



**L-Università  
ta' Malta**

**MATSEC  
Examinations Board**



# **Examiners' Report SEC Mathematics**

**Main Session 2025**

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## A. STATISTICAL INFORMATION

The total number of candidates who registered for SEC Mathematics in May 2025 was **4600**.

Table 1 shows the distribution of levels of the Main 2025 Session of the examination.

| Level        | Number of Candidates |
|--------------|----------------------|
| <b>1</b>     | 115                  |
| <b>2</b>     | 607                  |
| <b>3</b>     | 2567                 |
| <b>na</b>    | 1311                 |
| <b>Total</b> | <b>4600</b>          |

*Table 1: Distribution of Levels*

## B. GENERAL REMARKS

The overall facility of each question in the four papers 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.

## C. COMMENTS ON THE EXAMINATION PAPERS

### Paper I

#### Level 1 – 2 – 3

Table 1 shows the facility of the questions in Paper I (Level 1 – 2 – 3). This Table is followed by the examiners' comments about the individual questions in this paper.

Table 1: Facility of the questions in Paper I (Level 1 – 2 – 3)

*n* = 491

| Question No                         | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>Facility</b>                     | 0.75 | 0.61 | 0.77 | 0.52 | 0.35 | 0.37 | 0.46 | 0.64 | 0.32 | 0.43 | 0.55 | 0.12 |
| <b>% candidates with full marks</b> | 38.5 | 7.3  | 40.1 | 22.4 | 5.9  | 1.0  | 7.5  | 29.3 | 2.2  | 14.5 | 10.2 | 1.4  |
| <b>% candidates with zero mark</b>  | 2.0  | 1.6  | 2.0  | 20.0 | 23.6 | 9.0  | 11.8 | 15.5 | 25.5 | 26.1 | 10.0 | 52.1 |

*\*n stands for the number of candidates who sat for the paper, not those who registered*

### *Question 1*

With the second-highest facility on the paper, this question proved to be relatively straightforward. However, many candidates still made errors in some parts, often revealing gaps in their understanding of the number system.

In part (a), a considerable number of candidates experienced difficulty in inserting the correct inequality symbols. This may have arisen from a lack of familiarity with the symbols themselves, or from challenges in correctly ordering the given numbers.

In part (b), a substantial number of candidates gave incorrect responses when asked to state a number lying between 5.67 and 5.68.

In part (c), where candidates were required to determine how many quarters there are in 275%, many incorrectly gave 2.75 as their answer.

### *Question 2*

In part (a) the majority of candidates drew a circle with radius 3 cm correctly. However, some had difficulty labelling the diameter AB correctly. When constructing a  $60^\circ$  angle at B, construction lines were often missing. Candidates usually answered part (b) correctly.

In part (c), many candidates made mistakes in ticking the appropriate boxes. The statements "A right-angled triangle is an equilateral triangle" and "An isosceles triangle is scalene" were often coded as 'sometimes true' or 'always true', while most candidates coded the statement "A right-angled triangle is isosceles" as 'always false'.

### *Question 3*

Part (a) required candidates to order a set of five numbers. While the positive numbers were generally ordered correctly, many candidates incorrectly considered  $-0.00313$  to be smaller than  $-3.13$ . Most candidates answered part (b) correctly, demonstrating a sound ability to add positive and negative numbers.

### *Question 4*

Most candidates obtained a good mark on this question largely testing addition and subtraction of fractions. However, a substantial number did very poorly and as many as 20% of the candidates obtained a zero mark.

### *Question 5*

In part (a), the majority of candidates correctly determined  $\angle PQR$  by applying the property that the base angles of an isosceles triangle are equal in conjunction with the triangle angle-sum property. However, as in other parts of this question, many lost marks for failing to explain their reasoning. In part (b), many candidates successfully obtained the correct value for  $\angle QTR$ , generally through the application of the theorem that angles in the same segment are equal. In contrast, part (c) proved to be more demanding. Although the question did not involve more complicated theorems, finding  $\angle QRT$  in part (c) turned out to be more challenging. Indeed  $\angle QRT$  required a greater number of steps than the preceding parts, and the solution relied on the accuracy of the angle found in part (b).

Consequently, candidates who were unsuccessful in part (b) were unable to arrive at the correct result in part (c).

