

Leaving Cert Maths Higher 2001

Paper 1:

8 questions Attempt 6. Each question will in general be divided into three sections a,b,c. The marks are as follows (a)10 marks(b) 20 marks (c)20 marks. Part (a) is usually relatively easy and it should be possible to do this part in no more than **three or four lines (time at most 5 minutes).**

Part (b) may be divided into 2 parts it will generally a **procedure** i.e. a set piece of Maths like a proof Ex (1995)Prove $\sin 3x = 3\sin x - 4\sin^3 x$ or (95)Ex

Show $\frac{2}{n(n+2)} = \frac{1}{n} - \frac{1}{n+2}$ or EX95 Find x if $\frac{1}{\sqrt{3}}\sin x = \cos \frac{x}{2}$ You can see from the above

examples that they all are something that you have seen already. So to prepare for this section

(a) learn your proofs or at least learn the proofs on the topics you intend to answer questions on. The section will be marked as follows 20 marks for a correct answer; if the answer is incorrect you will lose three marks for each mistake (same mistake is never penalised twice). It is interesting to note that on the 1995 paper Q2b (i) received 20 marks while 2b(ii) received 5 marks, (2a) received 15 marks the reason for this was that 2c was said to be "too difficult" This happened again in Q5 where 5a received 15 marks 5b 20 marks again 5c was a bit unusual. In 6c they only gave 5 marks for the proof of the product rule. In question 7 the pattern was repeated, the difficult bit 7c(i) received only 5 marks. The pattern on the second 95 paper was more consistent and most questions were marked 10,20,20, In '96 and '97, 98,99 the marking scheme was more consistent at **10,20,20**, The general impression is that if part A contains **2 parts** then part **A will be worth 10 - 15 marks!**

For students hoping to get a C or pass the paper it is obvious that they can avoid the really difficult bits and get the result they want. Those hoping for an A1 will have to do some of the difficult bits but must keep in mind just how many marks they are worth.

Part c:

This section will definitely be the most difficult part of each question and may contain something that you may not have seen before Ex

$\frac{1}{(1+r)^n} \leq \frac{1}{1+nr}$ the deduce bit of this question seems

To be awarded no marks. It is worth noting that the part C's on paper 1 seem to be more difficult

Than those on paper 2 which seem to be more mainstream maths. This was especially obvious on the,99

Points to Note for 2001

Paper 1 :

Questions 1 and 2 : The following all look likely (i)**Factor Theorem**. (ii) Solving a linear and a quadratic simultaneously, (iii) A question on Indices (iv) a question on the properties of the roots of quadratic equations

$\alpha + \beta = \frac{-b}{a}, \alpha\beta = \frac{c}{a}, \alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta \dots \alpha^3 + \beta^3 = \frac{-b}{a}(\alpha + \beta) + \frac{c}{a}, \alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$ Inequalities

of the form $\frac{5-x}{x-2} \leq 1, x \neq 2$. and problems on absolute values $y \leq 3 - |x|, y \geq 0$. **Not**

asked since 96 when there was a near riot at the marking conference !There were a lot of inequalities on the 1995 paper, four on paper 1 there were none on the 94 what this means one cannot be sure but , I think it would be a good idea to get in a bit of practice on inequalities . check what was asked in 1999 and 1998.The inequality (which was based on a perfect square) asked in ,98 and ,99 could be asked again this year **see inequalities on web site** .Also an index equation was asked in 2(b),99, and 4(b)'98.

Question 3 Matrices and Complex numbers ; The matrix part can only be straightforward expect something on an inverse . The complex number bit may involve solving a quadratic ,and using DeMoivres theorem .This question has been upgraded since '98 be careful !

Questions 4 . Question 4 last year was really about Series , Binomial,AP/GP and even a part had an association with the Binomial Coefficients It is important to note that the end part of 4c was worth very little.

There is plenty of scope to ask questions on the general term $T_{r+1} = {}^n C_r ca^{n-r} x^r$

Question 5 : Arithmetic/Geometric Series,Logs/Index equations and Induction . I expect a Sum of a series maybe $\sum n^2$ or an "is a multiple of "to appear . Induction has featured prominently in this question is generally worth 20 marks . Note in ,97 there was an inequality asked .The format for '98 and '99 **was Binomial,Logs,Induction** .

Question 6 : Differential Calculus Product /Quotient/Chain Rules . Expect a rate of change problem in part C . Know how to find dy/dx of x^x . Part c in ,97 was tricky but the good news you got 10 marks for the dy/dx bit . Part © in 1999 required plenty of thought ! They seem to be using this question as a grader ie to separate the A's from the B's (because everybody does this question)

Question 7: Differentiation from first principals don't forget $y = \sin x$. , $y = x^3$ came up in ,97 Implicit functions/Parametric differentiation Newton Raphson . Again the part c of this in ,97 was difficult but again it was marked **10,10**.

Question 8 : Integration : some basic integrals plus Areas by integration and volumes of rotation note the only volumes you can be asked to find are Cones Hemispheres and spheres .

Proofs asked so far on Paper 1 .

2000 1(b) The Factor theorem, 3(c) Prove $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$, 5(b) prove by induction $n! > 2^n, n \in N, n \geq 4$ (6)b Prove from first

principals $\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$

1999 5© $\sum n^2 = \frac{n(2n+1)(n+1)}{6}$ by induction,6(b) $y = \sin x$ from first principals.

1998(5c) a version of $(1+x)^n$ by induction.

1997(1b) The Factor theorem, (6b) $y = x^3$ from first principles

1996(5c) Show by induction $y = x^n, \Rightarrow \frac{dy}{dx} = nx^{n-1}$.

1995(6c) Prove the product rule from first Principles, $y = u.v \Rightarrow \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$
(see the ΔX method on the website)

1994(5b) Show by induction that $2^{3n-1} + 3$ is divisible by 7. (7a) If

$y = \frac{1}{x} \Rightarrow \frac{dy}{dx} = -\frac{1}{x^2}$ from first principles.

I do not like to give tips but first principles seems to be popular with the examiners the ones that have not been asked so far are $y = \cos x$,

$y = \sqrt{x} \dots y = \frac{u}{v}$.

Last year many students made a total mess of Question 7 c it might get another run this year in a more simple form Question 8 for the last two years has had a difficult part c it would be a good idea to have a question in reserve just in case this goes badly for you !.

Since most students do Questions 1,2,3,6,7,8, these questions are often used to sort out the A grades from the B grades notice that the most difficult part c's have been in the six most popular questions !. For the moment the two easiest questions on the first paper are questions 4 and 5.

A couple of hours work on Questions 4 or 5 will bring great rewards.