L-Università ta' Malta

MATSEC Examinations Board

Examiners’ Report

SEC Mathematics

Main Session 2024

TABLE OF CONTENTS

A. STATISTICAL INFORMATION

The total number of candidates who registered to sit for Mathematics in 2024 was 4622, which is 327 candidates more than in 2023. The number of candidates registering for Paper IIA was 1982 and the number registering for Paper IIB was 2640. The number of candidates registering for Paper IIA was 153 more than that of 2023, while the number of candidates registering for Paper IIB increased by 174 from that of last year. The percentage of absent candidates this year stood at 8.4% as compared to 8.2% for last year, amounting to 38 more candidates.

Table 1 shows the distribution of grades for the Main 2024 session of the examination.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	287	359	517	335	290	-	-	152	42	1982
PAPER B	-	-	-	283	324	437	402	847	347	2640
TOTAL	287	359	517	618	614	437	402	999	389	4622
% OF TOTAL	6.2	7.8	11.2	13.4	13.3	9.5	8.7	21.6	8.4	100

Table 1: Distribution of grades for SEC Mathematics Main Session 2024

B. GENERAL REMARKS

General Remarks on the Written Examination

Analysis of the results revealed that the three papers in order of increasing difficulty were Paper IIB, Paper I and Paper IIA, as intended when the papers were constructed. The candidates' marks ranged from very low to very high in all the papers.

C. COMMENTS ON PAPER I AND PAPER II

Paper I

Section A

Section A of Paper I consists of 20 questions each carrying one mark, giving a total of 20 marks. The IIA candidates obtained a mean mark of 13.2 marks, based on the whole population of the IIA candidates. However, the IIB candidates gave a much weaker performance and achieved a mean mark of 6.1 marks overall. The following are some comments made by the markers about candidates' performance on each individual question in this paper.

Q1. A significant number of candidates correctly wrote the number in figures. However, a common mistake among Paper IIB candidates involved place value. Many wrote the ten thousand digit as if it where the hundred thousand digit.

Q2. A considerable number of Paper IIA candidates correctly evaluated $\frac{1}{5}$, 2.5×10^{-2} , and 4^{-1} and chose the smallest number. However, most Paper IIB candidates' incorrect responses indicated a misunderstanding of negative exponents. They incorrectly evaluated 4^{-1} as -4.

Q3. Many of the candidates identified the rule of the sequence and successfully wrote the correct missing value.

Q4. Most Paper IIA candidates correctly calculated the difference between the required values and obtained the correct length of the screw. However, most IIB candidates wrote an inaccurate length. A significant number of these candidates subtracted 0.5 from 4.4, not realizing that the part of the ruler shown did not start from zero. Computational errors were also common across this cohort.

Q5. Most of the Paper IIA candidates obtained a correct answer. Many of them converted the mixed numbers to improper fractions and then found the common denominator. Few candidates added the whole parts separately before adding the fractional parts. A significant number of Paper IIB candidates found difficulty adding these two fractions. Instead of finding a common denominator, they added the numerators and denominators separately.

Q6. A significant number of candidates performed poorly on this question. Most of the answers were incorrect due to misconceptions and incorrect use of the rules of indices.
Some candidates misinterpreted the value of 5^{-2}, writing it as 0.05 or –25. Others incorrectly added the indices of all three terms, resulting in an incorrect answer of 5^1. This error showed lack of understanding of the rules of indices, as the term 5^0 had to be added to the expression and not multiplied.

Q7. While many candidates realised that 4^3 equals to 64, a significant number of Paper IIB candidates incorrectly worked the value of the missing index by dividing 64 by 4. These candidates confused the index notation 4^x with multiples of 4.

Q8. A considerable number of candidates did not write the correct map scale. The most common mistake was simplifying the ratio without converting the distances to the same units, resulting in an incorrect scale of $1:10$. Another common mistake was partially simplifying the ratio and not writing the answer in the form $1:n$ or $n:1$. Paper IIB candidates particularly struggled with converting distances between centimetres and kilometres.

Q9. This question was well answered by many Paper IIA candidates. However, many Paper IIB candidates scored no marks. In general, candidates did not equate 18 to the output of the function and instead substituted 18 for x. The most common error occurred when expanding $3(5 - x)$, many failing to write the minus sign with $3x$.

