IMTA observations on Certificate Maths papers 2018

Preamble

- The IMTA feel that the certificate examinations in mathematics were well received this year and the majority of teachers and students are satisfied with the standard of assessment now that the examinations have concluded. The following points have been raised by several of our branches and we feel that they are worth of attention.
- In relation to the Leaving Cert. Higher Level examinations, any student who struggled with sequences and series was going to suffer repeatedly as a large number of questions included this material. The material in question 5 (b) of paper 1 is not strictly included in the syllabus and might have contributed to confusion for students sitting the paper. There was disappointment expressed that there was only one question in relation to the line and the circle in paper 2.It was felt that questions 8 and 9 in paper 2 were unfairly difficult and did not give a true reflection of the course. Students are also concerned that topics like financial maths and sequences can appear unexpectedly in paper 2.
- Both Ordinary Level papers at Leaving Certificate were well received by students with some issues reported with the wording in paper 2.The Foundation Level paper was a well-rounded paper that offered students plenty of opportunities to demonstrate their ability.
- For the Junior Certificate, all the papers were generally well received by students that sat them. It was reported that Higher Level paper 1 was well structured and nicely balanced. In contrast, paper 2 contained some extremely challenging material. The IMTA welcomes the improvements brought about in Ordinary Level paper 2 which we believe was well structured and assisted students with material that they find quite daunting.
- The presentation of the examinations is of a high quality but caution should be exercised when presenting diagrams without a scale. It is again extremely welcome to see questions incorporate the use of emboldened words and efforts being made to guide students to answer to the best of their ability.

	Paper 1 Higher – Leaving Cert
	• It was felt that this was a fair paper, although the presentation of certain topics caused confusion for some and they struggled to start questions . • Pupils felt that they had sufficient time but some candidates were under pressure to complete later parts due to the fact that they mismanaged their time working on the sequences in Question 5 and several did not complete the final page. • Questions 1, 2 and 3 from part A were straightforward, testing a range of skills. • For Question 4, students were disappointed that the theorem was asked rather than being able to demonstrate their skills with complex numbers. Many were unable to resolve the trigonometric identities that result at the end of the proof. They were happier with part (b). • In Question 5, students felt that they couldn't progress past part (b). • The weakest candidates struggled with Question 6 and were uncertain how to get the required area. • Section B was more challenging in terms of appearance but fair. • The balanced division of marks for Section B (55, 40, 55) is welcomed. • It should be noted that while students were reminded that the question continued on the next page, many candidates failed to turn the page because of the gap between the instruction and the end of the question. This resulted in them not completing the question which will have an impact on their marks. • Students need to be comfortable with sequences and series, appearing in several parts.
1	Fair question, should be accessible to most candidates.
2	Fair question, should be accessible to most candidates.
3	Fair question, should be accessible to most candidates.
4	Weakest candidates struggled with the theorem. More success experienced with part (b)
5	Students have reported being confused by part (b).
6	Fair question, should be accessible to most candidates. The weakest did not know how to get the area that was required.
7	Fair question, should be accessible to most candidates.
8	Students found the constant at the beginning a bit off-putting/intimidating. We would expect there to be issues with dealing with this throughout the rest of the question.
9	It is likely that parts (c) (ii) & (d) (iii) will have caused diffulty for students as they are unusual limits to consider. We would ask for the marking to reflect this. Some students got zero in (c) (ii) and felt that this was incorrect given the wording of the question.

