MATHEMATICS (9 TO 1)

Paper 0626/01
Paper 1 (Core)

Key messages

To succeed in this paper, candidates need to have covered all of the Core syllabus content. They need to show clear and logical working.

General comments

Candidates were prepared for the more straightforward questions on the paper.

Some candidates gave good clear answers to the questions requiring reasoning, but many answers were vague and did not answer the given question.

Many candidates were unable to perform algebraic manipulation and trial and error methods were commonly seen in these questions. This sometimes led to correct answers but candidates were not able to gain method marks if the answer was incorrect.

It was evident that many candidates were unfamiliar with set notation.

Use of a calculator is expected in this paper. It was clear that some candidates were using written or mental methods, rather than their calculator, for arithmetic and errors were often seen in these methods. Candidates should write down the calculation they have performed so that method marks can be awarded if the final answer is incorrect.

Comments on specific questions

Question 1

Most candidates answered this question correctly. Many showed the first step of working out the amount of money spent as £2.48.

Answer: £7.52

Question 2

(a) Most candidates identified the warmest temperature although some stated the name of the country, which was condoned on this occasion.

(b) The most common incorrect answer in this part was 13 or –13 resulting from 1 – 14 rather than the correct 1 – (–14). Some candidates did not read the question carefully and gave the answer –14, the temperature in Israel.

(c) Some candidates calculated the mean correctly. However, there was little method shown so part marks could not be awarded for an incorrect answer. Some candidates were unable to find the sum of the combination of positive and negative numbers and many ignored the negatives leading to the common incorrect answer of 16.6. It was also common to see candidates multiplying by 5 rather than dividing by 5.

Answers: **(a)** 8°C **(b)** 15°C **(c)** –13°C

Question 3

(a) Most candidates could use the timetable and calculate the correct time difference.

(b) Some candidates reached the correct answer in this part, but working was often lacking or set out in a confused manner. Most candidates could read the correct time from the clock and identify which bus would be taken. Candidates who used a counting on method to find the length of time were more successful than those who attempted to subtract 13 53 from 11 45 using a calculator. It was common to see the answer 1 hour 34 minutes, which was the length of the bus journey rather than the length of the whole journey.

Answers: **(a)** 43 minutes **(b)** 2 hours 8 minutes

Question 4

(a) Almost all candidates completed the table correctly.

(b) Most candidates answered this part correctly.

(c) Most candidates answered this part correctly.

(d) Many candidates identified that the sample was too small and others stated that there are other sports that were not included in the survey. Some candidates made irrelevant comments relating to values in the table. Some candidates suggested that he should have asked everyone in the country which was not acceptable.

Answers: **(b)** Football **(c)** 12

Question 5

(a) Candidates who identified that the solid was a prism were often unable to spell it, although this was not penalised if the answer was clear. The most common incorrect answer was trapezium, although answers such as triangle and square were also seen.

(b) It was clear that many candidates did not understand the term congruent. Some did copy the shape given but it was common to see reflections or rotations of the given shape, which were also acceptable.

Answers: **(a)** Triangular prism

Question 6

(a) Many candidates answered this part correctly.

(b) Some correct answers were seen but the most common incorrect answer was 2.088 which resulted from taking the cube root of the whole expression rather than just of 12. Some candidates could not use their calculator functions correctly and found the cube rather than the cube root.

Answers: **(a)** 83 **(b)** –0.601

Question 7

(a) Most candidates answered this part correctly.

(b) Many candidates realised that 3 would be part of their answer, but there was confusion between line symmetry and rotation symmetry. Answers of 3, 3 or 3, 0 or 0, 0 were all common.

Answers: **(b)** 0, 3

Question 8

(a) Many candidates were able to complete the table correctly.

(b) (i) This part was also often correct; however the answer 193 usually resulted from calculator evaluation rather than from identifying the relationship between the values in the calculation and the answer.

(ii) This part was not well answered. Many candidates referred to the calculations they had performed on their calculator rather than the patterns. Those who did refer to a pattern usually described how they identified 96.

(c) There were more correct answers in this part than in the last suggesting that candidates had identified the pattern in the numbers even if they were unable to explain it. It was clear that some candidates had used a calculator to evaluate the number and then wrote their answer in words.

Answers: **(b)(i)** $97^2 - 96^2 = 193$ **(c)** Two million and one

Question 9

There were some good responses to this question, usually resulting from identification that the test had a total of 40 marks, working out how many Carlo and Janey each scored and comparing with Marco's score. Calculations involving conversion to percentage were also common. Some working was not shown clearly and calculations that were not linked with the correct names did not lead to a convincing comparison.

Question 10

(a) Many candidates wrote a list of multiples of 5 here but gave extras which demonstrated that they did not understand the meaning of the universal set.

(b) Many candidates omitted this part demonstrating that they did not understand the set notation in the question.

(c) Many candidates omitted this part demonstrating that they did not understand the set notation in the question.

Answers: **(a)** 5, 10, 15, 20 **(b)** 4 **(c)** 5

Question 11

This question was not well answered. Many candidates could not work out the volume of the cuboid and multiplied the two numbers given to reach 65 rather than realising that the square base meant that they needed to find $6.5 \times 6.5 \times 10$. A number of candidates then used the density formula correctly with their value of the volume to find the mass. It was rare to then see any conversion between grams and kilograms or comparison with the given 1 kilogram to complete their answer.

Question 12

Very few candidates knew the formula for the volume of a cylinder which is a requirement of the syllabus. Many multiplied either radius by height or diameter by height and few calculations involving π were seen.

Answer: 141

Question 13

(a) Many candidates reached the answer 3, although this was not always shown as $x \leqslant 3$ which was required for full credit. Some candidates converted the inequality to an equation to solve. It was clear that some solved either by inspection or by trial and error as algebraic working was rarely seen.

(b) It was common to see candidates indicating the number 3 on the number line rather than showing the required inequality. Some candidates knew the closed circle notation for the inclusive inequality.

Answers: **(a)** $x \leqslant 3$

Question 14

Correct algebraic working was rarely seen in this question. Candidates often started incorrectly by collecting the terms in the bracket to reach 6*x*. Many attempted non-algebraic trial and error methods but where algebraic working was seen credit was given for any correct steps.

Answer: $x = 1.5$

Question 15

Candidates did not understand the term 'systematic sample'. A small number identified that 18 was relevant to the explanation but were not able to go further than this. Some gave explanations relating to random sampling but most answers suggested picking 10 girls and 10 boys. Very few responses gave any explanation about how the sample would be selected, whichever type of sampling they had referred to.