Q10. Many candidates who realised they could factorise the calculation by taking out 6.32 as the common factor managed to get a correct answer. However, basic computational errors were made when candidates attempted to multiply 1.4 and 1.6 to 6.32. Another common mistake was rounding the values to one significant figure to give an estimate of the calculation instead of working out the exact value of the calculation.

Q11. Most candidates found no problem in answering this question correctly. A few gave 90° for an answer. Quite a few candidates gave 30° for an answer as they worked with 144° instead of 114°.

Q12. Many candidates gave an incorrect answer. Among the most common errors, candidates did not multiply by the reciprocal of the divisor. Others multiplied the numerators and the denominators, hence making errors in simplifying afterwards.

Q13. Paper IIA candidates found no problem in answering this question correctly. In the case of paper IIB candidates, while many recognised that squaring is the reverse operation of square root, they still made errors in making x the subject of the formula, obtaining answers $x = (ab)^2$ and $x = a^2b$. Others ignored the square root completely obtaining answers, $x = ab$ and $x = \frac{a}{b}$.

Q14. Most common errors occurred when candidates subtracted 70° from 360° or 180°, obtaining 290° or 110° respectively, or simply stated 70° as the bearing of a from B.

Q15. Most candidates did not simplify the expression completely.

Q16. Paper IIA candidates performed well in this question, while it proved to be more challenging for Paper IIB candidates. Some candidates incorrectly used the sum of the interior angles of the kite to be equal to 180°, obtaining an answer of 20°. Others divided the sum of 75° and 65° by 2, obtaining 70°.

Q17. A considerable number of candidates found difficulty in answering this question. Some candidate’s used 26 cm for the height. Others just multiplied the two values obtaining an area of 260 cm².

Q18. In general, paper IIA candidates found this question easy. Some paper IIB candidates incorrectly gave 40°, 80° and 30° for an answer.

Q19. Some candidates used 1 or 7 for the gradient, while others did not use 7 for the y-intercept. Incorrect answers included $y = 2x + 2$, $y = 7x + 2$, $y = x + 7$ or just $2x + 7$.

Q20. Most candidates used the correct formula but did not simplify completely to obtain 44 cm for the answer. Other candidates did not use $\pi = \frac{22}{7}$ as instructed and left their answer in terms of π.

Section B

The overall facility of each question in this paper was worked out using the formula:

$$\text{Facility} = \frac{\text{mean mark on question}}{\text{maximum mark awarded on question}}$$

The facility of each question lies between 0 and 1 and gives a measure of the overall difficulty of the question, with the easier questions having a facility closer to 1. For each question in Paper I Section B, its facility and the percentage number of candidate achieving full marks on the question was worked out separately for the IIA and IIB candidates. The results are shown in the table below, followed by comments about the individual questions in this paper.

Question No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Facility	0.79	0.62	0.72	0.86	0.73	0.72	0.80	0.27	0.76	0.79
IIA Candidates achieving full marks (%)	32.3	39.3	17.2	50.7	4.6	26.4	48.9	18.6	65.4	27.1
Question No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Facility	0.39	0.18	0.38	0.63	0.36	0.29	0.42	0.03	0.20	0.29
IIB Candidates achieving full marks (%)	2.2	3.6	1.1	12.5	0.2	2.7	8.1	1.0	10.6	4.1

Q1. A significant number of IIA candidates answered this question correctly. However, some found part (g) more challenging because it involved factorising the numerator before simplifying with the denominator. Many incorrectly simplified one of the terms in the denominator with the denominator. Candidates sitting for paper IIB performed poorly when it came to expand brackets and collect like terms correctly.

Q2. Most candidates found part (a) of this question challenging because it involved forming an equation that involved fractions. Some candidates converted to decimals to solve it, while others attempted to use equivalent fractions.

Part (b) proved to be easier for many candidates. However, some candidates did not recognize that the number of days is inversely proportional to the number of workers.

Q3. Most IIA candidates performed well in this question. However, some struggled to simplify the ratio in part (a).

In part (b), some candidates did not convert the measures for the cup of flour and the teaspoon of baking powder into grams before writing and simplifying the ratio.

In part (c) some candidates did not provide an integral answer for the number of packets needed.

In part (d), some candidates did not use one or more of the facts given. Responses indicated that some assumed the baker bakes 30 cakes ignoring the fact that this was a daily figure. Also, some candidates reported the total sales instead of the profit made over the entire week.

