Examination Report

Additional Mathematics

519

JC

2025

Code	Subject Name and Component	Page#
519	Additional Mathematics P1	03 - 12

General Comments

This paper gave candidates an opportunity to demonstrate their knowledge and application of Mathematics. The paper appeared quite demanding for candidates. Few high-scoring scripts were seen, and there was no evidence that the examination was too long. Some candidates omitted questions or parts of questions, but this was likely due to a lack of knowledge rather than time constraints. Marks ranged from 0 to 96. No candidate obtained 100.

Candidates generally performed well on Questions **1 (a)(b), 6(d), 12(b)(i), 14(a)(iv) (b) (i) and 17(a).** Questions which proved particularly difficult for the candidates were **1(c), 2, 3, 5, 7, 8, 10, 11, 13(b), 15 and 17(b).**

Candidates who did well on this paper generally:	**Candidates who did less well on this paper generally:**
• attempted all questions • showed complete methods and calculations, especially in questions that specifically requested working • used and understood correct mathematical terms, such as 'parallel', 'angle of depression', 'median' and 'mode' • read the questions thoroughly and picked out the key information required • demonstrated good calculator skills • provided working in 'show your working' questions • used correct mathematical notation, such as f(x) = 3x + 1 or f:x→ 3x + 1	• did not read questions carefully • truncated numbers and/or rounded off prematurely, leading to inaccurate responses • did not check their work, nor consider whether an answer made sense in context • did not attempt all questions • did not present their working in order, but instead writing calculations and values randomly across the available space • did not know or use the correct formulae , for instance the formulae for $\overrightarrow{\lvert DC \rvert}$ would be $\sqrt{4^2-(-4^2)}$ instead of $\sqrt{4^2+(-4^2)}$

COMMENTS ON SPECIFIC QUESTIONS

Question 1

(a) Provided candidates with a comfortable start to the paper with most managing to state the order of the matrix P. Common incorrect answer: 3 by 2

Correct answer: 2 by 3

(b) This part was well done as most candidates were able to subtract the matrices. There were a few though who failed to work out directed numbers. Common incorrect answer: $\begin{pmatrix} -6 & -6 & 12 \\ 6 & 6 & 18 \end{pmatrix}$

Correct answer: $\begin{pmatrix} \mathbf{8} & \mathbf{10} & \mathbf{-12} \\ \mathbf{6} & \mathbf{-6} & \mathbf{18} \end{pmatrix}$

(c) This was very poorly done. Quite many candidates found this question challenging and it was rare to award full marks. Some were unable to multiple the matrices but able to give a conclusion based on their incorrect answer. Others would multiple correctly but failed to give a conclusion.

Correct answer: KQ ≠ QK or $\mathbf{(-22) \neq \begin{pmatrix} 6 & 21 \\ -8 & -28 \end{pmatrix}}$

Question 2

(a) Whilst many candidates seemed to know that they had to place the matrices side by side and then multiple out, many would just obtain a mark for placing side by side and then failed to multiple the matrices correctly. Common incorrect answer $\begin{pmatrix} 1 & 4 \\ 9 & 25 \end{pmatrix}$

Correct answer $\mathbf{\begin{pmatrix} 7 & 8 \\ 12 & 31 \end{pmatrix}}$

Question 3

(a) This question was fairly well answered. It was noted that some candidates just gave the order of the two matrices without explaining anything.

Correct answer: The number of columns in the first matrix is not equal to the number of rows in the second matrix

(b) This was poorly well answered.

Correct answer: order of the matrices is not the same

Question 4

(a) Most candidates found this question challenging although there were a considerable number of candidates scoring 1mark. The most common misunderstanding was calculating the angle of depression from the vertical line, which was angle bº. Some used incorrect trigonometric ratios. Common wrong answer: 23.2º

Correct answer: 66.8º

(b) This was fairly well answered question. Whilst most candidates correctly used the Pythagoras rule to find the correct answer, there was also a large number of candidates who were unable to round off the answer correct to 3 significant figures, resulting to a loss of the accuracy mark. The answer was truncated. Common wrong answers; 7.6 7.61

Correct answer: 7.62

(c) This part was not answered well. A majority of candidates calculated $\tan^{-1}(\frac{3}{7})$ which was angle bº instead of tan bº. Common incorrect answer: 23.2º.