#### *Question 6*

In part (a), most candidates recognised the given transformation as an enlargement; however, many did not provide a complete description, frequently omitting either the scale factor or, more commonly, the centre of enlargement. In part (b), candidates usually gave a correct response, though a significant proportion did not identify the correct translation vector. A common error was to count the number of small squares instead of applying the given scale. In part (c), many candidates correctly identified the three given triangles as right-angled. However, when comparing triangles ABC and A'B'C', a considerable number incorrectly described them as congruent rather than similar. In part (d), many candidates determined the areas of the two triangles accurately. Nevertheless, some chose to measure the sides directly instead of applying the given scales; due to the small size of the sides, this led to substantial measurement errors, and consequently, the loss of a mark.

#### *Question 7*

Most candidates demonstrated a sound ability to use the bar chart to determine the total number of volunteers. Responses to part (a) were generally accurate, with many candidates correctly calculating the probability of volunteers involved in Ticket Sales. Similarly, in part (b), a good proportion of candidates successfully identified the percentage of volunteers engaged in Event Promotion.

However, a considerable number of candidates encountered difficulties in establishing the total number of volunteers. Errors arose either from misreading of the bar chart or from incorrect addition of the category values.

Part (c) proved more challenging. A large proportion of candidates either made no attempt or failed to apply the pie chart appropriately in order to determine the fraction of volunteers engaged in Event Organisation who were within the 15–30 age group. This step was essential to obtaining the correct solution.

Performance on part (d) was generally poor. While some candidates adopted a correct initial strategy—seeking the total age of the group—they frequently applied incorrect methods. Instead of multiplying the number of people in the group by the given average age ( $10 \times 41$ ), many resorted to inconsistent or invalid calculations, leading to incorrect conclusions.

#### *Question 8*

Most candidates worked out the two problems appropriately. In part (a), some lost the final mark by giving their answer as 18.75 days rather than 18 days for the number of days the cat food was going to last. Similarly in part (b), when working the least number of boxes of cat food to be bought, the answer 4.8 needed to be rounded up to 5 boxes. A common error here was to round down to 4 boxes or to leave the answer as 4.8. A number of candidates making mistakes in converting from grams to kilograms or vice versa lost all the marks on this question.

*Question 9*

Few candidates obtained full marks on this algebra question. In part (a), various incorrect manipulations were made to factorise the given expression. However, a good number of candidates gained a mark for partial factorisation of the expression. In part (b), candidates often failed to expand brackets correctly giving responses of the type  $5x(2x - 4) = 10x - 4$ . Changing the subject of the formula  $b = \sqrt{\frac{a+2}{3}}$  in part (c) was found to be especially challenging. Many made mistakes in their very first step by converting the equation to  $3b = \sqrt{a+2}$ . A good number managed part (d) involving the solution of two linear simultaneous equations successfully, however a good number of candidates made mistakes when they were trying to eliminate one of the two unknowns.

*Question 10*

In part (a), a good number of candidates gave a fully correct answer including correct units of measure. However, a variety of mistakes were also seen, a prominent one being the confusion of area with perimeter. Part (b) was better answered, even though some candidates mistakenly included the gate with the perimeter of the stone wall.

*Question 11*

In part (a), a considerable number of candidates provided a correct algebraic representation of the given verbal condition for the number of figolli,  $y$ , produced after time  $t$ ; namely,  $y = 15t + 50$ . However, some candidates omitted part of the condition and gave the incomplete equation  $y = 15t$ . Most candidates completed the table of values for the graph accurately, plotted the graph successfully, and read values correctly as required in parts (b) and (c).

In part (d), the production of jam tarts after time  $t$  was described verbally. Candidates were required, without drawing the graph, to explain how the graph of the number of jam tarts differed from that of the figolli. Only a small number of candidates responded successfully either by comparing the gradients and intercepts of the two lines or by giving the equation for the production of jam tarts,  $y = 20t + 30$ .

*Question 12*

In part (a), the majority correctly worked out the total volume of concrete in a tile, measuring 1.2m by 1.5m by 8cm. However, a good number of candidates just multiplied the given values directly without ensuring that all the measures were in the same unit.