Q4. In part (a), candidates had to calculate the probability of the outcomes obtained from two different spinners, i.e. two single events. Some candidates incorrectly used 24 for the total number of outcomes for each spinner. This value represented the total number of outcomes of the combined possibility space referred to in part (b).

Part (b) was answered correctly by almost all candidates, with very few losing marks for interchanging numbers in some combinations.

In part (c), candidates had to use the probability space completed in part (b). Part (c)(i) was quite straightforward for most candidates as it referred to combinations with the same number. However, part (c)(ii) proved to be more challenging as it referred to combinations involving prime numbers.

Q5. In part (a), candidates had to translate triangle T using a given column vector. Many candidates misinterpreted the scale, i.e. two squares per unit, and counted the number of squares instead of units.

Part (b) required candidates to reflect triangle T in the y-axis. Some candidates incorrectly reflected the triangle in the x-axis.

In part (c), candidates had to rotate triangle P. Mistakes here included rotating the triangle clockwise rather than anticlockwise, or using the origin as the centre of rotation instead of the vertex (2.5, -0.5).

Part (d) involved enlarging the triangle with a scale factor of 2. Some candidates were able to enlarge the triangle but got confused when using the centre of enlargement, leading to errors in the correct position of the image.

In part (e) candidates were asked to describe a single transformation, mainly a rotation of 180° about the origin. Many candidates correctly identified the transformation as a rotation but did not specify the angle of rotation (180°) or the centre of rotation (the origin). Other incorrect answers included identifying the transformation as a reflection or indicating 90° as the angle of rotation.

Q6. In part (a), candidates had to work out the value of the missing angles between parallel lines. Common mistakes included: assuming that the shape is a cyclic quadrilateral; mistakenly identifying angle s and angle r as vertically opposite angles; referring to interior angles as angles on a straight line, referring to vertically opposite angles as opposite angles only, using terms like Z-angles and F-angles to describe alternate angles and corresponding angles, respectively. A few candidates also did not provide reasons for their answers. In such questions, it is recommended that the proper terminology is used when referring to these angles and that each step is justified with the proper reason.

In part (b), the question involved calculating one of the interior angles of a pentagon, given three interior angles and one exterior angle. Common mistakes included assuming the sum of the interior angles of a pentagon is $360°$ and incorrectly using the exterior angle $125°$ as one of the interior angles of the pentagon.

Q7. Most candidates were able to read the graph correctly. In fact, parts (a) and (b) were answered correctly by almost all. In part (b), however a significant number of candidates interpreted 4½ hours to be equivalent to 4.3 hours.

In part (c), some candidates did not give a proper time interval (i.e. 09:30 – 10:15) as requested but instead gave the starting time (09:30) only or gave 'second time interval' instead.

In part (d), the most common mistake, especially amongst paper IIB candidates, was using 0.3 hour as equivalent to half an hour. Also, in working out the speed, some candidates attempted to convert the units of the distance and time to metres and minutes and/or seconds, even if this was not requested. A good number of these candidates did not do so correctly. Moreover, a number of these candidates did not identify the units used in their final answer.

In part (e)(i), similarly to part (c) the proper time interval was not identified by some candidates. In part (e)(ii), similarly to part (d), some candidates chose to convert the units as explained earlier.

Q8. This question tested the knowledge of tax brackets. Most candidates especially paper IIB either did not attempt the question or ignored the tax brackets completely.

In part (a) the most common problem amongst those who attempted to solve this question was interpreting tax brackets. Many IIB candidates recognised that €40 000 lies in the €14 500 - €60 000 bracket and calculated the tax paid to be equal to 25% of 40 000, hence ignoring the fact that different tax rates apply to different brackets.

In part (b), few IIA candidates applied the correct computations to work out the new gross income. Some assumed that the new gross income lies in the same bracket as that of part (a). These candidates used the value of the tax paid in part (a) and used proportion to work out the new gross income. A significant number of candidates ignored the different tax brackets and divided €9000 by 0.25, while others did not recognise that this was a reverse percentage question and multiplied by 0.25 rather than divided.

Q9. In part (a), candidates had to form two linear equations from the information given. Most IIA candidates succeeded in writing the correct equations, while most IIB candidates did not. Common mistakes included using one variable only to represent the prices of both tickets, i.e. $35x + 52x = 12438$ or equating the total number of tickets with the price i.e. $x + y = 12438$.

