Guide to the Mathematics Aptitude Test

The MAT is an admissions test for candidates applying to study maths or computer science at Oxford University or maths at Imperial College London. It is a key pillar of your application, alongside predicted grades, your personal statement and interviews. It takes place in early November, after your UCAS application is sent off. The test is sat in college.

# Structure

The MAT is a 2 ½ hour long paper designed to test your skills as a mathematician. The content is taken from the AS-level pure syllabus, but the questions are asked in a more challenging style. There are 40 marks of multiple choice questions, followed by 4 written questions of 15 marks each. You cannot use calculators or formula sheets.

Generally speaking, candidates who are shortlisted for interview score 60 marks on average, and successful candidates score on average around 70. This does vary depending on the difficulty of the test, one year it was as low as 54/60. The MAT is not the only factor they consider, though, so scoring less than this is not a guarantee that you will not be successful, and vice versa.

# How to Prepare

The content of the MAT is entirely AS-level, so make sure that you are really confident with the material and memorize key formulae and identities. Other than that, it’s all about gaining experience in the style of questions. Try to start going through the specimen and past papers over summer, as once term starts there’s only two months before the test. Also, it can be useful to look at STEP papers, as although the question style is different, the level of difficulty is similar.

You can find past papers, mark schemes and more information here: <https://www.maths.ox.ac.uk/study-here/undergraduate-study/maths-admissions-test>

# Syllabus

•Polynomials: The quadratic formula. Completing the square. Discriminant. Factorisation. Factor Theorem. Remainder Theorem.

•Algebra: Simple simultaneous equations in one or two variables. Solution of simple inequalities. Binomial Theorem with positive whole exponent.

•Differentiation: Derivative of xa, including for fractional exponents. Derivative of a sum of functions. Tangents and normals to graphs. Turning points. Second order derivatives. Maxima and minima. Increasing and decreasing functions.

• Integration: Indefinite integration as the reverse of differentiation. Definite integrals and the signed areas they represent. Integration of xa (where a ≠ −1) and sums thereof. The trapezium rule and its use in estimating areas.

• Graphs: The graphs of quadratics and cubics. Graphs of sin x, cos x, tan x, √x, ax. Solving equations and inequalities with graphs.

• Logarithms and powers: Laws of logarithms and exponentials. Solution of the equation ax = b.

• Transformations: The relations between the graphs y = f (ax), y = af (x), y = f (x − a), y = f (x) + a and the graph of y = f (x).

• Geometry: Co-ordinate geometry and vectors in the plane. The equations of straight lines and circles. Basic properties of circles. Lengths of arcs of circles. Sine and cosine rules for triangles.

• Trigonometry: Radians. Solution of simple trigonometric equations. The identities tan x =sin x/cos x, sin2 x + cos2 x = 1, sin(π/2-x)= cosx. Periodicity of sine, cosine and tangent.

• Sequences and series: Sequences defined iteratively and by formulae. Arithmetic and geometric progressions. Their sums. Convergence condition for infinite geometric progressions.