the denominator into its prime factorisation and credit for communication

was awarded to those who showed how this could be done by, for example, a factor tree. Few candidates showed communication here.

(c) Most candidates described how to count the non-repeating decimals and the repeating decimals once the fraction had been converted to decimals. There was thus no reference to *a*, *b*, *c* or *d*. Consequently, very few correct statements were seen, even though some went to great lengths in describing their counting process.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/52
Paper 52 (Core)

Key messages

Showing working remains an essential skill for success in this paper. This will be even more vital from next year on, as thorough communication will be required for full marks.

In this particular paper it was important to be aware of the limits of the numerical display on the calculator and know what the calculator's convention for standard form meant.

General comments

Many showed good understanding of repeated decimal notation, in spite of some candidates perhaps meeting it for the first time,

There was much good work seen in finding equivalent fractions although many candidates lost marks through lack of care in reading the question.

Comments on specific questions

Question 1

(a) (i) The large majority of candidates were able to complete the equivalent fractions without error. Some gave no response or entered figures into the wrong fraction. Candidates should take their time at the start of the paper and not rush ahead. Communication was credited to the few candidates that showed their method for finding equivalent fractions.

(ii) Practically every candidate completed the prime factorisations correctly by entering 2 and 5 in the appropriate boxes.

(iii) The large majority of candidates could convert the fractions to decimals. The most common error was seen from those candidates whose calculator switched 0.006 to standard form. Standard form should be correctly written as 6×10^{-3} rather than the abbreviated calculator notation.

(iv) Many good responses to this question were seen. Candidates had to find a fraction that terminated, with numerator 1 and denominator between 30 and 99.

(b) (i) As in **part (a)(ii)** nearly all candidates entered the 2 and 5 correctly in the boxes to complete the prime factorisations of powers of 10.

(ii) The entries given in the middle column made it clear that answers of the form $2^x \times 5^y$ were required. Most candidates understood that but there were several that did not simplify their answer sufficiently. Other candidates did not use prime numbers to complete that column and answers containing 10 or 25 were seen. This question guided candidates to spot that the number of decimal places and the largest power were equal.

(iii) Candidates who had noticed the relationship in **part (ii)** had no difficulty in writing down the larger power as giving the number of decimal places in a fraction whose decimal terminates. Others tried

to find the answer by evaluating $2^{14} \times 5^7$, which led to a standard form that was unsuitable for finding the answer.

(iv) Many candidates noticed that 2 and 5 were the prime factors required. A large number of different answers were seen, often involving numbers that were not prime.

Question 2

(a) (i) Most candidates could find the correct equivalent fractions when given the denominators. As with **Question 1(a)(i)** there were several who omitted a fraction, sometimes not noticing the first fraction of $\frac{1}{3}$. A little more care in reading would have led to fewer errors of this sort. A few candidates gained credit for communicating how they found a numerator, for instance by writing 99 999 ÷ 41.

(ii) The notation for repeated decimals was new for some candidates and was therefore defined in the stem to **Question 2**. Many candidates used the notation successfully, but allowance was made for those who did not use it. A very large number of candidates wrote that the decimal for $\frac{1}{111}$ was 9.009… without the qualifying $\times 10^{-3}$. Candidates whose calculator was set to converting such fractions to standard form were at a disadvantage. It is recommended that calculators only display standard form as an answer when there are at least four figures on the denominator.

(iii) The large majority of candidates could rewrite a number composed of 9s as the correct power of 10 minus 1. Some candidates assumed that the last column had to contain a sequence and so gave an incorrect answer for the fourth cell in the last column. More careful reading would have avoided this error.

(iv) Since many calculators only display up to the ninth decimal place there were many answers where the candidate's fraction showed nine decimals, but often these did not repeat, for example $\frac{1}{17}$. Candidates need to realise that, when the calculator display goes no further than nine decimal places, the decimal does not have to terminate or start repeating.

(v) Successful candidates used the pattern seen in **part (a)(iii)** to write the correct answer. Many candidates tried other formulations involving *k* but this did not lead to a helpful result.

(b) (i) In this question it was first necessary to find the repeat length of decimal form of $\frac{1}{407}$. As seen earlier in **part (a)(ii)** there were many candidates whose calculator gave an answer in standard form and this was frequently misunderstood. Decimals answers of 2.457… or similar for $\frac{1}{407}$ were often seen.