In part (b), candidates had to solve the two equations found in part (a) simultaneously. Most IIA candidates correctly solved the equations using the elimination method whereas only a few IIB candidates managed to obtain the correct solution. A few candidates opted to use the trial-and-error method to find the values of the two variables.

Q10. In part (a) most candidates correctly calculated CY, the height of the house, using trigonometry. A few Paper IIA candidates opted to use the sine formula.

In part (b), a significant number of candidates managed to calculate AX, the height of the apartment block, but then did not subtract the height of the house to find AB.

In part (c), most candidates did not identify the angle of depression appropriately. Few candidates reasoned out that when finding angle ACB, they are finding the equivalent to the angle of depression, using alternate angles. However, some correctly calculated angle ACB but then proceeded to find its complement (angle BAC) and stated this for an answer. Others just calculated and stated the size of angle BAC.

Paper IIA

The overall facilities of the questions in Paper IIA are set out in Table 3. These facilities were worked out in the same way as described for the questions in Paper I Section B. Table 3 is followed by the examiners’ comments about the individual questions in this paper.

Question No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Facility	0.45	0.52	0.52	0.57	0.56	0.55	0.53	0.35	0.54	0.65	0.52
IIA Candidates achieving full marks (%)	18.5	37.7	20.7	15.6	20.8	26.8	10.3	4.8	14.3	16.2	26.6

Table 3: Facility for the questions in the Paper IIA *n = 1982**

**n stands for the number of candidates who actually sat for the IIA Paper*

Q1. In part (a)(i) a considerable number of candidates presented a correct method for working out this question, recognising the fact that the ratio of volumes of both jugs is equal to the ratio of the cubes of the heights. Candidates who rounded the value of the cube roots of the volumes ended up with a slightly inaccurate value for the height of Jug B. Some candidates wrongly assumed that the ratio of the volumes of the jugs is the same as the ratio of the sides.

In part (a)(ii) a considerable number of candidates presented a correct method for answering this question showing an understanding that the ratio of base areas of the jugs is equal to the ratio of the squares of the heights. However, some candidates wrongly assumed that the ratio of the volumes of the jugs is the same as the ratio of their areas. Other candidates assumed that the jugs have a circular base and used the formula for the area of a circle to determine the radius of Jug B. Then, they used the ratio of the sides obtained in part(a)(i) to determine the radius of Jug A and eventually its area.

Although several candidates worked out part (b)(i) correctly, there was a considerable number who stated that F is proportional to r or to $\sqrt{r}$ (instead of r^2) and worked out the constant accordingly. Others correctly obtained the constant “56” but then stated $F \propto 56r^2$ as an answer. A considerable number of candidates did not present an equation connecting F and r in part (b)(i) but then obtained the correct equation in question part (b)(ii) and hence calculated the value of r when $F = 87.5$ cm^3/s.

In part (b)(ii) the majority of those who obtained a correct equation in part (b)(i) managed to obtain the correct value for r. Candidates who in part (b)(i) presented an incorrect initial statement (i.e. $F \propto$ or $F \propto \sqrt{r}$), obtained arriving to an incorrect equation, used this result correctly only to obtain an incorrect value of r.

Q2. In part (a)(i) almost all candidates correctly constructed a circle centre A and radius 4 cm. Some candidates just presented an arc centre A and radius 4 cm, some of them being minor arcs while other being major arcs.

In part (a)(ii) a noticeable number of candidates constructed the bisector of angle ABC. Other candidates presented an angle bisector without using ruler and compasses. On the other hand, there were others who constructed or drew incorrect lines such as the perpendicular bisector of line AB or that of line BC or both. A significant number did not attempt this part of the question.

In part (b) almost all candidates who answered the previous part correctly, labelled X and Y correctly and measured XY within the stipulated range set by the examiners. Candidates who either did not attempt part (a)(ii) or presented a wrong answer could not complete this part of the question.

Q3. In part (a) some candidates drew a probability tree to represent the information given. Whilst a number of these candidates correctly considered the events as dependent, others regarded them as independent. Other candidates constructed a 12 by 12 possibility space which was not suitable to represent the situation presented in this question.

In part (a)(i) a considerable number just presented the working: $\frac{7}{12} \times \frac{7}{12}$ or simply $\frac{7}{12}$. A few candidates just subtracted one from the total number of fruits in the second event but did not subtract one from the number of apples, i.e. $\frac{7}{12} \times \frac{7}{11}$. Other candidates incorrectly stated that since two fruits are to be picked out of a total of twelve, the answer must be $\frac{2}{12}$.