Correct answer: $\frac{3}{7}$

5. (a) This question was poorly well answered. Most candidates failed to interpret the notation for the magnitude of the vector while others wrote incorrect formula for the magnitude of the vector. There was also a large number of candidates who lost the accuracy mark due to failure to give the answer to three significant figures. Common incorrect answers: 0 , 6, 5.65 , 5.6

Correct answer: 5.66

(b) Fewer candidates were successful in showing that $\overrightarrow{DC}$ is parallel to $\overrightarrow{OK}$. Some drew squares on the answer space and then showed the vector using diagrams, resulting to no mark awarded. Others showed no comparison of the vectors. Common incorrect answer: -3$\begin{pmatrix} 4 \\ -4 \end{pmatrix}$,

Correct answer: -3$\overrightarrow{DC}$ = $\overrightarrow{OK}$ or $\overrightarrow{DC}$ = $\frac{-1}{3}\overrightarrow{OK}$

OR

-3$\begin{pmatrix} 4 \\ -4 \end{pmatrix}$ = $\begin{pmatrix} -12 \\ 12 \end{pmatrix}$ or $\begin{pmatrix} 4 \\ -4 \end{pmatrix}$ = $\frac{-1}{3}\begin{pmatrix} -12 \\ 12 \end{pmatrix}$

Question 6

(a) Most of the candidates did very well in this question. Common wrong answers; $\underline{r} + \underline{m}$, $\underline{m} + \underline{r}$

Correct answer: $-\underline{r} + \underline{m}$

(b) This question was not so well answered as it seems that the candidates had difficulty in dealing with the operation signs when simplifying the vectors. Common incorrect answers; $-\underline{m}$ - $-2\underline{r}$, $-\underline{m} - \underline{r^2}$

Correct answer: $-\underline{m} - 2\underline{r}$

(c) This part proved challenging for candidates even though a good number were able to get the correct answer.

Correct answer: $\overrightarrow{EA} = 2\overrightarrow{CB}$

(d) The majority of the candidates performed well in this question. Common wrong answer; Parallelogram

Correct answer: Trapezium

(e) This question was well done by the majority of candidates.

Correct answer: $\overrightarrow{CB}$

Question 7

This question was one of the more demanding on the paper but was quite well done by many high scoring candidates, at least up to the point of forming the correct equations. Some candidates failed to form equations but used try and error method until they got the correct answer.

Correct answer: x = 5, y = 1

Question 8

(a) This question generally proved to be a challenge for many candidates. It was one of the non-response questions for some candidates. Quite a number of candidates could not clear the fraction correctly. Some of those that were able to clear the fractions failed to remove brackets correctly. Many candidates did not insert brackets on the two term numerators resulting to the loss of marks.

Correct answer: x = -15

(b) Correct answers were seen regularly, but there were also a significant number of candidates who did not get the correct answer. Some candidates would move 12 to the right hand side, introduce square root to both sides and then failed to continue working it out.

Correct answer: x = -3 or x = 4

(c) This was done reasonably well with many gaining one mark if not two for correctly clearing fraction and collecting like terms. Many candidates lost the accuracy mark for failing to reverse the inequality sign after dividing by a negative 3 or else changing inequality sign to an equal sign or just a less than sign. Common wrong answers: $x = -7\frac{2}{3}$, $x \geq -7\frac{2}{3}$, $x < -7\frac{2}{3}$

Correct answer: $x \leq -7\frac{2}{3}$

(d) This question was generally not well answered. Some fully correct responses were seen, but these were rare.