(ii) This question was similar to **part (i)** with the difference that 7 × 37 = 259 was not given and so had to be stated by the candidates. A majority of candidates omitted this step. For the same reasons as in **part (i)**, answers of 3.861… for $\frac{1}{251}$ were frequent. Another common error was seen in finding the lowest common multiple of 3 and 6. Some candidates interpreted the LCM as a common factor or gave 18 as the answer, in line with what had worked in **part (i)**.

Question 3

(a) The question asked candidates to add the decimal forms**.** A large number of candidates instead added the fractions before converting to the decimal form. A more careful reading of what was required was necessary.

(b) Very many candidates completed this table correctly and in full, with most using the dot notation successfully. A few omitted showing that the 3s in the decimal parts continued. The fourth column required breaking down the denominator into its prime factorisation and credit for communication

was awarded to those who showed how this could be done by, for example, a factor tree. Few candidates showed communication here.

(c) Most candidates described how to count the non-repeating decimals and the repeating decimals once the fraction had been converted to decimals. There was thus no reference to *a*, *b*, *c* or *d*. Consequently, very few correct statements were seen, even though some went to great lengths in describing their counting process.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/53
Paper 53 (Core)

Key messages

Showing working remains an essential skill for success in this paper. This will be even more vital from next year on, as thorough communication will be required for full marks.

In this particular paper it was important to be aware of the limits of the numerical display on the calculator and know what the calculator's convention for standard form meant.

General comments

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There was much good work seen in finding equivalent fractions although many candidates lost marks through lack of care in reading the question.

Comments on specific questions

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(iv) Many good responses to this question were seen. Candidates had to find a fraction that terminated, with numerator 1 and denominator between 30 and 99.

(b) (i) As in **part (a)(ii)** nearly all candidates entered the 2 and 5 correctly in the boxes to complete the prime factorisations of powers of 10.

(ii) The entries given in the middle column made it clear that answers of the form $2^x \times 5^y$ were required. Most candidates understood that but there were several that did not simplify their answer sufficiently. Other candidates did not use prime numbers to complete that column and answers containing 10 or 25 were seen. This question guided candidates to spot that the number of decimal places and the largest power were equal.

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was awarded to those who showed how this could be done by, for example, a factor tree. Few candidates showed communication here.

(c) Most candidates described how to count the non-repeating decimals and the repeating decimals once the fraction had been converted to decimals. There was thus no reference to *a*, *b*, *c* or *d*. Consequently, very few correct statements were seen, even though some went to great lengths in describing their counting process.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/61
Paper 61 (Extended)

Key messages

To do well on this paper candidates needed to be familiar with repeated decimal patterns and be able to read and write standard form numbers given on a calculator screen in the correct way.

For the modelling section accurate graph drawing and sketching was key, as well as knowing how to use a graphics calculator to draw and read values on graphs.

General comments

The knowledge of primes, powers and Lowest Common Multiple was good. Candidates who were familiar with transformations did better on several questions in the Modelling task. Very little working was shown in the Investigation task.

Comments on specific questions

Part A Investigation – Decimal Forms

Question 1

(a) (i) Most candidates could find equivalent fractions and used their calculators to convert fractions into decimals. Many candidates found it difficult to write 0.006 correctly. Candidates either wrote the answer directly from the calculator in standard form (6E−3) or unsuccessfully tried to write this as an ordinary number (e.g. 0.006 · E^3).

(ii) May candidates confused ‘powers’ of 10 with ‘multiples’ of 10 and this second answer was very common.

(b) (i) This was well answered. Candidates used the examples given to extend the patterns. A few candidates wrote the 2s and 5s in groups or in ascending order (e.g. they wrote 2 · 5 · 5 · 2 · 2 instead of 2 · 2 · 2 · 5 · 5). Writing the numbers in ascending order was not a rule, just a general expectation.

(ii) Candidates generally knew how to count decimal places and to write the denominators as a product of primes using powers. They used their previous answers in **part (b)(i)** to help them as in the instruction given for the question.

(iii) Adapting to using algebra rather than number caused some problems, so this part was not as well answered as the previous questions. Many attempted a numerical answer such as 2 or 5. Many candidates did not always find it so easy to work backwards.

Question 2

(a) (i) Some similar mistakes were made in answering this question as in previous parts of **Question 1**. Little evidence was seen of processes being used.

For the equivalent fraction row, errors appeared to be made copying from the calculator. The powers in the third row did not follow a pattern and needed to be calculated. Candidates tended to give answers to the last two columns as powers of 4 and 5, following the previous power of 3 that was given. A simple check would have shown this error and enabled a change to the correct answer. Candidates need to check answers using an alternative method wherever possible.