Question 16

Candidates found this problem difficult to access. Some did attempt to work out areas of one or more of the rectangles but very few were able to combine these with the semi-circle to reach the shaded area. It was common to see calculations involving lengths rather than areas. Very few candidates used their areas in a percentage calculation. A number of candidates attempted to estimate the percentage shaded by identifying that each rectangle was 33% of the shape and then subtracting a small percentage representing the semicircle.

Answer: 58.5%

Question 17

Many candidates were able to use index laws to find the indices in the answer. The most common errors involved not combining the numbers correctly so answers of $9x^7y^4$ and $7x^7 \times 2y^4$ were often seen.

Answer: $14x^7y^4$

Question 18

Many candidates omitted this question and those that attempted it usually swapped the *S* and *c* in the given formula. It was rare to see any correct algebraic manipulation.

Answer: $c = \dfrac{S - 3dh}{d}$

Question 19

Many candidates omitted this question. Those that attempted it did not understand that it related to prime factors. It was common to see three numbers with a sum of 455. Some subtracted 1 from 455 and then divided 454 by 3 and gave the answers 151.3, 151.3, 151.3. Only a very small number of candidates showed any attempt to divide 455 by any value.

Answer: $x = 13$, $y = 7$, $z = 5$

MATHEMATICS (9 TO 1)

Paper 0626/02
Paper 2 (Extended)

Key messages

- Full coverage of the Extended syllabus is needed to access the whole paper.
- Clear, logical steps in working out need to be shown in order to access method marks when final answers are incorrect.
- For the requirements of the question to be fully understood, careful attention to the key words and phrases in the question is needed.
- Questions need to be answered fully, and a check made to ensure the requirements of the question have been met, by re-reading the question before moving on to the next question.

General comments

Good responses were exemplified by clear and logical steps in the working out. Those with minimal or missing steps were more likely to lose marks in the event of minor errors and a final incorrect answer. Those with illogical or confusing steps, or untidy writing, were also more likely to lose marks, often as a result of losing their way through their solution, or misreading their own writing.

Candidates should be advised to consider the number of marks available in the question when deciding on a method to adopt.

Comments on specific questions

Question 1

This question required recall and use of the formula for the volume of a cylinder. The majority of candidates answered this correctly, showing a good level of detail in their working. Some candidates used incorrect formulae, and in some cases dimensionally incorrect formulae.

Answer: $141\,\text{cm}^2$

Question 2

(a) This inequality question was answered well by candidates. For full credit, candidates needed to identify the correct solution as $x \leqslant 3$. If solving as an equation, then the correct inequality sign is required in the final answer. Embedded answers are not acceptable

(b) Indicating 3 alone on the number line was not sufficient to gain any credit. Lines must extend far enough, include an arrow, and have a closed circle at 3, which was not always the case in the answers seen.

Answers: **(a)** $x \leqslant 3$

Question 3

This solving equation question was fairly well answered, although lack of clear, logical steps by some candidates resulted in sign errors. Some candidates were incorrectly combining x terms with constants.

Answer: 1.5

Question 4

This systematic sampling question was partially answered by many, with 18 identified by many for partial credit. Explanation as to how the sampling was to be carried out, which required some reference to an ordered list, was missing in most cases.

Question 5

In this multi-step question on area and percentage, candidates would be advised to adopt a more systematic method and show their working more clearly, as a significant proportion of answers were difficult to follow. Whilst evidence was seen that candidates were able to find the area of a rectangle and a semi-circle, there was little evidence of a plan to combine these elements in a way that would gain them credit. A number of illogical methods were seen, including using perimeter formulae rather than those for area. Many realised that the question required a percentage answer, but a significant number of candidates used incorrect methods to work out the percentage following an attempt at the shaded area.

Answer: 58.5%

Question 6

Some confusion was evident in candidates' use of the laws of indices, with multiplication of powers rather than addition. Another common error was to give $9x^7y^4$ rather than $14x^7y^4$.

Answer: $14x^7y^4$

Question 7

In this rearranging formulae question, some candidates were able to give the correct answer with minimal steps, but it is advisable to show how the answer is arrived at in steps rather than doing it all in one go. Many candidates were unable to identify the correct first step.

Answer: $c = \dfrac{S - 3dh}{d}$

Question 8

In this question asking candidates to compare approximations of π to the actual value given to 5 decimal places, many candidates were able to evaluate the expressions correctly, but few made a rigorous comparison of the values by finding differences.

Question 9

Although some candidates realised that division was required, the connection with prime factorisation was not made by most. A common error was to subtract 1 and divide by 3, and another one was to find 3 numbers that summed to 455. By considering the question, and writing down an algebraic expression for the number of counters in terms of x, y and z, candidates might have identified the solution better.

Answer: $x = 13$, $y = 7$, $z = 5$

Question 10

In this reverse percentages question, many candidates were able to gain a mark by identifying 88%, but then were unsure of how to progress any further. Some erroneously increased the given value by 12%.

Answer: 16 500

Question 11

In this perimeter of a sector question, many candidates were able to identify the formula for the circumference correctly, and use the appropriate dimension in it. Fewer candidates were able to find the arc length. A common error was to give this as the final answer and not to add on twice the radius.

Answer: 15.7 cm

Question 12

(a) In this box plot question, many candidates were able to correctly draw vertical lines at the appropriate positions, but few completed it as a box plot.

(b) (i) Many candidates correctly found the inter-quartile range from the lower quartile and upper quartile given in the table. Given the number of incorrect answers seen for this straightforward question part, it must be assumed that some candidates did not know what the inter-quartile range was.

(ii) This was a poorly understood question with a range of incorrect answers seen that did not point to a common misconception.

Answers: **(b)(i)** £22 000 **(ii)** £24 000

Question 13

This question on functions proved to be a challenge for most candidates.

(a) Many candidates did not attempt this question, so it seems that inverse functions, or the notation for inverse functions, is poorly understood by many. Some candidates gave incorrect answers with no detail of how they had arrived at it.

(b) (i) Composite functions seems to have been better understood than inverse functions. Many candidates attempted this explanation style question. Few gained the mark, due to a lack of a clear and full explanation. Again, there were a significant number of candidates that did not attempt this question.

(ii) Many candidates attempted this question. Some gave the composite function correctly. A common error was to see the composite function reversed.

Answers: **(a)** $\frac{x+3}{4}$ **(b)(ii)** $4x^2-3$

Question 14

Few candidates correctly worked through this question. Many were able to identify the gradient of the line given, but did not take the negative reciprocal to find the perpendicular gradient. Some erroneously used the given point (4, 5) with the origin to erroneously find the gradient of the given line, and use a stepping method to attempt the perpendicular gradient. Few were able to use the gradient they had found to attempt the equation of the perpendicular line. A systematic approach was required with this question, which was seldom seen.