In part (a)(ii) only few candidates obtained full marks. Many of those who considered the events as independent events worked it out as $\left(\frac{7}{12} \times \frac{1}{12}\right) + \left(\frac{1}{12} \times \frac{7}{12}\right)$. Others considered only one possibility for this situation i.e. the probability that the first fruit is an apple, and the second fruit is a pear ignoring the possibility of picking the fruits in reverse order. Others presented completely wrong working for this question: $\frac{7}{12} + \frac{1}{12}$ or $\frac{1}{12} + \frac{1}{12}$ or $\frac{7}{12} \times \frac{6}{11}$ or simply $\frac{7}{12}$.

In part (b) most candidates correctly multiply the answer obtained in part (a)(i) to 264 to obtain the required expected number of times that John picks two apples. For most of the candidates obtaining an incorrect answer in part (a)(i), the answer in this part of the question had to be rounded off to a whole number. However, many did not do so.

Q4. In part (a) most of the candidates obtained a correct answer, even if many of them gave the answer in the form $x = \frac{-ab}{c-a}$. The most common errors encountered in obtaining the subject of the formula included: dividing both sides by a, but then multiplying x over the bracket $(x - b)$, to obtain $ac = x^2 - xb$; others just shifted the denominator to the other side and then divided by c, ignoring the second variable on the right-hand side; some candidates wrote x^2, and then proceeded to applying the square root to both sides.

In part (b) some candidates did not factorise the quadratic denominator and attempted to work with a cubic common denominator. Although many of them managed to work out the necessary multiplications to obtain equivalent fractions, they then found it difficult to get to the final simplified answer. Some correctly factorised the quadratic denominator to obtain the lowest common denominator for the whole expression, but erroneously cancelled out the (x – 2) brackets, from the numerator and denominator of the second term, before expanding the brackets and collecting like terms in the numerator.

In part (c) most the candidates obtained the correct equations. When solving the simultaneous equations, the most common error occurred when substituting $\left(\frac{92}{y}\right)$ for x in the term $2x$. A significant number of candidates multiplied both numerator and denominator by 2 obtaining $\left(\frac{184}{2y}\right)$. In general, candidates used the correct mathematical processes to solve the quadratic equation, many opting for the quadratic formula rather than the factorisation method. Some candidates also attempted to solve the quadratic formula by trail and error. Other candidates just stated the value of x or y after obtaining the quadratic equation without showing any intermediate steps in their working. Marks were lost in such cases.

Q5. In part (a) candidates used a variety of methods to find the length of BD and hence prove that BO = 6.928 cm. Some applied Pythagoras theorem, while others opted for trigonometric ratios in triangle DBC. A few candidates equated the equations for area of a triangle, i.e. $A = \frac{1}{2}ab\sin C$ and $A = \frac{b\times h}{2}$, to work out the length of BD.

In part (b) many candidates used the formula $A = \frac{1}{2}ab\sin C$ or $A = \frac{b\times h}{2}$, using the value for BD found in part (a). However, some selected the wrong values when working with this formula and worked out $\frac{12\times 12}{2}$ instead. Other candidates worked out the area of triangle BDC correctly but then multiplied the answer by four, instead of eight. Most candidates correctly multiplied the area of the triangular face ABC by four, but some candidates multiplied this area by five, probably mistaking it for a square based pyramid which has five faces. Others, correctly found the area of the base, but instead of multiplying it by four, added it to the area of the slanting faces, which they incorrectly worked out as $\frac{12\times VO}{2}$, after finding the length of VO.

In part (c) many candidates did not work out VO, the height of the pyramid to calculate the volume of pyramid VABC. Instead, they used 12 cm for the height. Others used the surface area found in part (b) instead of the base area, when using the formula for the volume of the pyramid. Among the candidates who attempted to calculate the height VO in triangle VOB, some made mistakes in using the Pythagoras Theorem.

Q6. In part (a) most candidates gave the correct number of tiles for shapes 5 and 6, but many found difficulty in forming the correct expression for the number tiles for shape n.

In part (b) very few candidates managed to solve this problem using a correct algebraic method. A significant number of the candidates who formed a quadratic equation, did not show intermediate steps in working out the value of n, missing marks in doing so. Other candidates opted for a trial-and-error method to find the value of n.