Part (b) asked for the volume of the grey triangular parts within the whole tile. Many candidates correctly deduced the measures of the triangles and found the area of the triangles correctly. However, finding their volume was more challenging. Some repeated the mistake they made earlier, by working with different units for the dimensions of the prisms. Many left out this part; it is likely that a good number of candidates did not realise that, given that the tile had uniform cross-section, these parts were triangular prisms. The same mistakes appeared in part (c), where candidates were required to compute the volume of another shape of uniform cross-section, this time more complicated and involving also cylindrical parts. Indeed, very few candidates gave a correct response to this last part.

## Paper II

### Level 1 – 2

The following table shows the distribution of grades for Paper 1-2.

| GRADE     | 1 | 2 | 3 | 4 | 5 | 6  | 7  | 8  | U   | ABS | TOTAL |
|-----------|---|---|---|---|---|----|----|----|-----|-----|-------|
| LEVEL 1-2 | - | - | - | - | - | 22 | 29 | 78 | 112 | 97  | 338   |

Table 2 shows the facility of the questions in Paper II (Level 1 – 2). The examiners' comments about the individual questions in this paper follows.

Table 2: Facility of the questions in Paper II (Level 1 – 2)

$n = 241^*$

| Question No                  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Facility                     | 0.25 | 0.66 | 0.40 | 0.47 | 0.27 | 0.21 | 0.33 | 0.21 | 0.36 | 0.08 | 0.52 | 0.39 | 0.14 | 0.07 |
| % candidates with full marks | 0.4  | 12.4 | 5.4  | 10.4 | 2.5  | 17.4 | 10.8 | 5.4  | 8.3  | 0.0  | 13.7 | 5.0  | 1.2  | 1.7  |
| % candidates with zero mark  | 38.2 | 0.0  | 10.0 | 12.0 | 30.3 | 73.9 | 38.2 | 49.8 | 33.2 | 65.6 | 14.5 | 14.5 | 54.4 | 78.0 |

*\*n stands for the number of candidates who sat for the paper, not those who registered*

### Question 1

The vast majority of candidates attempted this question, but many appeared to confuse the mean, median and the mode. In part (a), a good number of candidates gave a correct value for the mode of the given data set. Fewer candidates managed to get a correct value for the mean and median. Only one candidate managed a fully correct response to part (b), by mentioning that the value 12 was affecting the mean.

### Question 2

This question was answered by all candidates, and it turned out to have the highest facility. The candidates needed to decipher whether the given statements about numbers were true or false. It is very likely that some candidates would have gained marks through guessing. This may explain why it is the only question where no candidate scored zero.

### Question 3

In part (a), candidates needed to determine which of the given fractions were equivalent to  $\frac{9}{21}$ . A good number correctly identified  $\frac{3}{7}$  as an equivalent fraction but very few saw  $\frac{12}{28}$  as being also equivalent. A large majority found difficulty with part (b), where they had to determine what fraction of the given shape was shaded. Apparently, these candidates did not even see the need to split the given shape into equal parts to determine the shaded fraction. Part (c) required candidates to shade  $\frac{1}{3}$  of a diagram involving 12 equal parts. Many just shaded 3 parts.

#### *Question 4*

Overall, this question was one of the best answered questions. In part (a), a good number identified  $\angle OMB$  as a right angle and line ON as a radius. However, in item 4(a)(iii), a common mistake was to confuse the terms parallel and perpendicular. Part (b) required candidates find unknown angles using the properties of the sum angles at a point and the sum of the angles of a triangle. A good majority of candidates gave correct responses this part question.

#### *Question 5*

Many candidates managed to work out correctly part (c), a money problem involving a single division operation. However, parts (a) and (b) of question 5 involving percentages were poorly answered. Similarly, very few candidates managed a correct response to part (d) involving division in a given ratio.

#### *Question 6*

The vast majority of candidates (73.9%) obtained no marks on this question where they were required to work out the simple interest on €7,800 at a rate of 2% per annum for 5 years. However, a substantial number (17.4%) obtained full marks. The remaining candidates usually managed to work out 2% of €7,800; but then failed to multiply their answer by 5.

#### *Question 7*

Many candidates were unable to write a number lying between 2.5 and 2.6. Another common mistake was to consider 0.315 to be bigger than 0.78 because the former has more digits after the decimal point.

