

Core topics in Mathematics

Revision Guide

Algebra

I should be able to:

- Manipulate and simplify any fractions.
- Use laws of indices to simplify expressions.
- Re-arrange and solve simple equations.
- Factorise expressions.

Functions

I should be able to:

- Sketch linear, quadratic, exponential and logarithmic functions and plot them precisely using EXCEL.
- Determine the gradient and intercept of a straight line and thus write down its linear equation.
- Solve quadratic equations.
- Determine the quadratic function of a parabola.
- Apply laws of logarithms.
- Transpose and solve equations involving logs and exponential functions.

Trigonometry

I should be able to:

- Recognise and know the basic properties of sine, cosine and tangent waves.
- Apply Pythagoras' theorem and SOH-CAH-TOA trigonometry to determine angles and side lengths of right-angle triangles.

- Apply the sine and cosine rules to determine angles and side lengths of general triangles.
- Understand how parameters such as amplitude and angular frequency influence a general trigonometric function.
- Solve trigonometric equations with multiple solutions.

Differential Calculus

I should be able to:

- Evaluate basic derivatives.
- Utilise the chain rule, product rule and quotient rule to differentiate more complicated functions and understand when to select each of these three techniques.
- Understand how to apply differentiation to solve problems regarding rates of change.
- Use derivatives to locate all stationary points of a function.
- Use the second derivative test to classify stationary points.

Integral Calculus

I should be able to:

- Evaluate basic definite and indefinite integrals.
- Use integration by substitution to evaluate more complicated integrals.
- Use integration by parts to evaluate more complicated integrals.
- Identify when it is appropriate to use integration by parts or by substitution.
- Use definite integration to calculate the area enclosed between two curves.

Complex Numbers

I should be able to:

- Represent a given complex number as an Argand diagram.
- Convert between polar and Cartesian (rectangular) forms of complex numbers.

- Conduct complex number arithmetic (addition, subtraction, multiplication, division) in Cartesian form and determine the conjugate and real and imaginary parts of a complex number.
- Multiply and divide complex numbers in polar form.
- Solve quadratic equations using complex numbers.

Matrices

I should be able to:

- Identify the order of a matrix.
- Conduct matrix arithmetic (addition, subtraction, scalar and matrix multiplication) and understand when these operations are valid.
- Calculate the determinant and inverse of a matrix where appropriate.
- Use matrix methods to solve pairs of linear simultaneous equations.

Statistics

I should be able to:

- Use EXCEL to determine the mean, median and mode of a data set.
- Use EXCEL to determine the range, IQR and standard deviation of a data set.
- Interpret the meaning of these statistics.
- Represent a data set using a histogram or bar chart where appropriate.
- Fit simple models to a data set and evaluate the goodness-of-fit.