IMTA observations on Certificate Maths Papers 2024

The IMTA welcomes enthusiastically the very fair, balanced and student-friendly State Examinations in Mathematics for 2024.

The overall feeling was that almost all papers were very fair with well 'scaffolded' questions to build confidence in the student as they worked through the papers.

There was also enough difficulty to differentiate between students of different abilities in all papers.

Observations on each paper now follows.

TS GL	Reasonably fair paper. Would certainly challenge the traditional Foundation Level student in places so hopefully there will be a lot of front-loading of marks in many places. • Q2b was same as on HL paper – is it ok that questions can be deemed suitable for two different levels? • Q3 - Sets question just as difficult as HL • Q4(c) tricky for JCOL to get units right in km/hr. • Q8(a) - No units in the Key • Q8(b)(iv) was very challenging at this level; more appropriate for HL? • Not enough space to answer Q9(a) as most students would draw the T shaped net for that and you have to go outside the grid provided. • Q10b could have done with a table for the students to use. The question would challenge most JC HL students. • Nice that Algebra question was left until the end. Overall it was a fair paper that most students should be able to do well, even if they were traditional 'Foundation Level' students. It was also challenging enough that it should separate the best from the rest too.
TS AL	Overall a very well put together paper. Timing was appropriate also. Very clear instructions given. Diagrams / graphs very clear. Some parts of questions more challenging that others, but that is to be expected at HL. Students and teachers seemed happy with the paper. Generally, a well-received paper. • Q2 (e) : usually asked for the median interval when given a grouped frequency table. Assume pretty much any value in the range 240-320 would have to be accepted? Q6 : what degree of accuracy is required for the net? • Assume no workings required for Q7(c) if they just get there by trial and error with calculator. • Q9 (b) (ii) : two separate boxes should been included here as two separate questions asked.

ATF (LCA)	Fair paper – in line with previous years. Questions relevant to course specification and to students' lives. Images used were appropriate and layout of paper was generally clear with enough space for student work. Language was generally clear. • Q1 c) "private room" may cause some students trouble. They may interpret this as separate rooms for sub groups e.g. students, teachers etc. Allowance should be made for different interpretations in the marking scheme. • Q3 a) Although correct, the term "rectangular solid" may confuse some students. • Q4 b) (i) How will it be marked if a student allows for grout between tiles? • Q5 a)Some students might think that the "é" in "Sinéad" will be charged as two letters. Allowance should be made for this in the marking scheme. • There were a couple of sections (2b, 3c, 4bi and 6d) that will challenge the more able students but the questions were generally accessible. • Good scaffolding in places where appropriate e.g. 5c
AT BL	Overall a fair and well received paper with familiar type questions and no surprises. With preparation, students should have been comfortable and happy with the paper. Perhaps a little 'wordy' for this level.
AT GL P1	General overiew is that the paper was fair. It was a quite financial/arithmetic heavy. Students came out of the paper feeling confident and happy with Paper 1. Tables/information that was needed on multiple pages seemed to be repeated on the relevant pages. Questions seemed scaffolded for students, hopefully students will still get appropriate low partial credits when just successfully completing/writting down the scaffolded part. • Q2(i) will $z_2 = 2i$ suffice or does it need to be 0+2i? • Q2(c) is good in that it tests their understanding of conjugate but gives OL students the actual value of w, making it easier for them to decide where the conjugate would be. • Q3(c) If students write y in terms of x or x in terms of y it should be considered WOM. • Q4(c)(ii) Students may replace 128 with 2^7 or the other common approach would be to use rules of indices to split the 2^{4x+1} into $2^{4x}(2^1)$ which should also be considered WOM. • Q5(c) Students are typically not used to getting the deriveative of a linear function by finding the slope of it and so will likely score poorly in this part. • Q6(a) The scale of the y-axis could have been bigger to allow students to estimate the value of the function more accurately, k(2.5) is very close to 6. • Q6(b) Students will have found mapping these values to the graph on the previous page difficult. They would have likely found it difficult to decide on a "h" value for the trapezoidal rule. However, it is good that in ii they remind the students of what the estimate using the trapezoidal rule is meant to be so they can use this in the percentage error. If students got a different