Many errors in the decimal answers in the fourth row were caused by not understanding the format or not correctly reading the mode their calculator was in. A common error for $\frac{1}{111}$ was to write 9.009.

(ii) Despite mistakes in their answers to **part (i)** candidates were able to match the length of the repeating decimal to the power of 10 of the denominator and so answer this question successfully.

(b) (i) To answer this question candidates were required to write out the decimal and to find the LCM of the repeat lengths of the two fractions. Many candidates did both of these correctly whilst others omitted to confirm that the repeat length of $\frac{1}{407}$ as a decimal was also the LCM of 2 and 3, the repeat lengths of the decimals of $\frac{1}{11}$ and $\frac{1}{37}$.

(ii) This was similar to **part (i)** but was more open and required three pieces of evidence. The extra detail was to show that $7 \cdot 37 = 259$. This was rarely seen. For both these **part (b)** questions candidates needed to know that a 'show that' required at least two different ways of finding the answer.

(iii) Finding the LCM of 6 and 9 was completed successfully by many candidates.

Question 3

(a) Candidates showed that $\frac{1}{5}+\frac{1}{3}=\frac{8}{15}$, which they then converted to a decimal to show it was a recurring decimal. They did not, however, follow the instructions in the question which told them to add the decimal forms and not the fractions.

(b) This table was completed correctly most of the time. Most candidates knew how to write a product of primes using powers.

(c) Although many candidates could not answer this question, some did realise that the highest power, i.e. value of *a* and/or *b,* needed to be 5 to fit the criteria given in the question. There were many combinations of *a* and *b* that candidates could choose from. The next part was to work backwards from a repeat length of 30 to find 5 and 6 that have an LCM of 30. Some candidates did get this far and used the information that the values of *c* and *d* needed to be prime to give answers. A pair of correct answers was given in **Question 2(a)(i)**.

(d) Very few candidates attempted this question. Most candidates did not notice that the LCM of *q* and 3*q* was 3*q*.

Part B Modelling – Flowering Times

Question 4

(a) (i) and (ii)

The graph drawing for these first two parts of **Question 4(a)** was often precise and careful. Equally often, the drawing was inaccurate and roughly done. Most of the time the curves showed the intention of crossing and turning at the correct points, although the maxima and minima were often drawn across more than half a square and were therefore outside the tolerance. Pen rather than pencil was often used. Candidates' answers showed the importance of the practice of drawing graphs with the emphasis on accuracy.

(ii) This part was less well answered than **part (i).** A common error was to translate the graph by 8 downwards or to reflect in the line y = 8.

(iii) Most candidates could fully define this transformation although poor terminology was frequently seen.

(b) Incorrect answers were due mostly to the inaccuracy of the candidates' graphs or possibly misunderstanding the question and giving the first full month.

(c) (i) To find an accurate answer, candidates needed to draw this graph on their calculators. This was well answered. Many candidates rounded their answer to the nearest whole number, which although allowed was not appropriate. Few related their numerical answer to June.

(ii) Many candidates followed this well and used the connection between hours of daylight and darkness correctly.

(iii) There was good use of the daylight/darkness hours connection, which was spoilt by the poor use of a negative number with brackets. An answer of 12 + 3.9… was very common as was the answer of 24 – (12 + 3.9…). In this latter case the candidates were awarded the mark because their answer was correct although not simplified.

(d) Few candidates looked in any depth at Pierre's model and so did not realise that $2\frac{20}{31}$ represented the 20th March.

Question 5

(a) (i) Many candidates started with the values given for *a* and *b* and worked round in a circle, which was not acceptable as a proof. Other candidates substituted incorrect angles that were close but not accurate, e.g. using cos 1 instead of cos 0. More able candidates worked through the 'show that' question by starting with the model and worked towards the given answer.

(ii) Generally the curve sketching was well managed. Many candidates set a good scale on the *y*-axis and produced a relatively symmetrical curve. Straight lines and parabolas were common wrong answers and not sketching over the whole domain of the graph lost the mark. If the sketch was incorrect it was usually due to a poorly chosen scale, such as 0 to 100.

(b) (i) Most candidates traced their curve to find the correct answer to this question.