#### *Question 8*

Many candidates (49.8%) did not gain any marks on this question. A good number managed to gain just one mark by properly inserting brackets to make the given arithmetic equation correct. However, few candidates were able to work out the division involving fractions.

#### *Question 9*

Responses suggest that most candidates struggle to present organised work, a key skill for solving multi-step problems. Many candidates managed a correct response to parts (a) and (b) involving one step time calculations. These answers were almost never supported by any written working. Part (c) asked for the area of a composite shape made of rectangles. However, some of the dimensions of the shape needed to be deduced. Many made mistakes in these deductions and markers could not make any sense of the working.

#### *Question 10*

With a facility of 0.08, this construction question was very poorly answered. A good number of candidates just managed to construct the triangle ABC as requested in part (a). However, many of such candidates lost a mark for not showing the arcs of their construction. Part (b) involved constructing angle bisectors while part (c) involved drawing a perpendicular from a point to a line. Barely any candidates made marks from these parts. Indeed, not a single candidate achieved full marks on this question.

### *Question 11*

Despite being a level 2 question, this question turned out to have one of the highest facility levels in all the paper. The vast majority found no difficulty with filling in the possibility space. In answering part (a), a good number of candidates mistakenly argued that 6 is more difficult than 1 to roll on a dice, because 6 is bigger.

### *Question 12*

Part (a) involving the use of compass directions was poorly answered, with most candidates seemingly guessing their answers. Part (b) involved completing a shape to make it symmetrical about a horizontal and vertical line. Although this part was generally better answered, a common mistake was to draw a shape that was only symmetrical about the vertical line. Many gained marks on part (c), where candidates had to draw all the lines of symmetry of a six - pointed star. However, a good number only managed to draw three of the six lines of symmetry.

### *Question 13*

Overall, candidates' performance on this question, which tested the interpretation and construction of graphs of straight lines, was unsatisfactory. In parts (a) and (b), a significant number of candidates experienced difficulty when substituting negative values and plotting the corresponding points for graph A. Part (c), which required candidates to determine the equation of line B, was attempted by very few. Similarly, only a small number of candidates attempted part (d), which required them to verify whether the point (26, 59) lay on line A or on line B.

### *Question 14*

Many candidates did not attempt this question, and a large majority of candidates did not gain any marks. A few candidates managed to determine the perimeter of the square and of the rectangle in terms of  $x$ . However, writing the condition that the perimeter of the rectangle was twice that of the square was too challenging for all but a very small minority.

**Level 2 – 3**

The following table shows the distribution of grades for Paper 2-3.

| GRADE     | 1 | 2 | 3 | 4   | 5   | 6   | 7   | 8 | U   | ABS | TOTAL |
|-----------|---|---|---|-----|-----|-----|-----|---|-----|-----|-------|
| LEVEL 2-3 | - | - | - | 345 | 243 | 534 | 369 | - | 648 | 224 | 2363  |

Table 3 shows the facility of the questions in Paper II (Level 2 – 3). The examiners' comments about the individual questions in this paper follows.

Table 3: Facility of the questions in Paper II (Level 2 – 3)

$n = 2139^*$

| Question No                  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Facility                     | 0.52 | 0.66 | 0.84 | 0.35 | 0.39 | 0.28 | 0.15 | 0.41 | 0.58 | 0.45 | 0.26 | 0.51 | 0.05 |
| % candidates with full marks | 1.5  | 25.9 | 68.6 | 3.9  | 6.5  | 2.6  | 0.8  | 11.0 | 4.4  | 11.0 | 18.8 | 13.9 | 1.5  |
| % candidates with zero mark  | 10.0 | 4.0  | 6.0  | 16.3 | 14.3 | 24.6 | 53.5 | 25.5 | 7.8  | 2.5  | 67.1 | 27.0 | 88.7 |

*\*n stands for the number of candidates who sat for the paper, not those who registered*

**Question 1**

In part (a), many candidates gave correct answers for the mean, mode and median of the distribution. In finding the mean, a substantial number of candidates were observed to round their answer to a whole number. During instruction, candidates may need support in understanding that when a population consists of whole-number values, the mean is often not a whole number. A common mistake when finding the median was failing to arrange the values in ascending or descending order before identifying the middle number. Whilst most of the candidates gave a correct answer for the mode; a few candidates gave two values as their answer, namely 3 and 4. In part (b), very few candidates answered correctly, indicating that instruction should place greater emphasis on how outliers can distort the representation of a distribution.