Answer: $y = -\frac{1}{2}x + 7$

Question 15

(a) The majority of candidates did not identify the angles required. Candidates are advised to use the diagram to add missing information, such as the angles in this case. Many attempted to apply Pythagoras' Theorem to a non-right-angled triangle with 5, 5 and *BC*. It was common to see an incorrect answer with no working preceding it.

(b) Many candidates did not attempt this question on the area of a triangle. Of those that did, it was common to see incorrect formulae used, or possibly correct formula with incorrect values – it is advised for candidates to write down the formula they are using before substituting values. Again, adding missing information onto the diagram would have helped when choosing which formula for area of a triangle would be most appropriate to use.

Answers: **(a)** 8.66 cm **(b)** 32.5 cm^2

Question 16

(a) Some candidates were able to successfully arrive at the answer required. Others started well, made slips and then stated that it could not be written in the form given. Some candidates were unaware that it was simply algebraic manipulation and made no progress.

(b) This iteration question was not attempted by many. Some were able to make a correct first step and made no further progress.

Answers: **(b)** iteration leading to 4.30

Question 17

(a) A minority of candidates did not attempt this. The most successful approach was to expand the left-hand side. It was common to see errors in the expansion. Others made errors in the expansion and then attempted to solve an equation. Candidates are advised to take careful note of instructions in questions.

(b) Of those candidates that attempted this explanation, many had the misconception that if a quadratic would not factorise then it had no solutions.

(c) Few candidates were able to make the link to the form of the equation in **part (a)**. Many erroneously gave co-ordinates using coefficients from the given equation, so perhaps had some memory of a link to reading off co-ordinates using a form of the quadratic.

(d) Few candidates attempted this question part. Of those candidates that attempted it, most were able to sketch a quadratic curve.

Answers: **(c)** (2, 3)

Question 18

This challenging probability question was attempted by many candidates. Only a small minority of candidates identified that a cube root was required, and even fewer realised that this then had to be subtracted from 1 to arrive at the correct answer.

Answer: $\frac{2}{7}$

MATHEMATICS (9 TO 1)

Paper 0626/03
Paper 3 (Core)

Key messages

To succeed in this paper, candidates need to have covered all of the Core syllabus content. They should be able to apply their mathematics to everyday situations and combine mathematical skills in solving problems.

General comments

The question paper included a range of questions: some routine tasks, some set in familiar contexts and others that required application of a range of skills in contexts that were less familiar. In general, candidates performed reasonably well on the more routine questions but were less proficient when they needed to identify the mathematics required to solve a problem. There were clearly areas of the syllabus that most candidates were unfamiliar with.

Where candidates knew how to proceed with a question they usually attempted to show a full method. Numerical skills were mixed and sometimes weak, but a fair number demonstrated good non-calculator skills in a variety of problems. Algebraic skills and techniques were very weak throughout for nearly all candidates.

Comments on specific questions

Question 1

(a) Most candidates answered this part correctly.

(b) Several candidates did not recognise that computing 216 – 153 is equivalent to –153 + 216 and became confused as to how to proceed efficiently giving answers such as –369. Of those that did go on to attempt a sensible subtraction there were some arithmetical errors, but many achieved the correct answer.

Answers: **(a)** 322 **(b)** 63

Question 2

(a) (i) Most candidates measured the line correctly.

(b) (i) Many candidates measured the angle correctly. Some were not able to use their angle measurer efficiently and gave obtuse or even reflex numbers as answers.

(ii) Most candidates recognised that the angle was acute.

Answers: **(a)** 7.3 **(b)(i)** 64 **(ii)** Acute

Question 3

(a) Some candidates were confused between factors and multiples, giving an answer of 3. Only a minority gave the correct answer.

(b) The majority of candidates gave a correct response. Again a few were confused between factors and multiples giving an answer of 60.

Answers: **(a)** A multiple of 60 **(b)** 3 or 1

Question 4

Many candidates were able to find the decimal and percentage equivalents to $\frac{1}{4}$.

Some found 70% and 0.03, but it was only a very few who could find the fractional equivalents.

Answers: 0.25, 25%, $\frac{7}{10}$, 70%, $\frac{3}{100}$, 0.03

Question 5

(a) Many candidates gave the correct metric measure of kilograms. A small number gave imperial measures such as pounds or stones.

(b) A few candidates gave a correct answer but most gave an answer of cm.

Answers: **(a)** kilogram **(b)** cm^2

Question 6

A few candidates did not know how to proceed on this question. For those who did attempt the question most showed an understanding of scale and obtained 1 or 2 marks. There were very few fully correct solutions involving the technique for constructing a triangle with ruler and compass.

Question 7

(a) Candidates found manipulating algebraic expressions difficult. They got muddled using and interpreting the sign in front of each part, so incorrect answers such as $–8p + 11r$ were common. Few candidates found the correct answer.

(b) A fair number of candidates showed some appreciation of algebraic notation by getting at least one of the two improvements correct.

Answer: **(a)** $4p – 5r$

Question 8

Candidates generally found this question difficult, but for those who did attempt it there were a variety of different methods used, most of them appropriate. There were few fully correct solutions, but many obtained part marks for a partially correct method. Many errors in their working were arithmetic rather than conceptual.

Answer: 64.6

Question 9

(a) Nearly all candidates worked out the correct total number of cars.

(b) Many candidates gave a valid sensible reason.

(c) (i) Many candidates gave a correct response as a fraction. Unacceptable answers were words such as ‘unlikely’ or ratios.

(ii) There were some correct solutions; a few candidates omitted to simplify their fraction.

Answers: **(a)** 68 **(c)** $\frac{9}{68}$ **(d)** $\frac{21}{34}$

Question 10

Most candidates did not know how to solve this problem; many just gave an incorrect answer with no working. For those who did attempt to show working their method was often confused and incoherent. Few obtained the correct solution.

Answer: 3

Question 11

(a) The majority of candidates were unfamiliar with vectors and there were very few meaningful attempts.

(b) Very few candidates attempted this part.

Answers: **(a)** $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ **(b)** $\begin{pmatrix} 12 \\ -4 \end{pmatrix}$

Question 12

Many candidates made a good attempt at this two-stage problem and there were a significant number of correct answers. Good non-calculator skills for solving percentage problems were seen.

Answer: 9.60

Question 13

There were only a few correct responses. Candidates were confused as to the order of operations required and getting muddled between subtraction and negative numbers. Common errors were answers of –45 or computing $5 – 3^2$ and obtaining an answer of –4 or 4.