Paper 2 Higher – Leaving Cert	
• Students felt that this was a more approachable paper than paper 1, with the more able students worried about the most difficult parts. • The language was, by and large, very accessible for students and little ambiguity encountered. • No complaints about time management were reported but many were unable to complete the final question. • Division of Section B marks (50, 60, 40) is welcomed but 60 is the absolute maximum allocation.	
1	Nice standard question, even if a rather high entry fee of €2000 to a competition – however it is acknowledged that this made numbers easier to manage and it proved to be a nice opener to the paper.
2	Fair question, should be accessible to most candidates.
3	(a) Fair question, should be accessible to most candidates. (b) This was quite familiar from the older syllabus, current students might have encountered some difficulty however if they understood the theory behind factorial notation it would have caused no problems.
4	Fair question, should be accessible to most candidates.
5	(a) Fair question, should be accessible to most candidates. (b) This part requires a lot of thought, if the students approach it as point of intersection of two lines then it is quite straight forward. It is likely that a lot of difficulty will be encountered for those working with the perpendicular distance formula here (c) There is a presumption that students saw the connection to the previous parts here – they may not realise that A, B, m and n are all the same from parts (a) and (b). It would have been helpful if part (b) asked for them to show that B is $(6,13)$ and this would enable them to work more easily on part (c).
6	Fair question, should be accessible to most candidates that prepared for it.
7	Fair question, should be accessible to most candidates. Part (d) does involve awkward calculations but it is acknowledged that this will allow for differentiation of candidates.
8	Unusual combination of topics but parts should prove to be accessible for students.
9	It is predicted that this will have caused lots of issues for students with many leaving the final page of the paper blank. Those that persevered and tried basic trig skills on question (a) should be rewarded.

Paper 1 Ordinary – Leaving Cert	
• It was felt that this paper was well received with appropriate scaffolding to reflect the cohort of students now taking this option. • The overall impression from students is that it was a nice, fair paper. • Overall, there was little ambiguity encountered and little confusion reported.	
1	(c) Weaker students will find it difficult to form an equation to solve for the required answer.
2	(a) In this part, it is likely that some students could miss z3 entirely. In the question it stated that z3 = z1- z2 (b) Consideration should be given to awarding the correct answer NO full marks. Candidates were not asked to justify or explain their answers. (c) The question requires the answer in the form a+bi, students shouldnot be penalised too much for giving answer as –i. Weaker students will not think to write answer as 0 – i.
3	Fair question, should be accessible to most candidates.
4	(a) some students may miss this part of the question and go straight to filling in the table. (b) It is hoped that students do not need to shade the 25 tiles grey and keep 2 white tiles to be awarded full credit.
5	In the question it would help students if the full function $f(x) = -x^2 + x + 6$ was written – for students looking back when answering part (c). (a) – It is felt that point A is not very clear on diagram. (b) Weaker students will struggle with this aspect of the question. (c) Giving the answer is likely to confuse weaker students.
6	Fair question, should be accessible to most candidates.
7	In the diagram – labelling the parts as row 1, row 2, row 3 would have helped weaker students The diagram would have been better if it was inverted. (a) – (d) could be answered using logic, list out the rows and number of seats, full credit should be awarded for this method. If students used formulae – there was not enough room given to answer part (d) For parts (d) and (f) it is hoped that students do not have to write their answer in the spaces provided, in order to earn full marks.
8	(e) – The term "rate" is beyond the remit of weaker students if the question had said find C'(t) they would have been able to answer it. It would have been possible to test their understanding of the phrase "rate" in another way or at the end of the section – not at the very start. (e) (ii), (iii) and (iv) needed to use the answer to (i) – weaker students will have left this part blank. If students found C'(t) in any of these parts, they should get marks for (e) (i).
9	Fair question, should be accessible to most candidates.