**Question 2**

In part (a), the majority of candidates correctly converted  $\frac{1}{5}$  as a percentage. Part (b) was also suitably answered by most. However, some candidates suitably found the number of bottles sold but did not subtract this from 200 to obtain the remaining number. Nearly all the candidates answered part (c) correctly and realised that the greatest number of bottles that could be bought was just 6 since a part of a bottle could not be bought. Part (d) proved to be very challenging with many giving incorrect responses or leaving it out completely. Candidates often made mistakes when using the given ratio by weight of sugar : lemon juice : water in the lemonade to find the fraction by weight of the lemon juice. A few candidates worked out the sum correctly but then lost the final accuracy mark by giving their answer as 500kg rather than 500g.

### Question 3

This question involving representation of fractions as decimals and percentages, turned out to have the highest facility and a good number scored full marks. A considerable number of candidates just lost one mark for not simplifying the fraction  $\frac{65}{100}$  to its lowest terms.

### Question 4

This question assessed candidates' understanding of transformation geometry. Part (a) proved challenging for most candidates. Few were able to correctly plot the line  $y = -x$  and perform the reflection; the majority reflected the shape in either the  $x$ -axis or the  $y$ -axis instead. The question also required candidates to enlarge the given shape by a scale factor of 3 from a point that was not the origin. While most applied the correct scale factor, few positioned the image accurately. In part (b), candidates were required to complete a design to achieve rotational symmetry of order 4. This was generally well answered, although some responses contained minor errors that prevented full accuracy.

### Question 5

In part (a), many candidates successfully carried out the required calculation and expressed the answer in standard form. Some obtained the correct numerical value but did not present it in standard form. A significant number of errors arose from difficulties in using calculators accurately. In part (b), candidates were asked to identify the reciprocal of  $\frac{2}{3}$ . Only a few produced a correct response. This part of the question also required candidates to state the result of multiplying a number by its reciprocal. Those who answered the first part correctly generally obtained the correct result here as well.

### Question 6

In this construction question, a considerable proportion of candidates (24.6%) did not gain any marks. In part (a), candidates were required to construct a triangle given its sides, and many completed this successfully. Part (b) asked for the construction of the angle bisectors of two angles of the triangle. This part proved much more challenging, with some candidates giving completely incorrect responses, such as drawing perpendicular bisectors of two sides rather than angle bisectors. Some lost marks for not using compasses in their construction as instructed. In the final part, few candidates succeeded in constructing the inscribed circle of the triangle accurately.

### Question 7

This question proved very challenging and had the second-lowest facility on the paper. In part (a), few candidates realised that angle BOC could be found directly using the angle-at-the-centre theorem. Many nevertheless obtained it through longer methods, relying on isosceles triangle properties and the sum of angles on a straight line. Some candidates incorrectly assumed that triangle BOC was equilateral, while another common error was to treat angle ACD as  $90^\circ$ , despite it clearly being smaller as part of angle OCD — the angle between a tangent and a radius. Even when correct values were found, marks were often lost for failing to provide adequate reasoning.

Part (b) was even more challenging. While some candidates correctly began by finding the radius of the circle, very few went on to apply trigonometry to determine the length of chord BC as required. A number instead calculated the length of arc BC rather than the chord.

### Question 8

In part (a), most candidates successfully expressed the perimeter of the square in terms of  $x$  and simplified it to  $4x$ . Some, however, did not attempt the question, while a few incorrectly gave the answer  $x^4$ . In part (b), many were able to verify that the perimeter of the rectangle was  $10x - 8$ .

Part (c) proved more demanding. Many candidates struggled to form the required equation from the statement "*The perimeter of B is twice the perimeter of A*". A common error was to double the perimeter of B instead of A. Another very common mistake was to write an algebraic expression rather than a complete equation. Others incorrectly equated one of their algebraic expression to  $x$  or to an arbitrary integer. Even when the correct equation was formed, some candidates were unable to solve it, revealing weaknesses in basic algebraic manipulation.

In part (d), despite earlier success, a few candidates made errors in substitution, often through incorrect use of brackets when entering calculations into the calculator.

