

## Leaving Cert Ordinary Maths Paper 1

### Must Know File:

#### Question 1 Arithmetic

- (a) Must be able to find Compound Interest
- (b) Must be able to find the cost price when given the percentage profit.
- (c) Must be able to work out a persons take home pay if given their gross pay, tax credits and tax rates. Some textbooks may not have information on **Tax credits**.
- (d) Must be able to handle numbers written in Scientific notation.
- (e) Must be able to deal with % errors.
- (f) A knowledge of working with ratios is a must
- (g) **Bills/Money similar to 2009 but easier**

#### Question 2 Algebra:

This is the first of two questions on Algebra: (a) Must be able to solve an inequality (b) Must be able to solve simultaneous equations, either two linear equations or a **Linear and a quadratic**. (c) Must be able to write a given expression in index form, and solve an index equation. You **must know the rules of indices**. Perfect squares appeared in 2008.

#### Question 3: Algebra:

(a) Must be able to write one thing in terms of another (manipulation of formulae). (b) Must be able to **use the factor theorem i.e. to find the three roots of a cubic equation**. (c) Must be able to answer questions on the graph of a quadratic function (not asked for some time). Or given a quadratic function to find the coefficients of x and the independent term. The part c of this question can be quite varied.

**Be careful with questions 2 and 3 the part c's can be tricky**. They examine the entire algebra course over questions 2 and 3, if you are weak at maths or have done ord maths for Junior Cert there is a lot to learn.

#### Question 4: Complex Numbers (Nice question short Syllabus)

(a) Must be able to add, subtract, multiply, divide complex numbers, and find the modulus and the conjugate. (b) Must be able to solve a Quadratic Equation which has complex roots, (use the roots formula and don't forget that  $i = \sqrt{-1}$ ). (c) Must be able to plot Complex numbers on an Argand diagram. (d) Must be able to solve linear equations involving Complex numbers. (REALS = REALS, I = I)

#### Question 5: AP's and GP's: (Nice question short syllabus)

- (a) Must know the formulae for the  $T_n$  and  $S_n$  of an AP and be able to find a and d using simultaneous equations. (b) Must know that in all AP's  $T_2 - T_1 = T_3 - T_2 = d$ . (c) Must be able to find a and d if given  $S_n$ . (d) Must know the formulae for  $T_n$  and  $S_n$  of a GP. (e) Must know that in all GP's that  $T_2/T_1 = T_3/T_2 = r$ . Must be able to find a and r if given two terms of a GP. (this is the easiest question on paper 1)
- (b) 4 formulas to learn no tricky algebra nor a bad question

#### The three Calculus Questions

#### Question 6: Periodic Functions and Calculus

- (a) Must be able to find the period and range when given the graph of a function. (b) **Calculus** (i) Must be able to find the **Max and Min** of a cubic function. (c) **Graph** Must be able to sketch the

graph of the cubic function in part b for certain values of  $x$ . You will use the results of part b to help you draw your graph. (This can be a messy question). Questions based on the meaning of  $dy/dx$  can also be included such as slope of tangent

**Question 7: Calculus** : (a) Must be able to differentiate from first principals (first principals can appear in Q6 or Q8). (b) Must be able to use (i) the product (ii) The quotient (iii) The chain rules for differentiation. (It is often not necessary to simplify (tidy up) your answers (c) Must be able to deal with problems involving distance speed, and time using differential Calculus. **The same question has been asked here since 1994.**

**Question 8: Functions and Calculus** (a) Must be able to find  $f(x)$  given different values for  $x$ . (b) Must be able to solve equations of the form  $f(x) = a$ . (c) Must be able to sketch the graphs of functions of the type  $f(x) = 1/(x + 3)$ . A cubic function came up in 1999 this was a bit different.

**General Comment**

(a) Questions do not have to be done in any particular order, do the easiest questions first.

A good start is essential. (b) If your algebra is not good use **your calculator for all situations**

**involving minus signs, use the roots formula**  $\left(\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right)$  to solve quadratic equations. (c) It

is essential that you pick your questions carefully do your best question first. (d) **Know your formulae** and write them down as soon as you get into the exam hall .Do all graphs on graph paper and remember the best way to scale a graph is to use 10 small squares between each number on the X-axis and 5 between each number on the Y-axis. (e) Remember how the **marking scheme works (a, = 10 marks, b = 20 marks, c = 20 marks).** .

