

MATHS (ordinary level – paper 2)

Must-Know File

Section A

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. (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) Practice using 2006, 2005, 2004

Question 2: The Line

(a) (i) **You must know all the formulae** (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 dived into Questions based on **points** (know your formulae), Questions based on **lines** (know the properties of lines) Practice 2006, 2005, 2004, be prepared to draw a diagram! See formulas notes in next section.

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) Practice using 2006, 2005, 2004

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 $\cos X = -0.5$ find two values of X between 0 and 360 degrees (has not been asked very often). Practice using 2006, 2005, 2004

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 practice using 2006, 2005, 2004, 2003

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. Practice 2006, 2005, 2004, 2003

The Options : Section B

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. Practice 2006-2000

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) lots of practice needed for part c!

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. Practice using 2006, 2005, 2004 watch out for the "clever" questions at the end of the question

Best approach to paper 2

Paper 2 has a much better choice of "dead cert" questions than paper 1 as a result your choice of questions really depends on what you regard as your favourite topics or least favourite topics.

So for many people that could mean answering questions in the following order

Q7 (statistics), **Q1** (area and volume), **Q2** (the line), **Q3** (the Circle), **Q5** (Trigonometry), + option.

(i) Always do your best question first!

(ii) Be prepared to draw lots of diagrams! **Q2, Q3, Q5, Q11**, (always use graph paper) use a pencil for all diagrams.

(iii) Your calculator will get a lot of use on this paper (Trigonometry and Statistics) make sure it is working properly do not change calculators before the exam.

(iv) You must attempt one question from section B

(v) If you have time do an extra question the examiner must correct all questions.