Answer: 45

Question 14

(a) There were few correct answers. Common errors were 27 500, 27 470 and 28 000. Some candidates did not understand the principles behind rounding at all and gave answers such as 27, 27.469 and 0.27.

(b) There were very few correct answers. Common errors were 0.1, 0.06 and 0.06000.

Answers: **(a)** 27 000 **(b)** 0.060

Question 15

(a) Most candidates realised that there were errors in the order of operations but there was a mixed response in giving clear and relevant reasons for this.

(b) There were few correct answers to this with many candidates not using the correct order of operations.147 was a common incorrect answer, with candidates just making one error, for which they were awarded one mark,

Answer: **(b)** 99

Question 16

A few candidates knew the technique for multiplying fractions and these generally went on to gain both marks, with only a few omitting to simplify their fraction.

Answer: $\frac{1}{12}$

Question 17

(a) Many candidates understood the principle of plotting the data on the scatter diagram, but often there was a lack of accuracy resulting in the loss of one or both marks.

(b) A fair number of candidates gave the correct answer of positive. A common error was to give an answer of 'increasing'.

Answer: **(b)** positive

Question 18

(a) Candidates did not know how to approach this and there was little of substance in their responses.

(b) A few candidates solved the problem correctly without using algebra.

Answers: **(a)** $8a + 100 = 380$ **(b)** 35

Question 19

A few candidates recognised the procedure for dividing the money in the correct ratio, but could not always go on to solve the problem and earned part marks. A small number of candidates made the error of dividing the money by 3, 4 and 5 separately.

Answer: 48

Question 20

(a) Candidates did not know how to find the gradient of a line.

(b) Candidates did not know how to find the equation of a line.

Answers: **(a)** 4 **(b)** $y = 4x + 3$

Question 21

There were a fair number of attempts at this question. None of the candidates used an algebraic approach, but some gained part marks by finding angles that satisfied some of the conditions. There were a small number of correct answers.

Answers: 35, 70, 75

Question 22

Most candidates clearly did not know the meaning of a bisector of an angle and either did not attempt the question or made little attempt to make an appropriate construction. There were a small number of correct responses.

Question 23

(a) Most candidates did not know the technique of using indices. There were a small number of correct answers. A very common error was to find $2^3 - 1$ as $6 - 1$, giving an answer of 5.

(b) Most candidates were confused by this question and there were few meaningful responses.

(c) Candidates lack of skills manipulating indices made this question inaccessible to nearly all candidates.

Answers: **(a)** 7 **(b)** 3, 7, 31

Question 24

(a) There were only a small number of candidates who obtained the correct answer. Many did not attempt to complete the tree diagram and the attempts that were made were often confused.

(b) Nearly all candidates were unable to use their tree diagram to find the correct answer.

Answer: **(b)** $\frac{6}{35}$

Question 25

(a) Candidates did not know how to factorise the quadratic expression.

(b) Candidates did not know how to solve the quadratic equation.

Answers: **(a)** $(x+3)(x-6)$ **(b)** $x = -3$ or $x = 6$

Question 26

Most candidates did not know how to approach this time, distance, speed problem, but there were some good attempts with a small number of correct answers given with a detailed method.

Answer: 60

Question 27

Candidates were not able to simplify the expression.

Question 28

Some candidates attempted this question but there were no correct responses. Answers of $3k^3$ and $3k^{-3}$, given by a few candidates, showed some understanding of manipulating such expressions.

Answers: $3k^7$

MATHEMATICS (9 TO 1)

Paper 0626/04
Paper 4 (Extended)

Key messages

Candidates should be aware of and have experienced the full syllabus content as there is no choice of questions. When answering questions candidates should include clear working and use appropriate levels of accuracy. Candidates should also have the capacity to interpret, reason and structure solutions in multi-step and contextual questions. Accuracy in graph drawing and in geometrical constructions is required.

General comments

Most candidates found the exam challenging and struggled to cope with the full demands of the paper.

Skills in routine algebra should be practiced and embedded so that they can be used fluently. Many of the candidates may have been more suitably entered for the core exam.

The topics of equation of a line, problem solving with angles, construction and probability trees were well answered.

The weaker areas included all algebraic manipulation topics, indices, similarity area and volume, fraction and decimal equivalence, matrices, inequalities and regions, vectors, surds.

Comments on specific questions

Question 1

(a) A few candidates were successful but many were unable to use the two given co-ordinates to find the gradient. Often no working was shown.

(b) More were successful here, often intuitively from the relation between the x and y co-ordinates rather than using the gradient.

Answers: **(a)** 4 **(b)** $y = 4x + 3$

Question 2

This question was generally well answered.

Answer: 35, 70, 75

Question 3

The construction of the angle bisector was generally good. A few drew an accurate line with no arcs**.**

Question 4

There was a mixed response to this question with candidates finding **part (b)** challenging.

(a) This was well answered.

(b) Many calculated the values for n = 2, 3, 4 and 5 but were unable to interpret which were prime. Others made arithmetic errors in the calculation.

(c) Those that were able to obtain 63 were usually always able to explain why this was non-prime.

Answers: **(a)** 7 **(b)** 3, 7, 31

Question 5

(a) The tree diagram was correctly completed by all the candidates.

(b) Most candidates struggled here and were unable to correctly combine the required probabilities. Some added, others did not identify the correct pair.

Answer: **(b)** $\frac{6}{35}$

Question 6

(a) Some candidates were successful, but others made sign errors in the factors. A few did not know what was required.

(b) The correct factors in **part (a)** invariably led to a correct solution here. Some were able to follow through from their factors in **part (a)** to earn the mark here.

Answers: **(a)** $(x+3)(x-6)$ **(b)** –3 and 6.

Question 7

This question was poorly answered. Many did not realise that the time for the first stage of the journey was required to solve the problem. Some attempted the division of 125 by 50 to find the time but were unable to complete this calculation accurately. A few broke down the problem correctly and obtained the correct answer.

Answer: 60.

Question 8

As this was a show that question, it was important that candidates showed every stage of their working with no errors or omissions. A few were able to expand the brackets correctly and show a systematic approach to obtain the given expression. Others were more random and worked with terms in isolation without writing complete statements.

Question 9

(a) The first part was well answered. The inter-quartile range appeared unfamiliar content to some candidates in **part (ii)** and only a few were successful. Only a few candidates annotated the graph.

(b) Only a very small number gained any credit here. One mark was available for finding the cumulative frequency representing 30 minutes or less here. Only a few used their graph to find this. The remainder of the marks were for finding the number that waited longer than 30 minutes as a percentage of the total number.

