MATHEMATICS

General comments

This paper proved to be a fair test for candidates of all abilities. It seemed to be somewhat easier than last year's paper, but still managed to challenge the most able. Weaker candidates found plenty that they could do. Candidates did not seem to have difficulty in completing the questions in the time allowed.

Candidates should be encouraged to check their working and transcription more carefully. There were a number of cases where a correct answer in the working appeared to be incorrectly transferred into the answer space. In such cases it is not always clear whether this is the result of further thought changing the response, or just a slip, so it is always likely that the answer in the answer space will be the one marked. There are occasions where method marks may be awarded, after a wrong answer, as a result of what appears in the working space. Some candidates do the working in pencil, which is then erased. It is then impossible to award any method marks. Candidates should be encouraged to present all of their working in a neat legible form.

Comments on specific questions

Question 1

Generally this question was quite well answered. The main difficulty in both parts was the position of the decimal point, though some of the weakest candidates did not understand what was required in the first part.

Answer: **(a)**   52.7%   **(b)**   70

Question 2

There was an excellent response to this question, on the routine manipulation of fractions, by candidates of all abilities.

Answer: **(a)** $\dfrac{11}{21}$ **(b)** $\dfrac{8}{45}$

Question 3

Although the method was well understood in most cases, the answers were too often spoiled by inaccurate arithmetic. Common sense should have rejected as ridiculous some of the answers seen.

Answer: **(a)** $336   **(b)**   £80

Question 4

The response to this question was rather disappointing. Many candidates showed only a very weak grasp of the concept of significant figures.

(a)   Some seemed to think one digit was required, giving an answer such as 4 or 5. Very many gave 4000 as their answer. Others quoted 4870 or even 4872.

(b)   Some very strange answers were seen here.

Answer: **(a)** 5000   **(b)**   3

Question 5

(a)   The idea was quite well understood here, but poor arithmetic led to many wrong answers. It was hoped that the time would be taken as 17/4 hours, when the work was easy, but many tried to convert to 4 hours 15 minutes and then to 4.15 hours. These candidates faced difficulties in the division of course.

(b)   It was hoped that a division would be shown and used. In many cases it was not clear how an answer had been achieved, especially when it was not a reasonable one. In this example a decimal answer was expected, though a mixed number was accepted. It was felt that an answer of 8/5 is not appropriate in this context however.

Answer. **(a)**   40 km/h   **(b)**   1.6 kg

Question 6

(a)   Very many candidates were aware of the correct way to describe this relation.

(b)   There was a mixed response here. Many correct answers were seen, but a few gave ± 9. Several gave the answer of 3 and rather more tried to use the square root, and reached √3 or ±√3.

Answer. **(a)**   Inversely   **(b)**   9

Question 7

Stronger candidates answered this reverse percentage well, but, as anticipated, many found 25% of $800. Although most of these went on to $600, several went on to a final answer of $1000.

Answer. $640

Question 8

This unusual question produced many worthy attempts.

(a)   Several good attempts used the 12 hour clock. Having obtained 8 30 the majority failed to complete the answer by going on to state 8 30 pm. The latter was accepted of course, though since the question had been set using the 24 hour clock, 20 30 was expected, and frequently seen. A common error was 10 30, coming from 03 30 + 7 hours.

(b)   There were some good answers here, though it was often expressed in an unorthodox manner, such as 04 00. A common error was to ignore the flight and to compare the local times quoted, obtaining 3½ hours

Answer. **(a)**   20 30   **(b)**   4 hours

Question 9

(a)   This was generally quite well done, but 0.4×10^{-5} and 4×10^6 were by no means rare.

(b)   This part proved to be quite a challenge. A large number of answers were in error by many powers of 10, due to faulty conversion of units and inaccurate use of indices. Although most candidates saw that the two parts of the question were linked, some divided **(a)** by 20 and others ignored the first part entirely, often cubing the 20. A method mark was available here where appropriate.

Answer. **(a)** 4×10^{-6} **(b)** 0.8 cm^3

Question 10

The response to this question was somewhat disappointing. Care was not taken to distinguish between the two types of inequality.

(a)   Answers such as $k = 5$ or 5.14 and $n = 9$ illustrate the general point made above.

(b)   This was rather better done, but only one point satisfies all the strict inequalities. Some gave several values for x and y.