### Question 9

The vast majority of candidates demonstrated a clear understanding of the frequency table and gave correct responses to part (a). However, in part (b), where candidates were required to draw a histogram, few achieved full marks. A recurring error was the incorrect labelling of the horizontal axis. Many candidates copied entire inequality expressions (e.g.,  $0 \leq t < 5$ ) onto the axis, instead of using a continuous numerical scale appropriate for histograms. Another common mistake was leaving spaces between the bars, which is incorrect in the context of histograms, as the data is continuous.

In part (c), several candidates correctly calculated the probability of selecting a candidate who studies 15 hours or more per week. They accurately added the frequencies for the intervals  $15 \leq t < 20$  (8 candidates) and  $20 \leq t < 25$  (4 candidates), resulting in the correct probability of  $12/50$ . However, some candidates demonstrated a misunderstanding of inequality notation. A frequent error was the inclusion of the  $10 \leq t < 15$  group (14 candidates) which led to the incorrect probability of  $26/50$ .

Part (d) assessed candidates' conceptual understanding of the modal class - the group with the highest frequency. Initially the modal class was tied between  $5 \leq t < 10$  and  $10 \leq t < 15$ , each with a frequency of 14 candidates. With the addition of one candidate who reported studying 10 hours, the frequency of the  $10 \leq t < 15$  group increased to 15, making it the new modal class. While several candidates correctly identified this change, a significant number failed to consider the updated frequency to take account the additional candidate. These candidates incorrectly gave the modal class as  $5 \leq t < 10$ , indicating a lack of attention to the revised dataset.

### Question 10

The majority attempted part (a) and successfully determined the number of tiles for the 4th and 5th terms. However, many struggled when it came to determining the  $n^{\text{th}}$  term of the sequences. Candidates with a fully correct response to part (a) often completed part (b) successfully. These candidates sometimes used trial and error to find the term that resulted in 487 white tiles. However,

some stopped at this point and did not go on to substitute this value into the  $n^{\text{th}}$  term formula for grey tiles to find the corresponding number of grey tiles. In part (c), candidates were asked whether one of the terms in the sequence could have exactly 101 grey tiles. A substantial number of candidates managed a correct response, usually by observing that the number of grey tiles was always even or a multiple of 4.

#### *Question 11*

This question focused on proportionality, with each part carrying only one mark. Both parts (a) and (b) dealt with inverse proportion. Although it was clearly stated in the question that the grant to each candidate was inversely proportion to the number of candidates in the group, most candidates mistakenly approached it as a direct proportion problem.

#### *Question 12*

A significant number of candidates encountered difficulty when required to formulate the linear equation representing the volume of water as a function of time required in part (a). However in parts (b) and (c), candidates usually gained marks for accurately completing the table of values based on the given equation and correctly plotting the corresponding points on the graph. In parts (d) and (e), most struggled with the interpretation of the graphs, but a substantial number gave correct responses.

#### *Question 13*

This question was poorly answered, with only a small number of candidates completing it correctly. Many either did not attempt the question at all or made only minimal attempts, such as marking a few of the given measurements on the diagram without proceeding further. A common issue was the failure to recognise that OA represented the perpendicular distance, which was critical to solving the problem. This oversight prevented many candidates from constructing the necessary right-angled triangles. In addition, most did not identify OQ and OS as radii of the circle. As a result, they were unable to establish the necessary relationships to apply Pythagoras' Theorem, which was central to the solution.

**Level 3 – 3\***

The following table shows the distribution of grades for Paper 3-3\*.

| GRADE             | 1   | 2   | 3   | 4   | 5   | 6 | 7 | 8 | U   | ABS | TOTAL |
|-------------------|-----|-----|-----|-----|-----|---|---|---|-----|-----|-------|
| <b>LEVEL 3-3*</b> | 289 | 367 | 504 | 352 | 149 | - | - | - | 215 | 23  | 1899  |

Table 4 shows the facility of the questions in Paper II (Level 3 – 3\*). The examiners' comments about the individual questions in this paper follows.