(ii) Many candidates tried to work backwards from the given answer of 3rd June. Most of these candidates did not manage to get back to the 53 days, whilst those who started with the 53 days were more likely to get to a correct conclusion of 3rd June. Many candidates found difficulty in linking the date to a day number and a common error was to take 3rd June as day 155 rather than day 154. The first day needed to be counted as 1 as opposed to the usual counting of one to two as 1.

(c) (i) This answer could be found from a trace on the graph on the calculator. Many candidates did not do this and tried other means to calculate the correct date. Few of these were successful.

(ii) Few candidates realised that they were looking for a change of the 90th day to the 79th day. Most of those who did establish this worked with a translation of 11. A few rewrote the model correctly; some put in the translation as – 11.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/62
Paper 62 (Extended)

Key messages

To do well on this paper, candidates needed to be familiar with work on sequences and to be able to look for and understand patterns.

For the modelling section accurate graph drawing and sketching was key, alongside knowing how to compare and to modify models.

General comments

The knowledge of sequences and use of differences to find formulae was generally very good. Some candidates benefitted from knowing how to solve quadratic equations correctly.

Many candidates knew how to use their graphics calculator to draw and to sketch graphs. The accuracy of transferring the graph from the calculator to the paper was less good. Candidates' use of algebra for manipulation and substitution was generally good. Adapting models was not always well managed.

Comments on specific questions

Part A Investigation – Crossing Points

Question 1

(a)–(b) This was very well answered. A few candidates did not complete the diagram on the right as the final dot was missed.

Question 2

(a) This was very well answered. Those candidates who may have missed a line on their diagram made a good recovery by using the pattern in the number of crossing points to amend their answer.

(b) Most candidates were able to answer this part correctly. Some, having recognised the pattern, managed to write down the answer without working. Some candidates left out the subject of the formula, in this case omitting to write 'p ='. A few fell into working out with n and gave their answer in terms of n instead of b. This was condoned on this occasion.

Question 3

(a) This table was well answered in the same way as **Question 2(a)**.

(b) Most candidates used the drawings and table to help them find the correct formula. The method of finding differences was also the most popular method to be used with most candidates showing three common differences, this being the minimum number required as evidence of communication.

Question 4

Those candidates who had successfully obtained the correct formulae in **Questions 2** and **3** continued to do so again for this question. Most gave the coefficient as the simplified answer of 3, although to find the pattern in **Questions 5** and **6** it was the unsimplified version that was required.

Question 5

Many candidates gained full marks for this question. The final cell in the 'Number of crossing points' column was where most mistakes were made. Entries such as 1 or a or a^2 or $(a^2 – a)$ were relatively common. Candidates often did not use a pattern to help them to complete this table. Using former answers to complete a question such as a table necessitated bringing together answers to look for a pattern. Answers needed to be checked, and changed if necessary, once the pattern was established.

Question 6

(a) Some candidates tried to start with the answer and work backwards. 'Show that' questions need to work towards the given answer and not to start with it. Many candidates did not write down the key significant fact that '$a = b$'. Some tried to expand the brackets and often made errors.

(b) (i) This diagram was correctly completed by almost all the candidates. Just a few omitted the question or missed a couple of lines.

(ii) A good number of candidates correctly calculated the 9 crossing points from the formula and counted the 7 crossing points, although many did not write down this information. By comparing this diagram to the previous ones many candidates thought that the difference was that this diagram had the points on A vertically above the points on B. With further trials they would have found that although this was true compared to previous diagrams, it did not necessarily cause the number of crossing points to be reduced. The fact that the points on A and on B were equally spaced was a correct observation.

(c) (i) Many candidates had a good idea of what they could do and most of these carried through the algebra to reach a correct conclusion. Good answers ranged from saying that the number of points had to be a square number, to labelled sketches or comments on non-integer results. Some reached $\sqrt{50}$ or $\sqrt{200}$ but did not go further to explain why this did not give the correct number of crossing points.

(ii) This was well answered by most of the candidates who got to the end of this investigation. Some candidates took a long way round such as trial and improvement whereas others, who immediately took the square root of both sides of their initial equation, got to the answer very quickly. Very few sketches were seen.

Part B Modelling – Value of a Car

Question 7

(a) This question was very well answered.

(b) The points were mostly plotted accurately and joined with relatively smooth curves. Those who used a straight edge to connect the points lost a mark for curve drawing as did those who did not join the points as well as plot them.

(c) This question was well answered. Several variations of the correct answer were seen. $\frac{1^x}{2}$ was not accepted, as opposed to $\left(\frac{1}{2}\right)^x$ which was accepted.