Paper 2 Ordinary – Leaving Cert	
• A paper which allowed all students to be challenged. The weak student will get to use formulae in the earlier parts of questions and the students aiming for an O1 will find the final part of most questions a challenge.	
1	It was felt that part (a) was a nice start for students. Introduction of the word "or" would help for part (b). Some students reported difficulty comprehending what was required in part (b) due to the wording.
2	It is welcomed that students will get to use formulae in parts (a), (b) and (c). Part (d) is challenging in that no identification was given for where S was on the diagram given. Students will struggle with the language of this question.
3	It is to be lauded that assistance was given to fill in probabilities for weaker student.
4	Part (d) will challenge students and likely only be attempted successfully by the most able candidates.
5	It was felt that the language in part (b) (ii) caused confusion for students.
6	Fair question, should be accessible to most candidates.
7	A fair question overall, which should be accessible to most candidates. However, explaining (f) (ii) was problematic.
8	Fair question, should be accessible to most candidates. It is noted that all the parts are connected which could be an issue for those that encounter difficulty with parts (a) or (b).
9	Part (a) (iii) was very difficult to understand for students. The Inferential Statistics was very well structured.

Foundation – Leaving Cert
• A very accessible paper that suited students of this level. • The format of the paper suits the candidates at this level. • However it was felt that this paper of a more difficult standard when compared to previous years.

Paper 1 Higher – Junior Cert	
• This paper was quite algebra and functions heavy however it is felt that the paper captured most of the concepts in Strands 3, 4, and 5. • A different level of depth was seen in this paper than in previous years due to the presence of several real-life problems. • Overall it is felt that there is balance in terms of the difficulty presented in the paper.	
1	Part (b) presented the question in a slightly different way than usual with the possibility for a very high number of answers.
2	For part (c), the phrase 'overall average speed' might have saved confusion.
3	The weakest tudents may have been confused by being asked to round to the nearest 'cent' which they may associate solely with Euro.
4	Students would not have expected so many null sets. Perhaps an extension question to label the four null sets would have put students' minds at ease while not simplifying the question.
5	Part (c) required some rearrangement but should have been accessible for most students.
6	Part (c) required students to solve and interpret an exponential inequality, the exact same question appeared on LCHL this year. It is hoped that full marks would be awarded for any relevant attempt. For part (e), an example of this could have been given. It is felt that parts (f) and (g) will have caused difficutites.
7	This question was poorly structured, especially in relation to part (b). It is suggested that high partial credit be awarded for the writing out of a number of terms.
8	Fair question, should be accessible to most candidates.
9	Fair question, should be accessible to most candidates.
10	A table in part (b) could have been beneficial. The term 'balance' for the bands may not be understood by candidates.
11	Multiple answers are possible for (ii) N and Z. It is recommended to accept one or other or both.
12	There is some question as to whether part (a) is actually on the syllabus in this format. It is anticipated that part (b) will be poorly answered. It is recommended that full marks be awarded for stating that..... ( )^2 > 0 and 24x > 0 for all positive values of x therefore always positive.
13	A difficult question which required abstract thinking. For part (b) the use of a Venn diagram or words should be eligible for full marks
14	A lot of students reported that they struggled with part (b) due to the way it was presented with no numbers.

Paper 2 Higher – Junior Cert	
• This paper was better received than paper 1. • Some confusion over the wording and language reported by students. • It was felt that this was a fair paper.	
1	This was a very accessible question for all students to settle into the paper.
2	The construction was doable. Part (b). Some students will struggle with this question as it deals with fractions – the question asks to show all workings which may put very good students off as they will be able to come up with the answer by seeing the rectangle.
3	Part (c) Asking for the length of the arc would caused difficulty for some students.
4	Part (d) (i) time consuming if students did not realise the was a fundamental principle of counting question. Part (d) (ii) student may have found this difficult depending on how they answered part (i).
5	For part (b) the syllabus states that students should be able to 'draw conclusions from graphical and numerical summeries of data recoginising assumptions and limitations. It is felt that part (b) will be answered using guesswork whie part (c) will be poorly attempted. It is suggested that more marks should be given to part (a) and a general answer be accepted for part (c).
6	In part (e) the intervals are not equal. This has the potential to confuse weaker students. Part (f) is felt to be a poorly worded question. 'as accurately as you can' is open for interpretation. This question should be given full credit for finding the median interval. Likely to have many different answers.
7	For part (a) (ii) It was beneficial that students were informed that they did not need to simplify their answer. Very fair and would save good students time trying to give their answer in the form ax+by+c=0. In (b) (ii) Students who solve simultaneous equations using manipulation would have an advantage here.
8	It is felt that this question will be poorly answered. Perhaps asking the student to find the equation of the line given the information would have guided weaker students giving them an opportunity to achieve marks.
9	Fair question.
10	Changing everything into the same units has the potential to cause difficulty. It is felt that part (a) is both confusing and vague. It is recommended to accept trial and error here.
11	Fair question, very well structured.
12	For part (a) it might be best to just accept axial symmetry.
13	It is felt that part (b) would have caused difficulty for students of all level given the wording of the question. More guidance could have been given how to begin the question. It is hoped that this question will be marked generously.
14	'Give your answer in the form $\frac{3^p}{2}$, where $p \in Q$.' This would have caused confusion among some students. Five minutes was very little time to expect students to complete this question. Especially when it was the final question on the paper.