Table 4: Facility of the questions in Paper II (Level 3 – 3\*)

$n = 1876^*$

| Question No                         | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| <b>Facility</b>                     | 0.52 | 0.72 | 0.77 | 0.82 | 0.60 | 0.69 | 0.77 | 0.91 | 0.64 | 0.78 | 0.66 |
| <b>% candidates with full marks</b> | 8.3  | 34.5 | 40.3 | 58.7 | 17.6 | 65.8 | 19.1 | 74.2 | 23.7 | 53.5 | 28.2 |
| <b>% candidates with zero mark</b>  | 3.1  | 2.2  | 4.6  | 0.2  | 9.2  | 29.6 | 0.6  | 0.9  | 8.3  | 3.0  | 2.0  |

*\*n stands for the number of candidates who sat for the paper, not those who registered*

**Question 1**

Part (a) was usually answered correctly but some candidates failed to round their answers to three significant correctly. Part (b) was more difficult, and a good number of candidates were not able to express correctly 400 and 1080 as a product of prime factors. In part (b), candidates giving correct responses, often lost marks for a number of reasons. Some found the LCM of the two numbers when this was not requested in this part. Others failed to use their prime factors to find  $\sqrt{400}$  and to determine whether 1080 is a cube number. In part(c), a good number of candidates were seen to confuse the HCF and LCM.

**Question 2**

In part (a), the vast majority of candidates successfully managed the enlargement. The reflection proved to be more difficult. Many candidates did not draw the line  $y = -x$  correctly, usually drawing the line  $y = x$  instead. Even those who drew the correct line often struggled when it came to the reflection in this line. The performance on part (b) was very good. However, in completing the shape to have order 4, some lost some marks by not shading the triangles they drew or by not completing the central cross.

**Question 3**

Overall, candidates did well in this question. In part (a), most filled the in the probability tree correctly. Some however, did not consider successive picks of the fruit as dependent events and ended up with incorrect probabilities for the branches representing the picks for the second and third child. In the following parts of the question, when working out the combined probabilities for a particular path along the probability tree (for example the probability that an orange followed by an

apple followed by an apple is picked), a common mistake was to add rather than multiply the individual probabilities. Some candidates failed to consider all the possible paths for the probability that one of the children obtains an apple and the other two get an orange. A similar mistake was made by some candidates in part (d) where they had to find the probability of selecting at least an apple. In the latter part question, many candidates chose the quickest method for working out the requested probability; namely one minus the probability of selecting three oranges. Others did it by adding the probability of the different possible paths together. While many still got the correct answer with the longer method, some lost marks by missing one or more paths.

#### *Question 4*

The majority got full marks for part (a). However, a substantial number of candidates did not manage to give a correct answer for the  $n^{\text{th}}$  term of the two given sequences. Part (b) was only accessible to those who got a fully correct response for the previous part. These usually used the algebraic expressions obtained in part (a) successfully and obtained a correct response to part (b). Part (c) was found to be easier than the previous part. Most equated the number 101 to the general expression for the number of grey tiles, leading them to a non-integral pattern number. Others correctly noted that the number of grey tiles was always even—or a multiple of 4—so a pattern with 101 grey tiles was impossible. However, no marks were awarded to candidates who just said that 101 grey tiles was impossible without giving any reason.

#### *Question 5*

Many candidates experienced difficulty when required to work in reverse, completing the frequency table from data in the cumulative frequency table. In a good number of cases, this resulted in the loss of all available marks for part (a), suggesting weaknesses in interpreting cumulative frequency and using it to reconstruct the original data. Greater emphasis during instruction on the relationship between a cumulative frequency curve and the corresponding dataset may help to address this gap. In part (b), candidates needed to use the given cumulative frequency curve to determine the mean and the interquartile range. The median is the position of the middle term, the  $\left(\frac{n+1}{2}\right)$ th term, where  $n$  is the size of the population. However, with Cumulative Frequency Curves it is often the case to use the  $\left(\frac{n}{2}\right)$ th term as an estimate of the middle term. Both methods were considered correct. The same goes for the quartiles. A common mistake was to use an incorrect value of  $n$ . Instead of using  $n = 30$ , some used  $n = 100$ , thus losing marks for both the median and the interquartile range. Others were working correctly with  $n$ , but did not use the cumulative frequency graph correctly to determine the median and the quartiles.