(d) Most candidates answered this correctly and gave an appropriate value. As this answer was a monetary value, two decimal places were expected. The decimal answer of 15.625 was accepted as was the rounded version, 16, but not the rounded version of 15.6, which was not correct for $. Some candidates returned to halving but stopped before 10 years.

Question 8

(a) The plotting was accurate. Many candidates also joined the points, which was ignored.

(b) In order to state the model that gave the higher value, candidates needed to show/calculate both values. Anna's could be written down from the table in **Question 7(a)**, which some candidates omitted to do, and John's needed to be calculated. Sometimes candidates then subtracted John's value from 16 000, thus losing the mark. Apart for the occasional arithmetical error, most candidates came to the correct conclusion supported by the correct evidence.

Question 9

(a) Lack of care and accuracy was the main reason for losing marks on this question. The shape of most candidates' graphs was good, but at the *P*-axis the curve needed to move down from 100 to approximately 80. In many cases this did not happen, or a clear gap was left between the curve and the axis. Occasionally the curve did not reach to · = 10, or turned up at that end.

(b) Candidates needed to state whether this was a good or bad fit and explain why. The comparison needed to show that the two models were not compatible for the first three years. Some candidates compared all years which was not what was asked for.

Question 10

(a) Many candidates managed to calculate the value of *a*. Some did not convert $\frac{7}{18}$ to a decimal and a few did not round to 1 decimal place.

(b) This sketch was often better drawn than the one in **Question 9**. More care needed to be taken by many candidates especially at 100 on the *P*-axis, where the drawing was supposed to start, and at $x = 10$, which the graph should have reached.

(c) This was not as well answered as **part (b)** in **Question 9**. Some candidates gave a detailed comparison over the years and others a more general, overall view. Both were acceptable. Some candidates compared Lisa's model to Eddie's model, which was not asked for.

Question 11

(a) Most candidates found it difficult to adapt Lisa's model. They managed to substitute for *a* but often could not bring in *C* correctly and many forgot the subject, '*V* ='.

(b) Without the correct model in **part (a)** candidates were unlikely to reach the correct answer here. Many did substitute into their model and continued correctly for one mark. It was not uncommon to see an answer of 3.65… converted to 3 years and 6 or 7 months.

CAMBRIDGE INTERNATIONAL MATHEMATICS

Paper 0607/63
Paper 63 (Extended)

Key messages

To do well on this paper, candidates needed to read and follow instructions and examples very carefully. The investigation section relied on the candidate's ability to look back and connect examples and answers together. The key to the modelling section was a good ability in the algebraic skills of substitution and rearrangement.

General comments

Candidates generally found the concept in the investigation much more difficult than that in the modelling section although many struggled with both contexts.

Candidates' algebraic skills were generally good. Many could not divide without a calculator and were unable to find an integer remainder when dividing using a calculator. Candidates found the notation in the investigation difficult and did not make good use of the examples given. Very little working was shown in the investigation task.

Candidates should be advised that in all answers, but especially those where a value or an answer is already given, they should show more figures than in the number stated.

Comments on specific questions

Part A Investigation – Remainders

Question 1

(a)–(b) These two questions were usually well answered. Some candidates had not understood the example and gave whole answers to the division sums, e.g. 2 r 3 for **part (a).** Common errors were 0.6 for **part (a)** and 0.38 for **part (b)**.

Question 2

Many candidates found one of several ways of showing this result. Some worked part way through an answer but omitted an important step. Others took the result and tried to work backwards which usually meant that they did not conclusively show that the remainder was 10.

Question 3

A few candidates explained that dividing by a factor (x) had to give a remainder of 0 because this was part of the definition of a factor. This explanation was not always thorough enough. Other candidates wrote some divisions but often not enough to establish the required evidence. There were six factors so at least five divisions needed to be seen. Many candidates wrote the divisions but did not indicate that the remainder was 0.

Question 4

There were many different incorrect answers given to this question, including 100 and 1.

Question 5

(a) In many responses there was little evidence of working to accompany the answers to this table. Some candidates wrote the answer instead of the remainder and some seemed to be working on a repeating pattern they thought existed, possibly in the rows. Each answer needed to be calculated separately, then a pattern, e.g. in the columns, could be found to act as a check for arithmetical errors.

(b) This 'show that' question could not be started from the answer, as many candidates had tried to do in **Question 2**. Many candidates managed to answer this successfully, especially if they worked their chosen divisions out separately. Those who worked from an incorrect table did not notice their errors. Some candidates did not show enough working to prove their example gave the required conclusion. For example, $R[4 \div 2] \div R[2 \div 4] \neq 4$ was not sufficient. The intervening line of '$= 0 + 2 = 2$' was required.