Answer: **(a)(i)** $k = 6$ **(ii)** $n = 8$

(b) $x = 2$, $y = 2$

Question 11

Many correct solutions were seen. The majority of candidates knew what was required to solve the simultaneous equations, but solutions were often spoiled by one or more sign errors, or by failure to multiply all of the terms in an equation by a constant. In this case the substitution method seems to be suggested, but many good solutions using other methods were seen.

Answer: $x = -7$, $y = -3$

Question 12

The response to this question was disappointing. The properties of the angles of polygons were not as well known as had been anticipated.

(a)   Although there were many correct answers, surprisingly few divided the exterior angle of 40° into 360° to find the number of sides. When using the angle sum of the polygon, 140 was frequently used in place 140n, leading to an impossible answer.

(b)   This part was better done, but 40° was a common wrong answer.

Answer: **(a)**   9   **(b)**   80°

Question 13

Candidates scored well in this question.

(a)   Some weaker candidates gave 25 or 30 as their answer. A few treated it as $10^2 = 100$.

(b)   The main error in both parts was failure to complete the simplification. Answers such as $\sqrt{x^6}$ were not accepted.

Answer: **(a)** 26   **(b)(i)** x^2 **(ii)** x^3

Question 14

(a)   The substitution of $x = 5.5$ caused more trouble than might had been anticipated. A large minority of candidates thought $(5.5 + 2)(2 \times 5.5 - 1)$ became $5.7 \times 10 = 57$.

(b)   This part was not well answered. Many evaluated $g(5)$, and many who did try to form the inverse function made a sign error, reaching $2x = 3y - 1$. Some who obtained $\frac{1}{2}(3x + 1)$ failed to complete the solution by substituting the value $x = 5$.

Answer: **(a)** 75   **(b)** 8

Question 15

(a)   Although most candidates knew that the distance was represented by the area under the line, the calculation of that area often contained errors due to misreading the scales (20 for 21), treating the region from $t = 10$ to $t = 30$ as a trapezium, omitting the rectangular part of the area from $t = 20$ to $t = 30$, or treating the whole area as a rectangle leading to $30 \times 21 = 630$.

(b)   This part was quite well done by many candidates.

Answer: **(a)** 500 m   **(b)** 0.5 m/s²

Question 16

(a)   This proved to be the most demanding question on the paper. In some cases this was the only mark lost on the paper. Clearly many were not able to visualise the prism. It was anticipated that some would forget the plane through the central cross-section and that some would think there were only 3 planes perpendicular to that one. This explained wrong answers of 3, 4 and 6, but many other inexplicable numbers appeared also.

(b)   Many candidates have clearly been well trained to cope with questions on bounds. Inevitably 50.4 appeared in the first part quite often, but it was not as common as in the past. The lower bound is always better done, but some could not find the perimeter of a rectangle. There were a few cases where the perimeter was first found to be 130 cm, which was rounded down to 129.5.

Answer. **(a)** 7   **(b)(i)** 50.5 cm   **(ii)** 128 cm

Question 17

(a)   This was well done by many candidates.

(b)   This was also well done, with factorisation proving to be less likely to lead to errors than the use of the formula.

Answer. **(a)** −12   **(b)**   2 or −½

Question 18

There were many completely correct solutions to this geometry question. Where arithmetic slips were seen, it was often possible to award credit for correct continuations. The small number of candidates who produced obtuse angles ought to have seen that these did not seem likely on the given diagram. Although diagrams in such questions are not drawn accurately (to prevent measurement), they would not be so inaccurate that candidates are misled.

Answer. **(a)** 54°   **(b)** 36°   **(c)** 36°

Question 19

(a)   This was usually well done, though a number gave the answer 20.

(b)   This was less well done. A number used −20 (or even 20) for *C*. Many candidates of all abilities did well, but many did not multiply 32 by 5 if they expanded the right hand side first, or they multiplied by 5/9 instead of dividing by it.

Answer. **(a)** −20   **(b)** $\dfrac{9C+160}{5}$

Question 20

Most were able to score some marks on this question, but there was a wide-spread habit of not taking account of the signs. Almost all clearly knew what the terms median and mean imply.

(a)   Very many correct answers were seen, but some were not able to evaluate 0.3 − (−2.3).

(b)   Some did not notice that the terms were not in ascending order, so they selected the middle term, 0.1, as their answer at once.

(c) The sum of the seven terms was usually attempted and then divided by 7. Unfortunately the mixture of positive and negative values proved to be a real challenge. Some ignored the signs, obtaining 6.4 or – 6.4, but many other values close to the correct sum of –5.6 appeared. Division by 7 was often reasonably done by multiplying numerator and denominator by 10, but the resulting answer was also multiplied by 10. This produced an answer of about –8 (or 8), which clearly does not fit in with the data.