Q7. Most candidates plotted the required line correctly in part (a).

Very few candidates answered part (b) correctly. A common mistake was to write the points of intersection of the curve and the line, rather than showing that since the points of intersection satisfy the equations of both the line and the curve, equating the expressions for y gives $2x^3 - 17x + 8 = 0$.

Part (c) was generally answered correctly by the candidates who managed to get part (a) correct.

Very few candidates managed to work out part (d) correctly. Some candidates considered $x = 0.5$ as the largest solution.

Q8. In general candidates found this question rather challenging. Most candidates managed to answer part (a) correctly but struggled with part (b) and (c).

In part (b)(i) few candidates applied the multiplying factor to determine the overall percentage change. Most of the candidates who obtained a correct answer did so by applying the percentages to a sum of money as an example. A considerable number of candidates just added and subtracted the percentages not realising that each percentage referred to a different amount.

Some of those who managed to answer part (b)(i) correctly, wrongly assumed that parts (i) and part (ii) represented the same percentage change only that (i) involved a decrease while (ii) involved an increase. Again, the most of those who answered part (b)(ii) correctly, did so by applying the percentage to a sum of money as an example.

Q9. Most candidates answered part (a) correctly.

In part (b), some of the candidates first worked out the perimeter with the given values for the length and the width and then determined the lower bound and upper bound values for the perimeter. This shows lack of knowledge on the application of lower and upper bounds in calculations. Furthermore, answers presented indicated that a notable number of candidates did not realise that the length of fence is actually the perimeter, and instead worked out the sum of the length and the breadth, or their product.

Part (c) proved to be quite challenging for the candidates. Few candidates presented the correct method to calculate the number of fence pieces to be bought. Some of the candidates specifically wrote that since the council wants 'just enough fence pieces' they must calculate the least amount of fence pieces.

Q10. Part (a) was answered correctly by most candidates.

In part (b), a considerable number of candidates plotted the graph correctly, however some did not label the axis. A small number of candidates switched the axis and represented the cumulative frequency on the x-axis. Due attention needs to be given to the scale and labelling of axis.

Many candidates did not give the correct answer for part (c) even though the cumulative curve was correctly drawn. It was evident from the responses that a significant number of candidates do not know how to take readings from a cumulative graph. For the inter quartile range some candidates worked out 280 – 70 rather than 59 – 27, i.e. the marks corresponding to the upper and lower quartile.

In part (d) many candidates only worked out the 35% of 280 to find the number of candidates passing the test. However, they did not use this answer to obtain the pass mark of the test from the graph.

Q11. In part (a) many candidates did not find the bearing of P from Q correctly.

In part (b) a considerable number of candidates did not manage to work out the value of angle PQR, many finding difficulty identifying the correct angle representing the bearing 305°.

In part (c) most of the candidates substituted the value of angle PQR obtained in part (b) and the values 3.5 km and 5 km in the Cosine rule correctly. However, some found difficulty using the calculator to obtain the answer.

In part (d) most candidates substituted correctly in the Sine rule, but then did not change the subject of the formula correctly to find angle PRQ.

Paper IIB

The overall facilities of the questions in Paper IIB are set out in Table 4. These facilities were worked out in the same way as described for the questions in Paper I Section B. Table 4 is followed by the examiners' comments about the individual questions in this paper.

Question No.	1	2	3	4	5	6	7	8	9	10
Facility	0.78	0.67	0.67	0.57	0.51	0.52	0.25	0.28	0.50	0.36
IIB Candidates achieving full marks (%)	44.2	25.3	28.3	41.9	15.9	14.8	7.3	8.8	20.6	8.8

Question No.	11	12	13	14	15	16	17	18	19	20
Facility	0.52	0.50	0.44	0.67	0.37	0.17	0.59	0.24	0.14	0.24
IIB Candidates achieving full marks (%)	17.0	12.5	23.1	22.7	12.5	11.7	41.2	2.2	3.1	5.8

* *Table 4: Facility for the questions in the Paper IIB* *n = 1982**

**n stands for the number of candidates who actually sat for the IIB Paper*

Q1. The majority of the candidates answered part (a) correctly. A few mistakenly put the numbers in descending instead of ascending order. Some candidates mixed the order of one or two numbers, showing that they had a poor understanding of the value of the digits making up the decimal numbers.

