

Maths for the masses

There is no choice with paper one or two on the maths exam – you must answer all questions. So here's what you need to know and some sample questions and answers to get you well on the way to top marks

EXAM STRUCTURE

The exam consists of two papers with six questions on each paper. Students must attempt all six questions. There are a total of 300 marks per paper. Each question will be worth 50 marks and will be divided into three sections (a), (b), (c). The sections will be marked as follows:

- (a) 10 marks
- (b) 20marks
- (c) 20 marks.

The structure of the exam is similar to the Leaving Cert but unfortunately for Junior Cert students there is no choice. You must attempt all questions.

Junior Cert Higher Maths Paper 1

The layout is as follows.

Question one: Arithmetic

Percentages, profit and loss, currency calculations and income tax and tax credits calculations, compound interest and scientific notation, such as

Evaluate: $(6.3 \times 10^9) + (5.8 \times 10^{10})$.

Question two

This question will involve sets and a test as to how much you know about your calculator.

Example

Evaluate $\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06}\right)^2$

and the rules of indices, such as

Write $\frac{125^{\frac{1}{3}} x 5^2}{5^3 x 25^{\frac{5}{2}}}$ in the form 5^k

You will also be asked to give answers to a given number of decimal places or significant figures.

Surd problems such as

$\left(\sqrt{12} + \frac{1}{\sqrt{12}}\right)\left(\sqrt{12} - \frac{1}{\sqrt{12}}\right)$

can also be asked.

The calculator keys needed for this question are $y^x, a\%, \exp$

Question three: Algebra

This is the first of four algebra questions. You can be asked all of the following:

(i) To solve an equation such as

solve (i) $3(x-4) - 2(5x-3) = 8, \dots$ (ii) $\frac{2x-1}{3} + \frac{x+3}{2} = 5$

(ii) Write one thing in terms of another.

(iii) To factorise a given expression, such as:

(i) $ax + bx + ay + by, \dots$ (ii) $3xy - 10x - 10b + 3by$ (common factors)

(i) $6x^2 - 19x + 10, \dots$ (ii) $3x^2 + 8x - 3$. (quadratic expressions)

(i) $9x^2 - 64y^2, \dots$ (ii) $(2x-1)^2 - (x-1)^2$ (difference of 2 squares)

(iv) To solve a quadratic equation. For example,

solve (i) $3x^2 + 16x - 12 = 0, \dots$ (ii) $\frac{1}{2x-3} - \frac{1}{2x+3} = \frac{6}{7}$

(v) You will be asked to solve a quadratic equation

using the formula $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ and give your answer correct to a given number of decimal places.

Questions involving a change of variable often appear in question three.

Solve $3x^2 - 10x + 3 = 0$ hence solve $3\left(\frac{1}{t}\right)^2 - 10\left(\frac{1}{t}\right) + 3 = 0$

Question four: More algebra

The emphasis here may be on factors and a word problem involving a quadratic equation.

For example:

In a draw, the winners shared equally a prize of €120. If there had been 3 more winners, then each winner would have received €9 less.

(i) Taking x as the actual number of winners write an equation in x to represent the information.

(ii) Solve the equation to find x .

Inequalities such as (i) $3x + 2 \geq x - 4, \dots, x \in R$. (ii) $-9 \leq 2x - 5 < 7, x \in Z$ will also be included.

It is important to note that the content of questions three, four, five and six is interchangeable.

Question five: More algebra,

In this question you will be asked to draw the graph of a quadratic function and to answer questions based on the graph.

The graph equation may have to be derived from a diagram or some other information. Simultaneous equations are often asked in this question

Solve for x and y $x + 3y = 9$
 $4x + 3y = 18$

Word problems involving simultaneous equations can also appear in questions three, four or five.

For example:

Let the cost of an adult meal be € x and the cost of a meal for a child be € y . The cost of a meal for 3 adults and 2 children is €125.

The cost of a meal for 2 adults and 3 children is €115.

Write down two equations in x and y to represent the information,

Solve the equations to find the cost of an adult's meal and a child's meal.

Question 6: Even more algebra

This question will involve functions and function notation. You must be able to answer all of the following questions:

(i) Given $f : x \rightarrow 1 - 3x, g : x \rightarrow 1 - 2x^2$ find $f(-2), g(5), f(x+2)$

(ii) Given $f : x \rightarrow x^2 + bx + c$ if $f(-3) = 0, f(2) = 0$ find b and c .

(iii) Given $f : x \rightarrow x^2 + bx + c$ if the graph of this function contains the points (2,-6) and (0,6), find b and c .

Remember, you must attempt every question.