Answer: **(a)** 2.6 m   **(b)** –0.5 m   **(c)** –0.8 m

Question 21

(a) (i) The table was usually correctly completed, though in some cases a slip was noted in one term.

(ii) Those who carefully marked the primes and squares in some way usually did well, but a few assumed there were 36 possible outcomes. Some weaker candidates had no grasp of probability, quoting one or more integers.

(b) Better candidates had no difficulty in quoting the correct answer.

Answer: **(a)(i)**

–	–	7	9	13
5	6	8	10	14
7	8	–	–	16
9	10	–	14	18
13	14	16	18	22

(a)(ii)(a) $\dfrac{6}{25}$ **(a)(ii)(b)** $\dfrac{1}{5}$ **(b)** 0

Question 22

There were many good constructions here. A few did not use the point *A* that was given and others drew *AB* with a length of 7 cm or 15 cm. Candidates were told to draw a line to find *C*. The majority drew the perpendicular bisector of *AB*, as anticipated. A small number drew the line *BC* at an angle of 40° to *BA*. This was accepted if it was clear that this had been done, but some drew arcs, centred at *A* and *B*, to meet at the point labelled *C*. In most of these cases it was clear that this was a false method, which could not be accepted.

The length of *AC* was usually within the required range. Almost all of those who knew that a reflex angle is greater that 180°, gained the mark for the angle, having obtained it from the given 40°.

Answer: **(b)(ii)**   45.0 to 46.5 m   **(iii)**   320°

Question 23

The majority of candidates scored reasonably well on this question.

(a) (i) The answer $3x^2 + 4$ was quite common, even from strong candidates.

(ii) Some false cancelling was seen, but many correct answers were seen.

(b) Some partial factorisation was seen, and others "cancelled" by 7 giving $x^2 – 9 = (x + 3)(x – 3)$, but there were many good solutions.

Answer: **(a)(i)** $3x^2 – 4$ **(ii)**   *x*   **(b)** $7(x – 3)(x + 3)$

Question 24

Some centres had prepared candidates well for this type of transformation question, but other candidates did not know what was required. Better candidates gave accurate, full and concise descriptions of both transformations. Some weaker ones thought both were some sort of stretch. Candidates should be aware that no answer that uses two or more transformations in such questions will gain any credit.

Answer: **(a)(i)** $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ **(ii)** Enlargement, centre (0 , 0), scale factor 2

(b)(i) Vertices at (6 , 6), (6 , 7), (7 , 4) and (7 , 3) **(ii)** Shear, factor 3, x-axis invariant

Question 25

All but the weakest scored something on this question.

Parts **(a)**, **(c)** and **(e)** were usually correct, but **(b)** was less well done.

(d) Many knew how to do this, but $y = \frac{4}{3}x + 2$ or $y = \frac{4}{3}x + c$ were common. Others just quoted $c = 2$.

(f) Many of the better candidates knew what was required here and obtained the correct answer, though weaker candidates struggled. Some good candidates gave the answer –4/5. Some tried to use the cosine formula, but were not usually successful.

Answer: **(a)** (2½ , 4) **(b)** 5 **(c)** $\dfrac{4}{3}$ **(d)** $3y = 4x + 2$ **(e)** (7, 2)

(f) $-\dfrac{3}{5}$

MATHEMATICS

General comments

Overall the paper proved to be rather more straightforward than last year's, although there were a number of parts which stretched even the best candidates. Although there was a very small group of candidates who were not really ready to take the paper, the vast majority recognised that then were several very straightforward parts and were able to tackle the paper with confidence.

Presentation was generally very good with many scripts a pleasure to mark. Nevertheless there are still a number of centres which appear to encourage candidates to give their solutions in double (or even triple) columns, which doesn't help the candidates and is difficult for Examiners. It is particularly annoying when the work is crammed into the first 4 or 5 pages and the rest of the booklet in left blank.

There were very few candidates who were unable to attempt the required number of questions in the time allowed, even though many used extremely long methods in a number of questions. This was particularly noticeable in **Question 8(f)**, **Question 11(a)(iii)** and the two trigonometry question, where some candidates regularly use the sine and cosine rules unnecessarily. It could perhaps be emphasised that by giving the number of marks that are available for a particular part of a question, the setter is giving the candidates an idea of the amount of work that is required. Thus a question which requires the sine as cosine rule will be allocated 3 or 4 marks [e.g. **Question 9(a)(ii)** and **Question 9(c)**] and since **Question 4(b)(i)** and **(iii)** are allocated only 2 marks, candidates should be looking for shorter methods. Similarly candidates attempting **Question 8(f)** and **Question 11(a)(iii)** might have looked for rather shorter methods than those often employed which could sometimes cover 2 or 3 pages.