Also Correct Formula written down (3 marks), Formula filled in (4 marks) ,Formula worked out (3 marks) total 10 marks

All questions carry attempt marks, which are awarded for any step taken in the right direction. The attempt marks are usually 1/3 of the marks for the particular section. Errors are punished as follows -1 for a slip (a small arithmetical error) -3 for a blunder a more serious technical error .If an error is repeated in a question it is only punished once (you only lose 3 marks not 6). Graphs are marked as follows 2 marks for each correct couple and one mark for plotting the couple .In questions involving formula, the formula filled in correctly will get most of the marks. Diagrams are useful and may merit some marks if they show added information not given in the question and constitute a step in the right direction.

**Leaving Cert ordinary Level Paper 1**

**What Questions should I do?**

The Problem with Paper 1 is the **lack of” dead cert comes up every year type questions”** (except question 7). This suits nobody except some students who have dropped from higher maths. So what is the best approach? This depends really on your ability in Algebra.

**Read this next bit carefully it will help you decide which questions to choose**

**So how do you know if your algebra is good?**

Ask yourself can you Solve (1) Simultaneous equations i.e. equations of the form  $3x + 4y = 10$   
 $5x - 7y = 3$

(2) Quadratic Equations ie equations of the form  $3x^2 - x - 2 = 0$  and get the answer correct **every time** (using factors). Or you must use the roots formula

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  but get the correct result **every time**. The important words here are every time!

(3) Solve simultaneous equations of the form  $x - 3y = 10$   
 $x^2 + y^2 = 10$

(4) Solve equations of the form  $2x^3 + 3x^2 - 5x - 6 = 0$ .

If the answer is yes, to all 4 questions then Paper 1 will be no problem you should attempt the following questions for a best result Q2, Q3, Q4, Q5, Q7, Q6 and If you have time try Q1 and Q 8. I know most people will tell you to start with Q1, but I believe if you are good at Algebra flaunt it! Getting Q2 and Q3 done will give you great confidence to continue.

Ok if the answers to the 4 questions above are **yes** to (1) and (2) but **no or maybe** to (3) and (4). Then you should try the following approach. Do Q7 Differential Calculus (first) the format for this question has not changed in 8 years.

Do Q4 (complex numbers) next again very predictable. Try Q5 AP's and GP's) next very little knowledge required here.

So three down three to go, Q1 should be done next followed by Q2 and Q3, you will at least get the part a of these done

Advice on how to maximise your Marks!

- (1) Before going into your exam have a plan of which questions you are going to attempt and stick to it!

This means that these questions must have been practiced off the face of the Earth using previous exam papers it also means that if formulae are required you must know them! Use past papers 1995-2008 don't bother with the sample papers they are only there to make the books look bigger!

- (2) When you go into the exam write down the formulae you need for this paper (only necessary if you have a bad memory, but it does calm the nerves). Go straight to the first question you intend doing and read it carefully.

Now try part (a) it usually takes 2-3 minutes (time allocated is 5 minutes) and continue on with the questions you had planned to do. Start every question on a double page.

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Must Know File.

**Question 1 Volumes and Area**

(a) (i) Must be able to find the length of an arc and the area of a segment of a circle (ii) Must be able to find the area of a rectangle, surface area of a cube, area of a triangle (**part a is always about finding the area of an object**). (b) Must be able to use Simpsons rule in all situations ( **5 marks for writing down the formula** ). (c) Must be able to find the volume of a figure which may contain a cylinder, cone, sphere, hemisphere (formula for the hemisphere is not in the tables )

**Question 2 : The Line :**

(a)(i) **You must know all the formulae (3 marks for writing down the correct formula)!**

(ii) Must be able to find the slope of the line  $ax + by + c = 0$  (b) Must be able to find where a line cuts the axes. (c) Must be able to find the equation of a line perpendicular to a given line. (d) You must be able to find where two lines intersect (e) Must be able to use Symmetry and translations. (f) Must be able to find the area of a triangle, parallelogram. This Question is often divided into Questions based on **points**, Questions based on **lines**.