Answers: **(a)(i)** 18 **(ii)** 14 **(b)** 15

Question 10

(a) This was poorly answered. Common errors included $3k^{-7}$.

(b) This was poorly answered. Most had little knowledge of fractional and negative powers.

(c) Again, this was poorly answered. Knowledge of fractional powers was limited here.

Answers: **(a)(i)** $3k^7$ **(b)** $\frac{5}{2}$ **(c)** $\frac{1}{3}$

Question 11

This question required candidates to find expressions for the volumes of the two solids that gave the composite solid. The more able candidates gave correct expressions for the cuboid and the pyramid before adding them. Many were unable to write a correct method for finding the volume of either solid however.

Answer: $12x^3$.

Question 12

For almost all of the candidates, this appeared to be an unfamiliar topic. Few appeared to link similarity with enlargement to find the linear scale factor and as a consequence this was very poorly answered.

Answer: 270.

Question 13

For almost all of the candidates, this appeared to be an unfamiliar topic. The common incorrect answer was $\frac{39}{50}$ from $\frac{78}{100}$.

Answer: $\frac{26}{33}$

Question 14

(a) Only a few interpreted the information given in the inequality to obtain the correct answer.

(b) Very few used the formula with $n = 0$ to obtain the correct answer.

(c) A few interpreted the multiplier correctly in the formula but the majority had little idea of what to do.

Answers: **(a)** 5 **(b)** 36 700 **(c)** 6

Question 15

For almost all of the candidates, this appeared to be an unfamiliar topic. In each of the three parts, there was little or no work for which credit could be given.

Answers: **(a)** $\begin{pmatrix} 12 & 9 \\ 18 & 21 \end{pmatrix}$ **(b)** 10 **(c)** $\frac{1}{10}.\begin{pmatrix} 7 & -3 \\ -6 & 4 \end{pmatrix}$

Question 16

The more able students recognised that for the points of intersection, the two sets of equations had equal y and x values and were able to form an equation in x and then solve it correctly. The majority of candidates were unable to make a start with the algebra and made little progress.

Answer: (–1.5, 1.5) and (2, 5)

Question 17

(a) Very few candidates used the information given in the question to establish the given inequality.

(b) A few more were successful with the information here and were often able to give one of the inequalities, usually $x \geqslant 3$, correctly.

(c) Some were able to drawn the $x \geqslant 3$ boundary line correctly but no-one gave a correct solution on the graph to this question.

(d) Having been unable to produce a correct graph in **part (c)**, candidates were unable to find the greatest profit.

Answers: **(b)** $x + y \leqslant 20$ and $y \geqslant 3$

Question 18

This question involving algebraic manipulation and an identity was answered very poorly. Marks were available for a correct expansion of brackets or a correct factorisation of one of the expressions on either side of the equation, but no candidates used this approach.

Answer: $g = 3$ and $h = -5$.

Question 19

For almost all of the candidates, vectors appeared to be an unfamiliar topic and **parts (a)** and **(b)** were either answered incorrectly or omitted.

Answers: **(a)** $2\mathbf{q} - 2\mathbf{p}$

Question 20

No candidates demonstrated an understanding of the relationship between the sine values of angles between 0° and 360° and even part marks for a sketch of the sine curve were beyond candidates' understanding. A common error was to give an answer of –63°.

Answer: 243 and 297.

Question 21

This question on surd manipulation was usually omitted. The few that attempted the question were unable to process the addition of the two fractions correctly and made little progress towards the given form for the answer.

MATHEMATICS (9 TO 1)

Paper 0626/05
Paper 5 (Core)

Key messages

In order to succeed in this examination, candidates need to give clear, logical answers to questions, showing sufficient method so that marks can be awarded. This is particularly the case when a candidate's final answer is incorrect or when the solution to a question has more than one step. Candidates who present their work neatly seem less likely to make simple errors such as misreading their own writing. Candidates also need to make sure that they read each question carefully and pay careful attention to key words and phrases.

General comments

Candidates found the problem-solving questions in this paper quite challenging. For example, **Questions 2(b)**, **3(c)**, **6(b)** and **6(c)** were not well answered and were often omitted. Candidates also struggled to understand the techniques needed to answer **Question 11**. Other questions, which were more routine, were better attempted. All candidates seemed to have sufficient time to answer those questions that were within their capability.

Comments on specific questions

Question 1

(a) (i) This question needed to be read carefully. Those candidates who assimilated all the given information were successful. Many candidates missed the important information in the first line and usually gave the answer 68p. A small number of candidates misunderstood what was needed and either found the cost of a whole roll of cloth which was sold in parts, £17.00, or found the cost of 14 metres of cloth. Occasionally candidates used the incorrect notation, 0.63p.

(ii) There were two successful approaches to this question. Candidates could either subtract their answer to **part (a)(i)** from 68 and multiply the result by 25 or work out the cost of a whole roll sold in parts and subtract £15.75 from the result. The latter method was more popular from those candidates offering a correct solution and showing any method. Candidates who gave the answer to **part (a)(i)** as 68p often gave the answer 0 here. Weaker candidates often made no attempt to answer this question.

(iii) This was a more routine part of the question and a greater proportion of candidates were successful. Weaker candidates rounded £0.70 to £1 and tried to work with that or used build-up methods that gave an inaccurate answer. As this was a paper for which candidates had access to a calculator these approaches were not credited. Other candidates multiplied 15.75 by 0.70 rather than dividing by it. A few candidates would have improved if they had either written down their method or taken more care in reading their calculator display as an answer of £25.50 was given by more than one candidate.

(b) Fully correct answers to this part were quite rare. A small number of candidates rounded or truncated their answer to the nearest integer. A few of these showed no working. It is likely that these candidates may have improved if they had shown method steps. A reasonable number of candidates earned a mark for finding the actual profit of £7.75. Most candidates who found this value went on to work out $\frac{7.75}{15.75}$, giving an answer of 49.2%. A small number of candidates attempted to work with £16 rather than £15.75. As a calculator is allowed in this examination, this was not necessary. Weaker candidates found $\frac{8}{15.75}$ or made no attempt to answer.

Answers: **(a)(i)** 63 **(ii)** 1.25 **(iii)** 22.50 **(b)** 96.9

Question 2

(a) (i) Many candidates found this part of the question to be accessible and were successful. Weaker candidates tended to give the answer 0 or –3. It should have been clear to these candidates from the information given in the next part of the question that neither one of these answers was correct.

(ii) Again, a good number of correct answers were seen. The most common incorrect answer was 6. Candidates who gave this answer may have improved if they had used their calculator, as the correct calculation was often stated.