	answer in (i) will they get full marks if they use this along with the actual value of 31.8 to calculate the percentage error? • Q7(a) y-axis scale of diagram not exactly correct with grid in background. 2 on y-axis sits too low relative to the grid. • Q7(a)(v) OL studnets are not used to interpreting rates of change/derivatives in context Qs. Wide variety of answers possible here "The number of bacteria 4 hours after the start of the experiment is increasing at a rate of 6000 bacteria per hour" or "The rate of change of bacteria at 4 hours is 6000" or "The instantaneous rate of change of bacteria 4 hours after the experiment started is 6000". • Q7(b)(ii) The word pattern here would be confusing to students, as they are not used to seeing T_n for Geometric patterns as forming T_n is not on the LCOL syllabus. Therefore they would not recognise this as a geometric pattern. If the Q wants students to identify that it is geometric, maybe having the three values in a table would have been better. Is the continuing the pattern method finding the common ratio and multiplying by it each time, whereas the otherwise method would be substituting in various n values. LCOL do not have logs and therefore could not solve the relevant equation using them. • Q8(iii) LCOL students can struggle with the term indefinitely. LCHL students tend to be familiar with it due to indefinite integrals and limits etc., whereas LCOL do not have these. Language could have been made more accessible by having "forever" in a bracket after the word. • Q8(b)(iv) Sn should be accepted either fully mupliplied out or leaving n/2 outside bracket and simplifying inside the bracket. • Q9(d) The formula is given without a dependent variable/function name on the left side. This could make (i) more difficult for some students. • Q10(a)(i) A very easy question. Although extremely basic, some students who are used to using percentages with income tax could be thrown by such a simple question and not realise it is just subtraction. This would be the weaker cohort though. • Q10(b)(i) This is conceptually difficult for students to understand that at a certain income someone would pay no tax due to the tax credits being larger than the income tax. Students are so familiar with calculating tax that has a positive tax payable and therefore may find this Q difficult to start as they may not recognise that when gross tax <= tax credits you pay no tax. • Q10(b)(iv) This is challenging conceptually for students as they are not given a specific value for the income. They must first understand that the €2000 was at 40% is now at 20%. Students may approach this by choosing an income over 42,000 and calculating the tax in both scenarios and then subtracting the income tax to see the reduction in tax. This should be considered a valid apprach as the wording of the question implies that any gross income over 42,000 has the same tax savings.

AT GL P2	Very fair and balanced paper. Q2(c) & (d) **Dependent events are NOT on the syllabus.** Q3 (b) is a bit unclear. If colour could be used it would clear up a lot of things. Q4 (c) was a good question to test understanding. Q7(a) (iv) may have been close to 0.9 or 0.3 – hard to tell without calculating it. The graph doesn't overly give an impression of being almost close to 1 given the scale used. Q9(a)(i) language issue – why not say 'and **one** container' instead of 'and either a cone or a tub'? Would have been consistent with rest of language used in question. Context and applications questions were unique and fun. A wide variety of skills were needed throughout both OL papers and should separate the results of students clearly.
AT AL P1	**General Sentiment** • Relief that the paper was much easier than P1 from 2023. • Mixed feelings about the overall difficulty, with some finding it too easy and others struggling with specific parts. • Request for fairness in marking, especially given the varied difficulty perceptions. • Appreciation for certain well-constructed questions, but disappointment with the lack of expected topics like proofs. • Some groups were told about the typo in Q8 b but seemingly not all groups were told. **Positive Feedback** • Many students found the paper fair and accessible. • Hints in the exam were appreciated by many students, but some felt they weren't needed. • Students liked the variety of questions and the ability to verify answers. • Students were delighted to see differentiation by first principles on the paper. **Concerns and Issues** • **Difficulty Balance:** Some found the paper too easy, fearing harsh marking, while others found certain parts disproportionately hard (e.g. complex numbers, sequences &series). • **Mark Allocation Clarity:** Lack of clarity on the marks for each part of the question causes confusion as to now much effort should be put into certain questions. • **Question Wording:** Many found the wording of questions confusing, abstract, or misleading, particularly in long questions and financial maths. • **Time Management:** Some questions were perceived as too lengthy or wordy, causing time management issues. • **Integration and Differentiation:** Strong emphasis on calculus topics, with less coverage on other typical Paper 1 subjects like logarithms and proofs. • **Practical Errors:** Issues with instructions, ambiguous hints, and a typo in the paper were problematic.