(c) A very common answer to this question was to state that it was because you are dividing by the same number twice. Although this was true, it was not the complete reason for the remainder being the same. Some candidates did several trials so that they could see what was happening. This should be encouraged when answering questions like this where an explanation is required.

Question 6

(a) (i) Candidates did not always show the values entered to replace the letters or the answer to each substitution. Candidates should be encouraged to show every line of working, especially writing in work that they are doing on their calculator or mentally.

(ii) The key to this solution was to compare the algebra in this part to the algebra given in the stem of **Question 6**. Very few candidates did this. Some candidates did write $x = y$ but not $a = b$. Many candidates tried checking values as a solution to answering this question.

(iii) A lack of understanding of **part (ii)** led to very few correct answers for this part. The information was given in the stem to **Question 6** with the result quoted in **part (ii).** Some candidates worked out 76^2 and found the remainder. This was not using the previous result and so did not gain credit.

(b) (i) A small number of candidates completed this correctly. The table showed the result from **part (a)** being used in the second row and then candidates needed to see that the link between the rows was to take the answer from the previous row. Many candidates did not see this connection and either did not attempt to complete the last row or did not follow through with the use of 9.

(ii) Most candidates realised that when multiplying the same base numbers the powers are added. It was necessary to read the example very carefully and to compare it to the table in **part (i).** The first common mistake was to use powers that had not been given previously such as in the table. For example breaking the power of 11 down into 9 and 2 did not help because a result for 7919^9 had not been previously calculated and was not then calculated. The most common error was to use the powers for multiplying despite the example given; e.g. $7919^8 \cdot 7919^2 \cdot 7919^1$ led to $8 \cdot 2 \cdot 1$ instead of $9 \cdot 4 \cdot 2$. Carefully reading the examples and the information given was necessary to help candidates avoid such errors.

(iii) Most candidates answered 'No' after dividing 7919 by 13. Only the few who had correctly followed the previous parts of this question knew how to attempt this. Correct working was rarely seen.

(c) This was not well answered. A good understanding of **Question 6(b)** was necessary to be able to use similar working to find that when 7919^{64} is divided by 7 the remainder is 2.

Part B Modelling – Orbiting Satellites

Question 7

(a) (i) Most candidates plotted this mean accurately.

(ii) The line of best fit was usually correct. It was not always ruled. Sometimes it did not go through the mean. Quite often it tilted on the mean point as an axis, i.e. it went slightly above the points lower than the mean and slightly below the points higher than the mean, or vice versa.

(iii) This question was well answered. Many candidates managed to find a gradient and a *y*-intercept that would fit into the required ranges. Most candidates also knew to use the mean as one of the points for the calculations.

(b) Many candidates calculated both orbit times to find values within range. Most showed their working to gain evidence for communication. For model B some candidates went straight to 728.9, which was the value given in the question, without showing the value to at least one more decimal place.

(c) This question was quite well answered. Where a mistake was made leading to an incorrect answer, there was often not enough working shown to gain a method mark although there still might have been enough evidence for communication.

Question 8

This question was well answered with many candidates showing enough working to have evidence for communication. Some candidates did not provide a comparison.

Question 9

(a) This sketch was usually good. Touching the *h*-axis at (400, 0) was condoned as long as the curve continued upwards from this point.

(b) Most candidates managed to show correct substitution into the model which gained them evidence for communication and invariably led them to the correct answer. The comparison to the actual time was also well done, helped by the significant difference in the results.

(c) (i) This question was correctly answered by almost all candidates.

(ii) Most candidates managed to put into words the correct connection between the increase in radiation and the descent time. Some candidates stated that the descent was quicker, which was the result of the decrease in descent time, so this answer was accepted. Candidates needed to write about effects/comparisons in the context of the question. Answers referring to 'inverse proportion' or 'negative correlation' were condoned in this case. Some candidates tried to compare heights.

(iii) Some candidates choose either $D = ks^{1.1}$ or $D = k - s$ on the basis of the substitution of one value. Many trials needed to be successful if this method was to be used. Other candidates choose $D = ks^{0.9}$ giving the fact that it reduced descent time as their reason. If they had followed this up with a few calculations they would have found that it does not work. A number of candidates chose 'where *k* is a constant' as the most suitable model.