Paper 1 Ordinary – Junior Cert	
	• Students felt that this was a nice fair paper.
1	Part (b) word heavy
2	Fair question, should be accessible to most candidates.
3	Fair question, should be accessible to most candidates.
4	Part (b) could only be worked out from continuing the pattern. Part (d) could be confusing for students.
5	Fair question, should be accessible to most candidates.
6	Fair question, should be accessible to most candidates.
7	Third question that contains applied arithmetic.
8	Fair question, should be accessible to most candidates.
9	Part (b) would have caused problems
10	It is felt that students are likely to get N, Z and R mixed up, particularly when all in one question.
11	In part (b), students could have been asked to create an equation to assist with solving the question. It is recommended to give full credit for just an answer with no equation.
12	Part (c) – students felt that the presentation was unusual. The question was a simple law of indices but students would have been thrown by the phrasing of the question. It is recommended to allocate low marks here.
13	Fair question, should be accessible to most candidates.
14	Fair question, should be accessible to most candidates.
15	Part (c) was complicated. The quadratic already factorised may have been confusing to students.

Paper 2 Ordinary – Junior Cert	
	• Very well laid out paper. • Good structuring evident throughout questions.
1	Fair question, should be accessible to most candidates.
2	Fair question, should be accessible to most candidates.
3	Allowance should be made for separate or combined graphs.
4	Nice mix between Venn diagram and bar chart.
5	Fair question, should be accessible to most candidates.
6	Fair question, should be accessible to most candidates.
7	Nice mix in this question. Well put together.
8	Nice to see y=mx+c highlighted again for JC OL. (b) Steepest not generally used as terminology. (c) May calculate and forget to tick – full marks if answer is evident in calculations
9	(b) (ii) – it is recommended to accept protractor measured 90 Not stated that it is not to scale so may reproduce exact shape with corresponding measurements.
10	It is suggested that just writing down 4m would be accepted for full marks.

Foundation – Ordinary Level Junior Cert	
• A very accessible paper that suited students of this level. • Students reported being content upon emerging from the examination.	
1	Fair question, should be accessible to most candidates.
2	Fair question, should be accessible to most candidates.
3	Fair question, should be accessible to most candidates.
4	Fair question, should be accessible to most candidates.
5	In part (c), it is felt that giving the answer to the nearest 5c would be difficult for students. It is recommended to give high partial credit for the answer 197.
6	Fair question, should be accessible to most candidates.
7	Fair question, should be accessible to most candidates.
8	Allow for a wide range of values as students not used to seeing graphs like this.
9	Fair question, should be accessible to most candidates.
10	Fair question, should be accessible to most candidates.
11	Fair question, should be accessible to most candidates.
12	It was felt that the overall difficult of this question was beyond the capabilities of students at this level.
13	It was felt that part (e) was too difficult for students of this level.
14	Fair question, should be accessible to most candidates.