Regular comments concerning premature approximation have not resulted in a reduction in the practice and it should be emphasised that candidates who ignore either the general instructions concerning accuracy of answers given on the front cover, or those in a particular question with inevitably lose marks.

Marks were also lost on a regular basic when candidates, who understood the general idea of a question, failed to read it carefully enough. For example in **Question 6(a)** candidates gave the fourth term, or drew the fourth pattern, rather than stating the first four terms; in **Question 2(b)** where the given formulae were misread and in **Question 7 (d)(ii)** where candidates stopped after finding x.

Comments on Individual Questions

Question 1

(a)   A few candidates believed that the quadratic could be factorised and a small number attempted to 'complete the square' but quite often went astray while manipulating the equation. The vast majority, however, used the formula and many produced the correct two answers to the correct degree of accuracy. Nevertheless it was quite common for candidates to give the answers to 3 significant figures, losing marks when they gave the second answer or –0.787. The pair 2.11 and 0.78 also occurred quite often with candidates giving 'truncated' rather than 'corrected' answers. Errors were sometimes made in the numerical stages of the calculation, the most common being to take '–b' to be –4 or to divide by 2 instead of 6.

(b)   A surprisingly large number of candidates confused this with the difference of two squares and many started off with the statement $(3a - 4b)^2 = (3a - 4 b)(3a + 4b)$. It was also fairly common to see answers involving $3a^2$ and $4b^2$ or + 24ab. A number of candidates treated the expression as an equation and gave 'solutions'.

(c) This was very well answered, although, again, there were a few who attempted to solve.

Answers: (a)   2.12 or – 0.79; (b) $9a^2 - 24ab + 16b^2$; (c) $(4 - y)(3 + 2t)$.

Question 2

(a) There were many correct solutions, but there was much confusion between volume and surface area with a surprising number giving 105 as their answer to (i). Those who attempted to find the area of the faces were usually successful although a few forgot to double and gave 71 as their answer.

In (ii) most started with a value of 105 although a few worked with their answer to (i). Various operations were carried out on 105, with many finding the square root or dividing by 3, in many cases after a clearly stated $x^3 = 105$.

(b) It was disappointing to see a number of candidates using their own versions of the formulae, even though they were clearly given at the beginning of the question.

In (i) a small number took the base area as 64 or 16.

Most candidates used Pythogoras successfully, but some, having used the first given formula to answer (i), used the second formula to answer part **(ii)**. Part **(iii)** was generally well answered with most candidate using their answer to (ii), but a number used 15, suggesting a lack of understanding of the difference between 'perpendicular' and 'slant' heights. In the final part most candidates saw the need to add the base area to their previous answer, but a surprising number recalculated the curved area. A small number used $2\pi\,8$ instead of $\pi 8^2$.

Answers: (a)(i) 142 cm^2, (ii) 4.72 cm; (b)(i) 1010 cm^3, (ii) 17 cm (iii) 427 cm^2 (iv) 628 cm^2.

Question 3

(a) Part **(i)** was almost always correct, but (ii) caused much more difficulty with common wrong answers being 90° (candidate assuming that BD was a diameter) or 56° (ABOD being taken as cyclic). Most candidates realised that $\triangle$OBD was isosceles and correctly reached 28° for angle ODB. However many also assumed that DBC was also isosceles and angle CBD was calculated as 36°.

(b) There was some confusion between area and circumference but the majority had no real difficulty with (i) and found the correct proportion of the circle area. Part **(ii)** caused more difficulty and some continued to deal with the shaded region, even though 'unshaded' was highlighted in the text of the question. A significant number failed to add on the two radii OP and OQ.

Answers: (a)(i) 62°, (ii) 118°, (iii) 28°, (iv) 26°; (b)(i) 78.2 cm^2, (ii) 46.7 cm.

Question 4

(a) This was very well answered, with almost all candidates gaining both marks

(b) Although all the triangles were right angled , many candidates used long, complicated methods usually relying on Pythagoras and the sine rule. In spite of this, many were successful in part **(i)**, although occasionally angle HCB was stated to be "32° (vertically opposite)". There were also many correct solutions in part **(ii)** although a number of candidates went from the correct sin 32° = $\dfrac{40}{CD}$ to CD = 40 sin 32.