(iii) A good number of candidates were able to give the correct answer to this part. Most showed their working, with many subtracting 32 from 50 and dividing by 3 and some simply subtracting 3 from 50 until they reached 32. A few candidates gave the answer as 18, misinterpreting the number of marks lost as the number of questions incorrectly answered. Some candidates missed the key information in the first line and found that 7 correct answers and 1 incorrect answer scored 32 marks.

(b) Candidates found this part of the question to be very challenging, with very few scoring full marks. Some may have done better if they had improved the accuracy of their written communication as, for example, 27 was often stated as being a number of points rather than a number of correct questions. Others candidates needed to read the question more carefully as they did not subtract any points for the incorrect answers. These candidates often made comments such as 'Team X is not certain to win'. Some candidates worked out $\frac{3}{5}$ of 50 rather than $\frac{3}{5}$ of 45. Few of these were awarded marks as a special case as most stopped at that point. Many weaker candidates made no attempt to answer.

Answers: **(a)(i)** –60 **(ii)** –6 **(iii)** 6

Question 3

(a) (i) This part of the question was well answered by most candidates.

(ii) This was also fairly well answered. Some errors were made when reading the scale by a small number of candidates. Other candidates included extra sections of the travel graph. These candidates may not have understood that only the horizontal section of the graph represented no movement to or from the cinema.

(b) (i) The simplest method of solution was to use proportional relationships, i.e. 1 mile in 20 minutes so 3 miles in 60 minutes. Candidates attempting to use $\frac{\text{distance}}{\text{time}}$ were less successful, often using a time of 0.2 hours instead of $\frac{1}{3}$ hour and often multiplying instead of dividing. Some candidates may have improved if they had considered how reasonable their answers were, as walking speeds in excess of 10 mph were given on occasion.

(ii) Candidates found this part of the question challenging. Some candidates understood that the bus departed at 11 35. Others correctly wrote down a calculation for the time as $\frac{4}{24}$. However, very few correctly worked out that it took the bus 10 minutes to travel to the cinema, with most thinking that it took 6 minutes. Many candidates would have done better if they had shown their method step by step, rather than running many steps together or doing a great deal of mental arithmetic. Some candidates misinterpreted the question and attempted to find the time it took Alice to get to the cinema rather than her time of arrival.

(c) There were very few correct responses to this part. A few candidates stated that Paul took 30 minutes to travel 4 miles and Alice took 15 minutes to travel 5 miles and then stopped without attempting to convert one into a form comparable with the other. Most candidates attempted to find the time each person took to return home, rather than a rate such as the speed.

Answers: **(a)(i)** 4 **(ii)** 2 hours 50 minutes **(b)(i)** 3 **(ii)** 11 45

Question 4

It was apparent that many candidates had not studied stem and leaf diagrams as they made no attempt to answer **part (a)**. Candidates were able to use the given table of data to answer the rest of the question. Many candidates did not seem to realise this and often made no attempt to answer any part.

(a) Candidates who made a reasonable attempt often scored two marks, usually forgetting to complete the key. A good number of these candidates made good use of the blank grid given to complete an unordered diagram. This made the completion of the ordered diagram much easier.

(b) A reasonable number of candidates gave the correct answer. A few candidates stated the answer as, for example, 5.1 to 1.9.

(c) Very few candidates earned both marks. A reasonable number earned one mark – usually for an answer of either 3.3 or 3.4 or for circling both values in the stem and leaf diagram. A small number of candidates gave answers of, for example, 4 rather than 3.4.

(d) (i) A reasonable number of candidates correctly identified the mode. Some candidates attempted to find the median or the mean in this part. Other candidates gave the answer as 9 rather than 1.9. Again, there were many candidates who made no response.

(ii) A small number of excellent answers were given. Some candidates suggested it was not suitable as it was the most common, simply defining the mode. Again, there were many candidates who made no response.

Answers: **(b)** 3.2 **(c)** 3.35 **(d)(i)** 1.9

Question 5

This question was routine. In spite of this, candidates still struggled to offer solutions of any value. In **part (a)**, many candidates drew triangles rather than the required flags. The reflection was rarely completed correctly, with only a few candidates earning a single mark for a partially correct answer. Similarly, the translation was rarely correct, with the vertical displacement most commonly incorrect. Many candidates made no attempt to answer **part (b)**. Those who did were often able to recognise the transformation as being a rotation and some were able to give one other component of the transformation. However, few were able to state all three required components. A few candidates gave more than one transformation, which was not permitted.

Answers: **(a)(i)** Shape drawn at (–2, 2), (–4, 4), (–6, 6), (–6, 4) **(ii)** Shape drawn at (2, –6), (4, –4), (6, –2), (6, –4) **(b)** Rotation, 90° anti-clockwise about (4, 6)

Question 6

(a) (i) This part of the question was very well answered.

(ii) Similarly, this was also well answered.

(iii) A good proportion of candidates correctly substituted 2992.52 into the given formula. In order to show that the answer rounded to 279.54 it was necessary to give a decimal of greater accuracy. Some candidates did not seem to realise this. Some candidates omitted the brackets given in the formula and gave a negative answer. These candidates clearly did not link the information in the question with that given in the pay slip.

(b) A good number of candidates understood that the taxable income was £16 000. Many of these went on to correctly find 20% of 16 000 as 3200. Many candidates used build-up methods to do this, even though a calculator was available to them. A common wrong answer was 5200, from finding 20% of 26 000.

(c) Only the very best candidates were able to score highly in this question. A few candidates were able to earn some marks for one or other of the options correctly found. Some candidates found two years for one account and only one year for the other or compared the accounts after one year only. Other candidates thought that general comments such as 'Compound interest gives you interest on your interest.' were sufficient for the six marks.

Answers: **(a)(i)** 711.38 **(ii)** 2281.14 **(b)** 3200

Question 7

(a) (i) This part of the question was correctly answered by a high proportion of candidates.

(ii) A good number of correct solutions were offered for this part. Some candidates gave their answer as 4:30. This was not acceptable. It was not necessary to convert the half an hour into minutes and these candidates would have done better to have given the 4.5 hours their calculator would have given them, should they have used it.

(b) There were some good solutions for this question. A few candidates prematurely approximated their working values and gave inaccurate answers. Other candidates rounded the £3.99 to £4 and calculated 15% of that. As this was an examination where calculators were permitted, this was not necessary and resulted in an incorrect answer. A few candidates needed to read the question a little more carefully as, on occasion, candidates gave the discount rather than the sale price as their answer. Many candidates gave incorrect answers of £3.40 or £3.41 without showing any working. Credit could not be given in these cases.