- **Tick-the-Box and True/False Questions:** Seen as unfair and overly simplistic, making it possible to guess correctly without understanding.
- **Unfamiliar question types:** Some students were unfamiliar with the idea of justifying their answers and they found that aspect difficult.

Specific Requests

- Reduce marks for overly confusing or vague questions.
- Ensure clearer wording and instructions in future exams.
- Balance difficulty across both Paper 1 and Paper 2 to avoid drastic differences.
- Allow for generous partial credit to accommodate a range of student abilities.
- Maintain a variety of topics to ensure comprehensive assessment.

Q1 While students were happy with (a) and (b) many students struggled to solve the simultaneous equations in part c

Q2 Some students found the (a) part and the (c)(ii) part difficult

Q3 Some students found the part (c) part difficult
Q4 Everyone was happy with the first principles question. Some students found the part (c) part confusing

Q5 Some students found this question to be unusual and abstract and couldn't figure out part (c)

Q6 Many students found b (iii) difficult and some people didn't understand b(ii)

Q7 While part (a) was JC question, if students hadn't seen it before they found it confusing. The wording was poor in part (b) because a student could interpret that both Fiadh and her partner could have made individual payments or a joint payment.

Q8 Long Question, abstract at times

Q9 Many students found part (e) to be difficult

Also litres asked for in cm^3. If students didn't know it, they were in bother.

Q10 Some students found the level of abstraction and the amount of English to be a challenge. Some students didn't know what Axial symmetry meant.

Teachers expressed that there should not be a 'yo-yo' in the levels of difficultly from year to year. Papers should be 'pitched' at the same level of difficulty each year.
Students were able to show their knowledge in what the practiced in class due to the way the questions were 'staggered'.
Students were able to get 'marks on the board' in the early parts of questions.

	Having a '**choice'** in the examination must be retained in **all LC papers.**
AT AL P2	Overall, this was a very fair, clear, straightforward, carefully laid out and ***helpful*** paper. Students who had studied their maths course had every opportunity to do well with this paper. Explanations were given for many parts of questions to minimize any possible confusion of wording. Prompts and hints were given in many questions also. This will have assisted some students in starting a question to then progress further. The short questions were well defined and confined mostly by single topics – students would have been happy to see this in their choice of options. Statistics, probability, trigonometry, geometry, circle, line and probability. The choice and layout of the long questions was well considered. Students could play to their strengths: statistics/probability, geometry with area & volume, co-ordinate geometry, or a mix of trigonometry and probability. No radians were used on the paper, thus minimizing the opportunity for confusion between changing from degrees to radians and back. Students should have little to complain about after this exam. • **Q2 (a) and (c)** students were 'well led' into the answer. • **Q5.** Nice question and 'well practiced'. • **Q7 (c)** too much text. • **(d)** Question too vague and confusing in what merits the marks in 'Conclusion and reason for your conclusion'. • **Q8 (b)** 'Use Pythagoras Theorem' was a welcomed initiative and should be continued. • **(c) '**Using the similar triangles…' was a great guide and a positive development in both papers. • **Q9** Diagram was misleading. Is it a circle??? • **(c)** 'It might be useful…..' positive guidance. • **(d)** Use of 'Remember' a positive initiative. • **Q10 (a)** too much text and puts students 'off' question'. • **(iii)** again, use of 'remember' is positive.