Correct answer: *m* = -2, *k* = -1

Question 9

(a) This question was generally well answered by candidates with many able to remove brackets correctly. Common incorrect answers: $-3kx^2 – 4x^3p$, $-3kx^2 + 4x^2p$

Correct answer: $-3kx^2 + 4x^3p$

(b) Most candidates were slightly more successful in answering this question correctly. Some candidates obtained a mark for placing the factor side by side but failed to expand the double brackets. This was due to the fact that they had to deal with directed numbers. Common incorrect answers: $(x^2 – 25)$, $x^2 – 10x - 25$

Correct answer: $x^2 – 10x + 25$

Question 10

Few candidates were able to simplify the algebraic fractions. Most candidates would cross multiple by the denominators, earning them no marks. Some would have correct denominator but failed to remove brackets correctly in the numerator. Common wrong answers: 17p – 46 , $\frac{17p-10}{(p-6)(p-2)}$, $\frac{11p-46}{(p-6)(p-2)}$

Correct answer: $\frac{17p-46}{(p-6)(p-2)}$

Question 11

Very few candidates got full marks here and this was the question of the paper that was most often left blank. A good number picked up some method marks for correctly clearing fractions and removing brackets but failed to then factorize correctly.

Common incorrect answer: $\pm\sqrt{\frac{7k-3}{5k+1}}$

Correct answer; $\pm\sqrt{\frac{7k+3}{5k+1}}$

Question 12

(a) (i) Generally answered well by all candidates. However, there were some candidates who could not differentiate between a domain and a range. They listed the domain as the range and vice versa. Common wrong answer: domain = 4, 10, 13, 16 Range = 1, 3, 4, 5

Correct answer: domain =1, 3, 4, 5 Range = 4, 10, 13, 16

(ii) Generally answered well by most candidates. There was also a large number which wrote that it's a one to many function and got no mark.

Correct answer: one to one

(iii)Very few candidates got this part correct. Common wrong answers: f:x= 3x+1 , f(x) = 3x

Correct answer: f(x) = 3x + 1 or f:x→ 3x + 1

(b) (i) Many candidates gave the correct answer.

Correct answer: 11

(ii) The majority of candidates gave the correct answer.

Correct answer: 2m + 4

(iii) This question was answered well by stronger candidates, but many incorrect responses were also seen. Some candidates did not introduce brackets when substituting the functions resulting in an incorrect equation formed.

Correct answer: p = $\frac{-7}{9}$ oe

Question 13

(a)(i) Most candidates were generally able to get one mark for factoring out 2 but failed to further factorize the difference of two squares. Common incorrect answer: 2(b – 2)(b + 2).

Correct answer: 2(2 – b)(2 +b)

(ii) This question was not so well answered. Most candidates were able to identify the correct factors but could not assign the correct signs for the factors. Common incorrect answers:

(x – 5)(x – 15), (x + 15)(x – 5)

Correct answer: (x + 5)(x – 15)

(b) This part was answered poorly with most candidates unable to work out by factorisation. Other methods used to produce the required answer earned no marks.

Correct answer: (63 + 37)(63 – 37)

(100)(26)

2600

Question 14

(a)(i) Most candidates answered this question correctly. Common incorrect answers: 15, 34, 120

Correct answer: 50

(ii) The majority of candidates gave the correct answer. Common incorrect answer: 5

Correct answer: 6

(iii) Most of the candidates did well in this question.

Correct answer: $\frac{15}{50}$ oe

(iv) This part was very well done by most candidates.