(c) Candidates who recognised this as a question assessing sharing in a given ratio were usually successful. Some used their arithmetic skills and divided 21 by 7 then multiplied by 5, as expected. Other candidates drew dot diagrams, apportioning the staff and volunteers in blocks of 2 and 5 until they had used 21 dots. This was also very successful. A few candidates offered correct working which they then misinterpreted in some way. Candidates who gave the answer 6 without any method being shown could not be credited.

(d) Candidates found this question very challenging. Very few candidates were able to deal with the inverse proportion. The most common statements, when any were given in working, were that it would take 1 volunteer $\frac{5}{3}$ hours or that 0.6 volunteers would take 1 hour. Many candidates stated an answer without giving any working.

(e) (i) A good proportion of candidates understood that the scale was from 0 to 1 and indicated the correct position.

(ii) A reasonable number of candidates were correct and showed working to support their answer. Many candidates stated the answer as 3. It may have been that these candidates understood the mathematics needed but made arithmetic errors through mental arithmetic.

(f) Many candidates did not seem to have covered this part of the syllabus as they made no or little attempt to answer. Better candidates earned two marks for a sufficiently long arc of correct radius centred at the Quay. Some candidates earned a mark for a sufficiently long arc of incorrect radius centred at the Quay. Very few candidates interpreted the second bullet point correctly as the perpendicular bisector construction. Several candidates drew a straight line 6 cm long and marked a point R at the end of it. Other candidates marked a point R at the approximate midpoint of the line segment between the Bird Hide and the Visitor Centre. Perhaps these candidates misunderstood the meaning of the word 'region'.

Answers: **(a)(i)** 09 18 **(ii)** 4.5 **(b)** 3.39 **(c)** 15 **(d)** 3.75 **(e)(ii)** 30

Question 8

(a) The key to success in this question was to make **comparisons** between the performance in the two subjects, using the information given in the graphs. Figures, such as the mode or the maximum range, were expected in support of statements made. A good number of candidates observed that students did better in maths. The figures required to support this statement were rarely seen or, if they were attempted, were incorrectly stated. For example, some candidates stated that more students scored 100% in maths than they did in physics. Some students were confused by the proportions given for the vertical axis and thought that these were the marks scored in the examinations. These candidates made comments such as 'More students scored 30% in maths than in physics'. Some candidates made no attempt to compare the two subjects, making disjoint statements about each one. Other candidates made comments which were not based on the graphs.

(b) Almost all candidates stated that Manjit's conclusion was reasonable because the students performed better in the maths examination. Very few candidates observed that the sample size was very small or the data was from one set of students and therefore only applicable to those students, thereby making Manjit's generalisation unreliable.

Question 9

(a) Many candidates found this question to be accessible, giving correct answers to **part (a)**. Candidates who were unsuccessful usually treated the sequence as arithmetic and tried to find differences. As the sequence was a simple geometric one, this was not a valid approach.

(b) (i) More candidates gave the correct answer to this part, as this was an arithmetic sequence and the majority spotted that the terms were decreasing by 2 each time.

(ii) Candidates often gave answers of –2 or n – 2. Very few wrote anything of any value.

(iii) Candidates did not attempt algebraic solutions. Some candidates were credited for observing that –126 is an even number and the other numbers in the sequence were odd. Other candidates earned partial credit for an incomplete argument of this type.

Answers: **(a)(i)** 81 **(ii)** Multiply by 3 **(b)(i)** –7, –9 **(ii)** $3 - 2n$

Question 10

(a) A good number of candidates completed the table correctly. A few candidates earned a mark for a pair of correct values, having made sign errors. Some candidates seemed to be looking for an incorrect pattern in the sequence of y co-ordinates, rather than using the equation given, as the values –160, –80, –40, …, 5 were seen on more than one occasion.

(b) Many candidates made no attempt to answer the remaining parts of this question.

Success in this part was dependent on the accuracy of the candidates' plotting. Many were awarded partial credit for correctly plotting some of their points. Some would have improved if they had taken a little more care, particularly when plotting the points (–0.5, –20) and (0.5, 20). Few candidates were awarded full marks. Often candidates made no attempt to join their points to form the graph.

(c) Very few of the candidates who attempted a horizontal line read the scale correctly and drew the graph of $y = -7$ in the correct position. Some candidates drew oblique lines with y-intercepts of –7.

(d) As very few candidates had attempted **part (c)**, most were unable to offer an answer for this part.

Answers: **(a)** –2.5, –5, –10, …, 5 **(d)** Answer in range –1.6 to –1.3

Question 11

Most candidates found this question very challenging and very few wrote anything of value in any part.

(a) The key to this part was to see that triangle *ABC* was right-angled, using the angle in a semi-circle property. No candidate actually spotted this and the necessary Pythagoras was never seen. Some candidates attempted to multiply 9 and 4.5, whilst others gave the length of *BC* as 9. Scale drawings were not permitted as candidates had been instructed to 'Calculate…'.

(b) (i) This part of the question was intended to help candidates with **part (b)(ii)**. Most candidates did not realise this. Only a few stated that the triangle was equilateral. The most common incorrect answer was isosceles. Some candidates may have done better if they had attempted to write some of the lengths they knew on the diagram, as not many did this.

(ii) Candidates did not seem to have covered this part of the syllabus. Marks were rarely awarded and, when they were, tended to be for marking the length of the radius as 4.5 on the diagram. The answer 4.5 was common.

Answers: **(a)** 7.79 **(b)(i)** Equilateral **(ii)** 4.71

MATHEMATICS (9 TO 1)

Paper 0626/06
Paper 6 (Extended)

Key messages

This paper had a number of challenging problem solving questions which required candidates to have a broad understanding of the whole syllabus.

The calculus question was not well answered and it was clear that the majority of candidates had not been taught this topic, resulting in a loss of marks in a topic where there were a number of process marks that were relatively accessible.

General comments

Candidates made a good attempt at many of the questions and were, on the whole, able to complete the paper within the time. It was encouraging to see the majority of candidates trying to apply their knowledge and produce some clear and well-structured solutions. Candidates demonstrated they were able to select the correct method and demonstrate their ability to use processes efficiently. The more able candidates were able to demonstrate a good level of mathematical thinking and a mature approach to problem-solving.

Comments on specific questions

Question 1

(a) Most candidates did not understand the meaning of reverse bearing and a common wrong answer was 242. Very few candidates drew diagrams to represent the positions of Calais and Dover which could have helped.

(b) (i) The majority of candidates worked out 3 consistent comparisons and were able to deduce that the 29 ml bottle was the best buy.