In part **(iii)** many candidates got as far as 41.18... or 48.81... but many were unsure which was the required angle of depression. There were also many cases of premature approximation leading to answers outside the acceptable range.

(c) Although a few candidates used $\dfrac{15}{4.6}$, the vast majority started with the correct $\dfrac{4.6}{15}$. Unfortunately many did not realise the 'correct to the nearest hundredth of a second' was equivalent to 2 decimal places and left their answers at 0.3 or .0.307. There was some strange reasoning in part **(ii)** and it produced some ridiculously large or small answers.

Answers: (a)(i) $6.05, (ii) 62.5%; (b)(i)41.4°, (ii) 75.5 m, (iii) 48.8°; (c)(i) 0.31 s, (ii) 54 km/h.

Question 5

There was much confused thinking in this question and many clearly did not understand the situation.

(a) Many of those who did understand the situation still failed to give the first 4 terms of the sequence, some just giving the fourth term, others giving 3.

(b) Many did not attempt this and some simply wrote A = –2/n from the given Ax + 2.

(c) A large number of candidates failed to get to the equation 4n + 2 = 500 and of those who did many did not realise that the answer had to be an integer. There were many strange answers to part **(ii)**, but also some correct answers from trial and error methods.

Answers: (a) 6, 10, 14, 18; (b) 4 ; (c)(i) 124, (ii) 2.

Question 6

Almost all candidates gained some credit here although the notation n(A) seamed to confuse some, with answers such as {16, 4, 1} or n{16, 4, 1} appearing in (c).

(a) There were many correct evaluations of x and n {M ∩ P} was often correctly given as 4. There was rather less success with parts **(i)(c)** and **(d)**, with the answers to (c) often given as O or null set. Part **(ii)** was not very well answered, and many did not attempt it.

(b) This was well answered, particularly the first part where candidates consistently quoted a correct ratio of sides. Occasionally AC was found and left as the answer. In part **(ii)** a few candidates started with $\dfrac{8}{14} = \dfrac{32}{A}$ and reached the answer 56 but the majority started with the idea of the square of the lengths. A small number of candidates found the angle A using the ½ bcsin A formula and then used it again to find the area of ∆ABC.

Answers: (a)(i)(a) 8, (b) 4, (c) 21, (d) 19, (ii) Candidates who study only Mathematics (or equivalent) (b) (i) 7.5 cm, (b) 98 cm^2.

Question 7

(a) This was an easy mark for most candidates, although a number arrived at $3000 via 15000 $-\dfrac{3}{5}\times$ 20000.

(b) (i) A few used $\dfrac{1800}{21800}$ and arrived at 8.26% but the majority gained both marks

(ii) Some candidates didn't take $15000 from $21800 before finding the appropriate fraction and others failed to add on the $15000 bonus.

(c) Various methods were used and many correct answers seen, although some got as far as $12500, and left that as their answers and a few confused the ratio for James and Dan.

(d) The statement x > 15000 confused some candidates and it appeared in answers to both (i) and (ii). Some gave their answer to (i) as $\frac{3}{5}$x and clearly made little progress. Those who did get the correct expression for part **(i)** often continued as for as x = 90000, but many left this as their answer. A common error was to give $\frac{3}{5}$x − 15000 without the necessary brackets in (i). Occasionally this was followed by correct working in (ii) but more often candidates continued $\frac{3}{5}x - \frac{1}{2}x = 15000$ and then x = 150000.

Answers: (b)(i) 9%, (ii) $17720; (c) $27500; (d)(i) $\frac{3}{5}$ (x − 15000), (ii) $ 45000.

Question 8

This, the graph question, as usual proved to be a popular question, although relatively few gained more than 8 or 9 marks.

(a) p was almost always found correctly.

(b) There were many excellent graphs with correct scales, perfectly plotted points and smoothly drawn curves.

(c) Reading from the graph at x = 8 was usually successfully achieved, but very few could see the relationship between the given expression and the graph.

(d) The tangent was drawn well on most scripts, but relatively few gave an acceptable value for the gradient, with many omitting the negative sign, some leaving answers such as $\frac{-3.9}{1.8}$ and others using $\frac{x \text{ step}}{y \text{ step}}$.

(e) The line was usually drawn correctly, although a few went from (0, 12) to (6, 0) – presumably a scale misunderstanding.