**Question 3: The Circle:**

(a) Must be able to find the centre and radius of  $x^2 + y^2 = r^2$ , show a point is on /not on the circle, find where this circle cuts the axes. (b) Must be able to find the points of intersection of  $ax + by + c = 0$  and  $x^2 + y^2 = r^2$ . (c) Must be able to find the equation of a tangent at  $(x_1, y_1)$  on  $x^2 + y^2 = r^2$  (**The Quick way is to use the formula  $xx_1 + yy_1 = r^2$** ). (d) Must be able to find the centre and radius of  $(x - a)^2 + (y - b)^2 = r^2$ . (e) Must be able to find the image of this circle by a translation or a central symmetry. (by the way the circle in the form  $x^2 + y^2 + 2gx + 2fy + c = 0$  is not on the course!) Note the tangent at a point on the circle  $(x - a)^2 + (y - b)^2 = r^2$  is officially not on the course but appeared in 2003/02 (see clarifications issued by the Dept which stated the fact)

**Question 4 : Geometry**

(a) Must know your 10 theorems (b) Must be able to find the image of a triangle by an enlargement. **I do not recommend this question.**

**Question 5 Trigonometry :**

(a) Must know how to find the length of an arc and area of a sector and to find the lengths of the sides of a right angled triangle. Using the definitions for Sine, Cos, and Tan and be able to use these results in the expressions for  $\sin(A+B)$ ,  $\cos(A+B)$  as given in page 9 of the maths tables **a question based on the right angled triangle has been asked every year since 1995!** (b) Must be able to use the **Sine Rule and the Cosine Rules** to solve a triangle (find the length of the sides and the measure of the angles). (c) Must be able to use your calculator to solve trigonometric equations ex If  $\cos X = -.5$  find two values of X between 0 and 360 degrees (has not been asked very often).

**Question 6 Probability /Permutations /Combinations .**

(a) Must know how to find the number of arrangements of n different things (i) all at a time (ii) r at a time. (b) Must know how to find the number of selections of n things r at a time  $C_r^n$ . (c) Must know the rules for probability (**the and or rules**). Nice question put a bit of work into this question

**Question 7: Statistics :**

(a) Must be able to find the mean and mode of a frequency table. (b) Must be able to find a weighted mean. (c) Must be able to draw a **Histogram** from a frequency table where the class intervals are unequal. (d) Must be able to complete a partially completed frequency table given a

Histogram .(e) Must be able to construct a cumulative frequency table ,draw an Ogive find the median and inter quartile range . (f) Must be able to answer questions on the ogive .(g)must be able to find the Standard Deviation .There is a great way for finding the standard deviation

### **The Options :**

#### **Question 8 Further Geometry :**

Questions based on the extra geometry theorems (only 4) best advice is to **avoid this question** unless you have done higher junior cert maths! .

#### **Question 9 : Vectors (best kept secret on the paper)**

(a)Must be able to add vectors using the triangle rule . (b) Must be able to write vectors in terms of two given vectors. (c) Must be able to deal with vectors written in terms of i and j . (the easiest option if explained well) Must be able to use the Scalar product (dot product) and be able to find the angle between to vectors using the dot product.

#### **Question 10 : The Binomial theorem /Further Sequences and Series .**

(a)Must be able to write out the Binomial expansion of  $(1+x)^n$  ,  $(1-x)^n$  ,  $n \leq 7$ ,  $n \in \mathbb{N}$  .

(b)Must know the formula for the sum to infinity of a GP . (c) Must be able to find the Amount of an investment when successive instalments are made .This part is really a combination of the Compound Interest formula and a GP(First two bits are easy the part c can be tricky)

#### **Question 11: Linear Programming** (Most popular option but not necessarily the easiest option)

(a) Must be able to sketch inequalities of the form  $3x + 4y < 12$  and name the inequalities in a given Diagram. (b) Must be able to solve problems on Linear programming . The good news is that the problem can only involve two lines and the two axes .Easy question but tends to take a long time

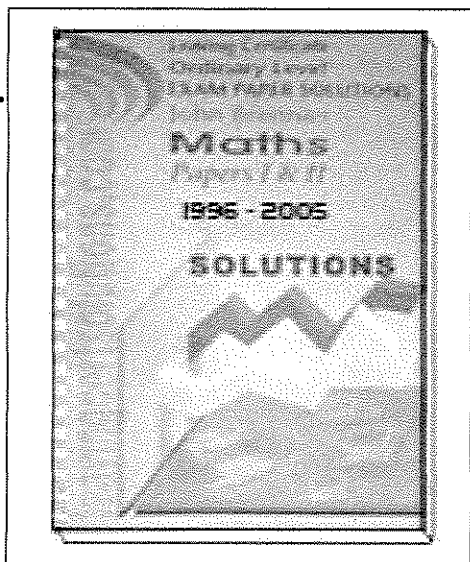
**(b) Best preparation for 2009 (1) Pick your questions! (2) practice your chosen topics in exam papers 2008,2007, 2006,2005, 2004,2003 2002 .**

**Best Option to do;Vectors** This option is the shortest of the four and some time put into this question will be very rewarding.

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