In part (b), many of the candidates worked out the order of operations correctly according to BIDMAS but made an error when working out 18 – 12 + 7. They mistakenly added 7 to 12 and then subtracted 19 from 18. In some cases, they subtracted 18 from 19.

Q2. The majority of the candidates gave a correct answer for part (a). A few candidates stated an odd number instead.

Most of the candidates gave a correct answer for part (b). However, a significant number of candidates incorrectly worked out the least common multiple rather than the largest common factor and gave 96 as their answer.

Candidates performed well in part (c) too. A few candidates stated a square number which was not within the given range, mainly 81, while others gave an even number which was not a square number. Some candidates stated 7^2 or 8^2 instead of 49 or 64.

In part (d) nearly all the candidates gave 48 for an answer. A very few either incorrectly gave 4 for an answer or did not attempt the question at all.

Q3. Most candidates correctly underlined 100 m for the length of a football pitch in part (a). A few selected 10 km.

In part (b) many candidates incorrectly chose 10 kg for the weight of a newborn baby.

Most of the candidates correctly selected 150 ml as the capacity of a teacup in part (c). Some candidates chose 500 ml as its capacity, while a few incorrectly chose 1.5 cc.

Q4. Most of the candidates obtained full marks for this question. The majority of the candidates who gave a wrong answer were adding the two numbers below instead of multiplying them as was required of them. Other candidates did not obtain the correct answer for the first block, namely 3, but then continued to work correctly for the next two blocks.

Q5. In part (a) most of the candidates rounded the numbers to one significant figure correctly and gave a correct estimate. Others rounded the numbers correctly but did not work out the square root of the numerator and gave 1 as their final answer. Some candidates used the calculator to work out the calculation since they had rounded the denominator 4.6^2 to 21, then rounded the final answer. Other candidates did not use 3 as the rounded value of π and hence they could not finish the calculation without the use of a calculator.

In part (b) most of the candidates used the calculator correctly to obtain the final answer. However, a small number of candidates incorrectly rounded their answer to two significant figures and gave 0.23 instead of 0.24 as their answer.

Q6. Many candidates obtained correct answers for part (a), writing a number in standard form and part (b) writing a number in ordinary number.

In part (c) a significant number of candidates did not give the difference between the areas of the two lakes in standard form and or rounded to two significant figures.

Q7. In part (a) some candidates did not equate the sum of the expression to 360°, while many candidates simplified the expressions incorrectly. A significant number of candidates added the algebraic terms and the constants separately then equated them to obtain the equation $7p$ = 80°. Hence, the answer for *p* was incorrect.

In part (b) candidates had to confirm that Marina's statement was correct and give a reason for their response. However, many candidates just stated that Marina's statement was correct or incorrect either without proving their statement or by stating a reason that was not related to cyclic quadrilaterals. Few candidates worked out the size of two opposite angles to show that they add up to 180°, hence referring to the fact that the two opposite angles of a cyclic quadrilateral are supplementary.

Q8. In part (a) many candidates used Pythagoras Theorem to show that h = 0.7 m. However, some applied the theorem incorrectly when they added 2.4^2 to 2.5^2. Others worked out the square root incorrectly. A few candidates used value for h, 0.7 m, to show that the hypothenuse is 2.5 m. It is recommended that when proving a statement, the statement itself should not be assumed and used in the proof.

In part (b) many candidates obtained the total area of the shaded face of the greenhouse by using the formula for the area of a trapezium or by splitting the area in a triangle and rectangle. However, some candidates worked out 2.4^2, assuming the rectangle was a square. Others picked the wrong values for the height or base of the triangle.

In part (c) many candidates used the answer obtained in (b) to work out the volume of the greenhouse. Most candidates worked out this problem with little or no difficulty.

Q9. In part (a) many candidates managed to work out the money Lora had left. Some candidates worked out $\frac{5}{8}$ of €240, while others calculated $\frac{3}{8}$ of Lora's money and then subtracted this amount from €240. A few of these candidates did not work out the subtraction and incorrectly gave €90 for their answer.

In part (b) many candidates divided the €30 donated by Lora by their answer obtained in (a).

In general, candidates performed well in part (c) of this question.

Q10. In part (a) many candidates correctly indicated that adding 20 to each term of Sequence A gives the terms of Sequence B.