(f) Only very good candidates realised that the best way to tackle this question was to equate x^2/8 +18/x − 5 to 12 - x and simplify. Most candidates substituted the values of the x coordinates of the points of intersection of the curve and the line into the given equation. This inevitably gave very complicated simultaneous equations in A and B and although candidates often gained a method mark for this approach they invariably wasted a lot of time.

Answers: (a) 2.5; (c)(i) 1.4 to 1.5, (ii) 6.4 to 6.5; (d) −2.0 to −2.5; (e) A = 8, B = −136.

Question 9

This proved to be a popular and well answered question although marks were often lost through premature approximation.

(a) There were many correct answers for the bearing, but answers such as 318° (270 + 48), 147 (180 − $\frac{1}{2}$ ×66), 132 (180 − 42) were all seen quite often. Most candidates correctly applied the sine rule in the next part although a few recognised that the triangle was isosceles and either used the cosine rule or 2 × 7 × cos 66.

(b) (i) Most candidates were successful here, with the majority using $\frac{1}{2}$ ab sin C, although a few omitted the sin 41 and others has cos 41.

(ii) The most common method here was to use 6.3 sin 41 although a few used their answers to (i). Quite a number thought that BD was the distance required and used the cosine rule.

(c) Most used the cosine rule to find an angle, but not always A. Some found another angle and the used the sine rule to find A. Some left this as their answer but most went on to find the bearing. A few could not simplify the cosine rule correctly and ended up with e.g. 25 = 4 cos A. A small number assumed that the triangle was right angled.

Answers: (a) (i) 138°, (ii) 5.69 km (b)(i) 14.5 km^2, (ii) 4.13 km; (c) 56.4°.

Question 10

This was not a very popular question and candidates generally gained fewer marks than in the other B Section questions.

(a) Most candidates correctly read off the median value, although a few gave the answer as 60. There was less success with the interquartile range. Many were able to quote a correct value for either the upper or lower quartile, but relatively few produced an acceptable IQR. It was disappointing to see answers such as 90 − 30 = 60 → 31.8. There was even less success with part **(iii)** where 12 was the common wrong answer.

(b) (i) Many answers of 6 or 12, with few attempting to find the number of children in the 12 < t ⩽ 14 range who took less than 13 minutes.

(ii) There were more successful answers here, although wrong mid points or end points were sometimes used.

(iii) Many candidates assumed that each child was picked from a group of 16 and answers of $\frac{7}{64}$ or $\frac{7}{32}$ were very common. Some candidates did use a reduced group and gave an answer of $\frac{7}{60}$. Relatively few doubled this and gave the correct answer.

(iv) Only the best candidates had any success in this part and answers of 3.2, 4 and 10 were seen regularly.

Answers: (a)(i) 31.8 cm, (ii) 0.45, (iii) 108; (b)(i) 9, (ii) 12.5 min, (iii) $\frac{7}{30}$, (iv) 1.6 cm.

Question 11

Very few candidates were able to tackle both topics confidently and high marks were relatively rare.

(a) (i) There were many correct answers to this part, but errors, usually with signs, often produced one or more wrong elements, with –6 appearing regularly instead of +6 or 0 instead of 8.

(ii) Many candidates were able to find the determinant of A correctly, but sometime the evaluation of –2–(–9) led to an answer of 11 or –11. Surprisingly perhaps, candidates did not make the transition from the value of the determinant being 7 to p = $\frac{1}{7}$ easily. There was often much intermediate work and it was not uncommon to find different values of p being obtained as a result.

(iii) Relatively few candidates used X= A^{-1}C with almost as many using CA^{-1}. A large number used the long method involving $X = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and simultaneous equations. Weaker candidates thought X = C – A or C ÷ A was to be used.

(iv) Reflection was usually stated, but the line of reflection was often given as y = –x.

(b) Only very good candidates scored well on this topic

Quite a number were successful with one or other of the first two parts but the last part proved particularly difficult and very few gained the marks.

Answers: (a)(i) $\begin{pmatrix} -6 & 6 \\ -6 & 8 \end{pmatrix}$, (ii) $\frac{1}{7}$, , (iii) $\frac{1}{7}\begin{pmatrix} 2 & 3 \\ 3 & 1 \end{pmatrix}$, (iv) Reflection in the y axis (or x = 0); (b)(i) 2, (ii) $\begin{pmatrix} 10 \\ -7 \end{pmatrix}$, ,
(ii) –5.