(ii) A correct conversion was seen by almost all candidates. However, many candidates were unable to recognise the need to multiply by one exchange rate and divide by the other exchange rate.

(c) (i) Candidates who recognised that 340 was equivalent to 5 parts were generally successful. Common errors included misreading the question and mistakenly working out 340 divided by 16.

(ii) Most candidates were able to give the correct ratio in its simplest form. Some candidates did not score because they gave the unsimplified ratio of 27 : 3.

(d) (i) Whilst a few candidates gave the correct lower bound, many others did not understand how to approach this question.

(ii) Good understanding of standard form was seen with most candidates understanding that the number needed to have a power of 10 in the answer. A common error was to write 476×10^2.

Answers: **(a)** 298 **(b)(i)** 29 ml **(ii)** 30.22 **(c)(i)** 204 **(ii)** 9 : 1 **(d)(i)** 47 575 **(ii)** 4.76×10^4

Question 2

(a) (i) Candidates were generally able to place the 3, 5 and 7 correctly. The 40 proved more of a challenge with many candidates mistakenly thinking that the 40 pupils who like bowling, **only** like bowling.

(ii) Candidates were not generally able to recognise the four regions that needed to be considered. Of those that did, a follow through mark was available and some candidates successfully gained this.

(b) (i) Candidates who understood the notation were able to describe the shaded regions correctly.

(ii) This region was harder to describe and only the most able candidates were successful, although many recognised that the complement had to be used somewhere.

Answers: **(a)(ii)** 44 **(b)(i)** $A \cap B$ **(c)** $(A \cup B)'$

Question 3

(a) The correct answer was frequently seen. The most common errors that were seen included slips in simplifying the expression, only summing two sides, or finding the perimeter of the triangle.

(b) (i) Only the best candidates recognised that Pythagoras needed to be used for this part. Many candidates attempted to solve the equation by using the quadratic formula or by trying to factorise.

(ii) Candidates struggled to recognise that they needed to solve the equation in **part (b)(i)** to find x. Of those finding values of x, not all recognised that $x = 0.5$ was not a possible solution.

Answers: **(a)** $12x - 2$ **(b)(ii)** 10

Question 4

(a) (i) The most able candidates completed this equation by using 0.96^2. Others obtained the correct answer by using a year by year approach. Errors included finding 4% as £24 instead of £240.

(ii) The candidates who used 0.96^2 in **part (a)(i)** were generally able to obtain this mark. Others gave answers which multiplied by k rather than having a power of k.

(b) Frequently the candidates who answered **part (a)(ii)** correctly were able to successfully find an expression for the increase in investment.

(c) (i) This part proved difficult, with candidates finding it hard to recognise the relationship between this part and the previous parts.

(ii) Few candidates showed any working for this part and of those that did, many struggled to recognise that they needed to find n from $\left(\frac{13}{12}\right)^n = 2$.

(d) Candidates were generally able to draw a decreasing curve starting from £6000, but it was rare to see a graph that decreased exponentially.

Answers: **(a)(i)** 5529.60 **(ii)** $6000\times(0.96)^k$ **(b)** $3000\times(1.04)^k$ **(c)(ii)** 9

Question 5

(a) (i) Candidates made a good attempt at this question but clear proofs were rare. A common wrong assumption was that the angles at E were right angles.

(ii) Candidates were more successful with this part and those who used the fact that the triangles were similar frequently scored full marks. Errors arose from candidates attempting to use Pythagoras' Theorem or from using the wrong multiplier.

(b) A number of candidates were able to work out x as 63 but found it harder to give clear geometric reasons. Candidates who did not recognise that $EF = EG$ generally did not score any marks.

Answers: **(a)(ii)** 8 **(b)** 63

Question 6

(a) (i) Candidates often recognised the need to use the midpoints and stated these, but they did not then realise that 50×61.2 needed to be calculated and hence further progress was not often made. The correct answer was rarely seen.

(ii) It was clear that some candidates had a good understanding of histograms and used frequency density correctly to complete the diagram. Candidates were required to label the y-axis 'frequency density' but this was not often seen. A significant proportion of candidates made no attempt at this part.

(b) This was a challenging question and many candidates could not deal with the fact that there were n marbles rather than a given numerical quantity.

Answers: **(a)(i)** 130 **(b)** $\frac{5}{18}$

Question 7

(a) Few candidates recognised the need to use Pythagoras and were unable to proceed further. The candidates who used Pythagoras were usually successful and gave OP correctly in surd form.

(b) Few candidates were familiar with the correct form for the equation of a circle. Those who knew the correct form generally scored full marks.

(c) This part was only accessible to candidates who knew that the tangent was perpendicular to the radius. Without this knowledge this question was difficult to access and the majority of candidates were unable to show the required result.

(d) This part proved to be quite difficult as it required combining the information and results gained from the previous parts. Few candidates attempted to use either the area of a triangle (or kite) or of a circle. In addition, it proved tricky for candidates to recognise that the intercepts of the tangents would lead them to the dimensions of a triangle (or kite).

Answers: **(a)** $\sqrt{40}$ **(b)** $x^2 + y^2 = 40$ **(d)** 141

Question 8

(a) (i) Candidates were able to demonstrate a good understanding of transformations and give clear descriptions of the enlargement. Unfortunately, a number of candidates did not give a single transformation and these candidates scored zero.

(ii) It was unusual for candidates to give a matrix in the correct form and it was evident that the majority of candidates did not know how to do this.

(b)(i) Most candidates made an attempt at describing the single transformation. Only a minority of candidates correctly recognised it as a reflection and even fewer were able to give the correct line of reflection.

(ii) This part was answered very accurately with the majority of candidates competently multiplying together the two matrices.

(iii) Candidates recognised that their result in **part (b)(ii)** was the identity matrix but it was rare for candidates to recognise the geometrical significance of the result and explain that a repeated reflection in the *y*-axis is equivalent to the identity matrix.

Answers: **(a)(i)** Enlargement, scale factor –2, Centre *O* **(ii)** $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$ **(b)(i)** Reflection, *y*-axis

(ii) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

Question 9

(a) A significant proportion of candidates had clearly not been taught differentiation and as a consequence they were unable to answer this part or the following parts.

(b) This part was inaccessible without an answer to **part (a)** and as a result most candidates gave no response or substituted $x = 2$ into the given equation of the curve.

(c) (i) Similarly this part depended on **part (b)** and most candidates gave no response.

(ii) Since further differentiation was required, most candidates could not complete this part.

Answers: **(a)** $3x^2 - 12x + 9$ **(b)** –3 **(c)(i)** (3, 0), (1, 4)
(ii) Maximum at (1, 4) and minimum at (3, 0) with justification.