In part (b) many candidates managed to obtain the values 36, 56 and 10 000, but did not state 10 020, n^2 and $n^2 + 20$ for the remaining cells.

In part (c) many candidates correctly used the term value 900 to obtain the term number.

Q11. In part (a) candidates were asked to choose the best option out of two offers. The majority of the candidates answered all the required parts appropriately, however some candidates did not state the amount by which Offer B is cheaper than Offer A. Incorrect responses in Option A occurred when candidates subtracted €500 from the total of €1440 instalments instead of adding them. In Offer B some candidates also found difficulty in calculating the discounted price.

Most candidates worked out part (b) of the question correctly.

Q12. Candidates were required to construct a diagram involving two angles measuring 60° and 90°. A significant number of candidates managed to complete an accurate construction using compasses. However, a considerable number of candidates lost marks for using the protractor to draw the angles rather than using compasses and ruler only as instructed.

Q13. The majority of candidates answered part (a) correctly. The most common mistake occurred when the formula for the circumference of a circle was often used instead of the formula for the area.

Similarly, in part (b), most candidates managed to answer this question successfully. However, some candidates used an incorrect formula and hence did not work out the volume of the soil used.

Q14. In part (a) most candidates completed the frequency table correctly.

In part (b) almost all candidates gave the correct value for the mode. Those who failed, either found the median value or tried to find the total number of raisins.

Part (c) also proved to be quite easy for most of the candidates. However, a significant number of candidates did not obtain the correct value for the mean when they worked out the total number of raisins by adding 27, 28, 29 and 30 instead of working out $(27 \times 3) + (28 \times 6) + (29 \times 5) + (30 \times 4)$ before dividing by 18.

Most candidates worked out part (d) correctly.

Q15. In part (a), almost all candidates calculated the correct time interval, with a good number of candidates completing the rest of the question correctly. However, some candidates found difficulty converting 2 hr 30 min to 2.5 hrs or 2½ hrs correctly to continue working the question and used 2.3 h instead. Others converted 2 hr 30 min to minutes and calculated the speed in km/min.

Part (b) proved to be challenging to most candidates. Some candidates did not increase the speed found in part (a) by 3.6, but divided 174 km by 3.6 instead, thus failing to get the correct time interval. Furthermore, a significant number of candidates found difficulty in finding the total time taken to reach Pisa to determine the arrival time.

Q16. This question was about algebraic ratios. Many candidates did not manage to form the correct expressions for the amount each person gets and hence did not form the correct equation. The most common error was dividing the total amount by three. Some candidates wrote the correct equation but then applied incorrect operations to find the amount Anġlu gets. A few candidates used the trial-and-error method, which many times did not lead to the correct solution.

Q17. Most candidates performed well in this question. A few candidates did not understand what was required of them in part (a) and some even omitted it.

In general, in part (b), candidates managed to construct a correct pie chart.

Q18. The most common mistakes in this question occurred in parts (a) and (c). Some candidates switched the x and y coordinate values, while others did not write the brackets as per coordinates notation.

In parts (d) and (e), some candidates worked out the gradients but did not write the required equation of the line.

Q19. Similar triangles proved to be challenging to some candidates. In proving similarity in part (a), some candidates identified the equal angles but did not provide a reason. Others did not use the correct notation and often stated letters, e.g. AXY = ADC, without any indication whether they are referring to an angle or a triangle. In some cases, part (a) was not attempted at all.

In part (b) some candidates incorrectly subtracted 8.2 from 12.3 to obtain the value of YC. Other candidates used Pythagoras Theorem, assuming that the triangles were right angled.

Q20. Many candidates had difficulty finding the values of the required angles while others did not write the correct reason/s. A few candidates incorrectly assumed that triangle OAB was an equilateral triangle, while others considered triangle BAD to be an isosceles triangle.

D. CONCLUDING COMMENTS

Examiners across all papers note that some candidates' work lacked neat and logical presentation. It was also noted that candidates often refrain from presenting all the necessary calculations in their workings. Although procedures, such as those related to four operations in fractions and the solution of quadratic equations, may be worked out with a calculator, candidates are still required to show intermediate steps in their working. When presenting geometrical facts, candidates are required to state the reasons, even when not specifically requested to. Early rounding of answers, especially when the answer of one part of a question is used again in subsequent parts should be avoided. In constructions, candidates are required to show all arcs and lines.

Chairperson
Examiners Panel 2024