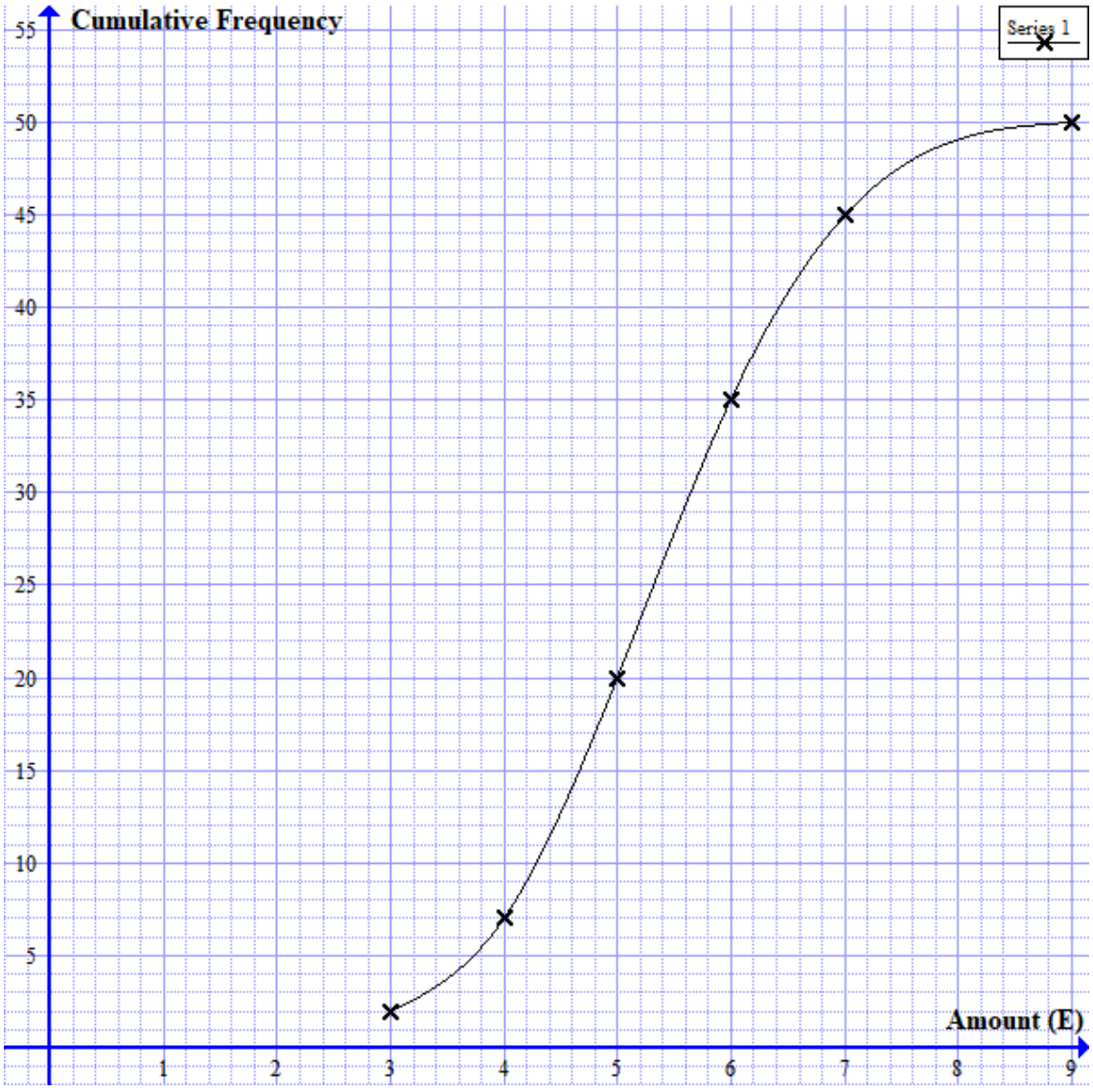
Correct answer: 0

(b)(i) This question was generally well answered by candidates.

Correct answer: 2, 5, 13, 20, 45, 50

(ii) This question was fairly well answered. Candidates should be encouraged plot all points and join the points using free hand not a ruler. Curve must be drawn through all points.

Correct answer: all points plotted correctly, smooth curve through all points



(c) This was poorly well done. Some candidates only calculated the median position and gave it as their answer.

Correct answer: 5.2 to 5.3

Question 15

(a) This part was fairly well answered. There were also a significant number of candidates who did not attempt the question.

Correct answer: RR, RB, BB, BB, BR, BB, BR, BB

(b)(i) This part was not so well answered.

Correct answer: $\frac{8}{15}$

(ii) This question was poorly well answered. Common incorrect answer: $\frac{7}{15}$

Correct answer: $\frac{13}{15}$

Question 16

(a) A fair proportion of candidates answered this part correctly.

Correct answer: $\frac{1}{4}, \frac{2}{3}, \frac{2}{3}$

(b) This was poorly well answered.