In part (c), candidates who had successfully completed part (b) usually drew the box plot correctly. Some however lost the final accuracy mark by leaving out or misplacing the whiskers at the extreme ends of the distribution.

In answering part (d), some candidates estimated the frequency for the number of locations with more than 15 birds observed from the frequency table rather than from the cumulative frequency curve as instructed.

### Question 6

The majority obtained full marks on this question. However, a substantial number of candidates gained zero marks on this question. Usually, these candidates did not recognise this as a reverse percentage question and simply worked out 82% of €55,000. A few candidates lost a mark by not rounding their answer to the nearest cent or nearest euro. In instruction, it is useful to help candidates appreciate that, in monetary problems, answers should be rounded according to the context in which the problem is set.

### Question 7

Most candidates completed the table of values for the graph correctly. They were generally able to plot and draw a smooth cubic curve, although some incorrectly used a ruler to draw the graph. A few candidates gave only two solutions to the cubic equation, and a common error was misreading the scale.

Most were also able to draw the linear graph accurately. Surprisingly, some simply drew the graph of  $y = x$  instead of the line  $y = -5x + 5$ , as instructed. A number of candidates used a table to find coordinates for the line but made minor errors. Despite these errors, they failed to recognise that the graph should be a straight line and instead plotted the points as obtained, resulting in a zig-zag pattern.

In part (f), many candidates either did not write the correct cubic equation for the point of intersection of the two graphs or omitted this part of the question entirely. A common mistake was giving the point of intersection instead of giving the equation satisfied at that point. Others overlooked the instruction to use the graph and attempted to solve, the cubic equation algebraically.

### Question 8

Despite targeting level 3\*, this question turned out to have the highest facility. Few made mistakes in this question. In part (a), some candidates gave an incorrect interpretation of the phrase "depreciated by 10% annually". They considered that each year the percentage depreciated by 10% more than in the previous year. Moreover, a few candidates used an incorrect formula, treating the situation as if the car's price were increasing rather than depreciating. In part (b), some candidates did not appear to understand the question properly; rather than working with the €15,000 as the deposited amount, they worked with the depreciation amount. Others went beyond the question and calculated the interest accumulated instead of just giving the amount in the account after six years, as requested.

### Question 9

In part (a), the vast majority of candidates worked out the requested angles correctly. However, a substantial number struggled with explaining their working. Again, in part (b), many managed a fully correct response. However, a substantial number of candidates did not get to make a start on the problem. This is because they failed to realise that being radii, the length of a number of sides in the given figure could be worked out from the circumference. Once candidates found the radii, they usually had no difficulty with the trigonometric part. There were various methods for determining the length of chord BD, and most candidates used the cosine formula in triangle OBC. A good number

of candidates realised that triangle BAC was right-angled and simply used trigonometrical ratios to find BD.

### *Question 10*

Part (a) required the construction of two loci. Some candidates had difficulty interpreting which loci were requested, and many attempted to construct various loci with different sides and angles instead. Those who correctly identified the required loci generally constructed them accurately. Part (b), involving the use of the cosine formula, was well answered by the vast majority of candidates.

### *Question 11*

In part (a)(i), most candidates wrote out the correct inequality. However, many proceeded to solve it as an equation, giving  $x = 8$  and disregarding the inequality sign. In part (a)(ii), the most common incorrect answers were 8 and 8.1.

In part (b), The majority of candidates correctly formed the equation  $xy = 600$ . However, when interpreting the constraint that 80 m of fencing was used; many gave the incorrect response  $2x + 2y = 80$ . This part also involved the simultaneous solution of a hyperbolic and a linear equation. Some proceeded through trial and error. Such candidates typically found only one solution set. Many others proceeded to eliminate one of the unknowns. Candidates who used the substitution  $x = \frac{600}{y}$  or  $y = \frac{600}{x}$  often struggled more when forming the quadratic equation. Most chose to solve the resulting quadratic using the quadratic formula rather than by factorisation. A good number of candidates managed a fully correct solution using one of these methods. There were however cases, even when both solution sets were found, where candidates omitted the pair  $x = 20, y = 30$ . Presumably they did so because the diagram shows  $x$  to be bigger than  $y$ . When teaching, it is useful to help candidates appreciate that figures involving unknown quantities can never be drawn to scale.

### **Chairperson**

### **Examiners Panel 2025**