Correct answer: $\frac{3}{12}$ oe

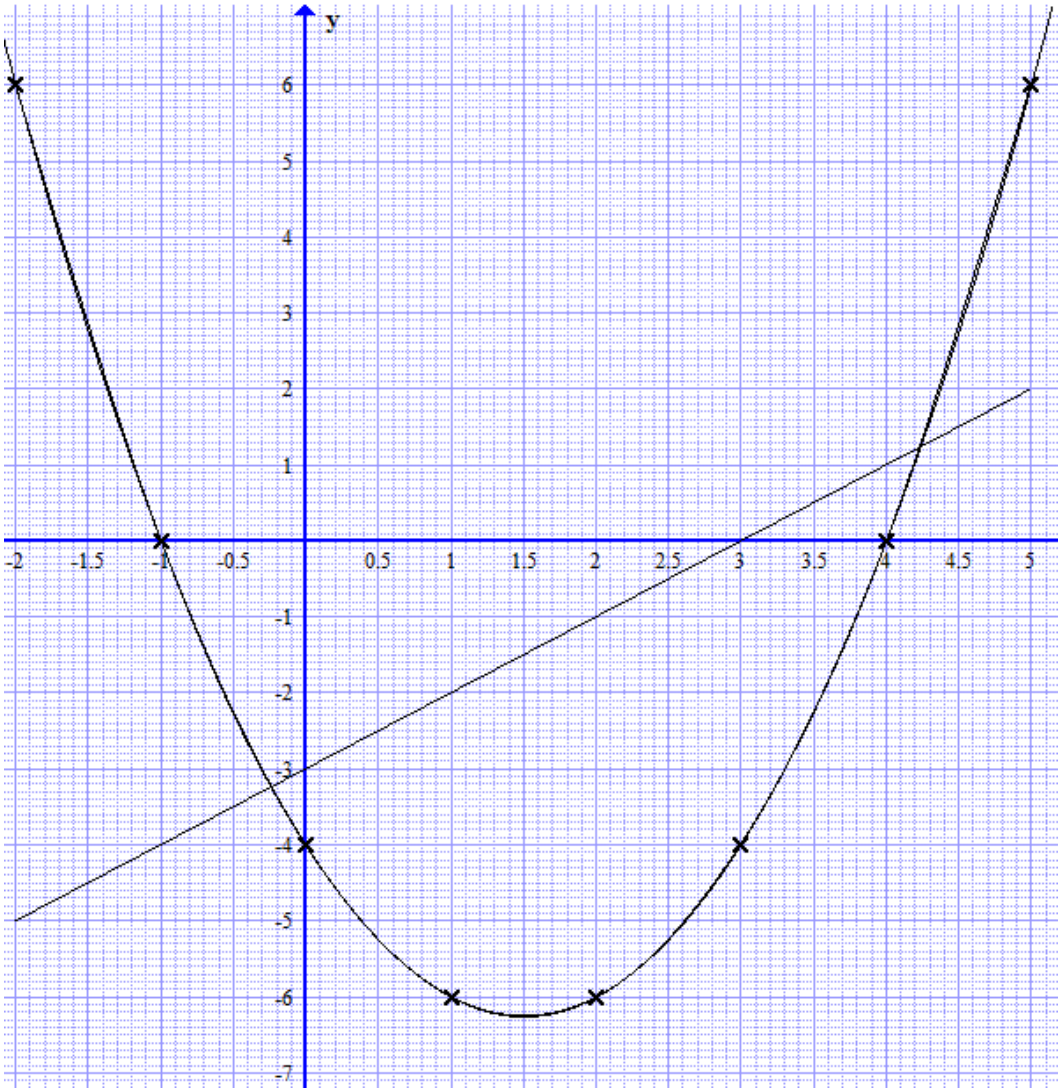
Question 17

(a) A number of candidates gave a correct answer. This was one of the questions where candidates performed very well.

Correct answer: p = 0, q = 6

(b) This part was answered reasonably well by many candidates. There were some excellent smooth graphs drawn by candidates. All 6 given points were at least plotted correctly and a smooth curve was drawn through all plotted points.

Correct answer: 8 points plotted correctly and smooth curve through all points



(c) This question was fairly well answered. Candidates correctly used the graph or solved for y algebraically.

Correct answer: -6.2 to -6.6

(d) This question was also challenging for many candidates. Some candidates failed to draw the correct line y = x – 3. A few of those who drew correct line made it short , cutting the curve at one point hence getting one correct value of x.

Correct answer: x = -0.2 to -0.3 , x = 4.2 to 4.3





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