Maths

A level Mathematics is often thought of as a subject of complicated calculations. However, calculations form only a small part of this rigorous discipline which requires clear thinking and the development of specific ideas into generalised solutions.

On one hand A level Mathematics deals with highly abstract topics which require considerable imagination combined with the discipline of 'proof'. On the other hand mathematics underpins virtually all the practical developments in science, IT and economics which have formed our modern world.

A level Mathematics gives you the opportunity to study topics such as geometry, calculus and trigonometry (pure mathematics) and to use these ideas within the 'applied' topics such as mechanics and statistics.

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| **Task: Indices and surds**  You can apply the rules of indices and surds to simplify algebraic expressions. The following expressions can be simplified in **index form:**    Example 1    Simplify these expressions:   1. b. c. d. |

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| Roots can also be expressed using indices, such as the square root of is written as  In general:    Example 2    Evaluate each of these without a calculator:   1. b. c. d. |

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| Example 3    Write these expressions in simplified index form:  a. b. c. d. |

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| A **surd** is an irrational number involving a root, for example or .  You can multiply and divided using the rules:    You can simplify surds by finding square-number factors, for example = = 2. It may also be possible to simplify expressions involving surds by collecting like terms or by **rationalising the denominator**. Rationalising the denominator means rearranging the expression to remove any roots from the denominator.    Example 4 |

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| Simplify these expressions without using a calculator.  a. 3 b. c. d. |

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| 1. Evaluate each of these without using a calculator:   1. 5–1 |

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| 2. Simplify these expressions fully without using a calculator. |

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| 3. Simplify these expressions fully without using a calculator. |

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| 4. Expand the brackets and fully simplify each expression: |

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| 5. Write each of these expressions in simplified index form. |

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| **Task: Solving linear equations and rearranging formulae**  This topic recaps the **balance** method to solve problems involving linear equations, and both the **elimination** and **substitution** methods to solve linear simultaneous equations. You can solve linear equations and inequalities using the **balance** method where the same operation is applied to both sides.  Example 1    Solve the equation  Example 2    Solve the inequality |

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| When solving inequalities, remember that multiplying or dividing by a negative number will reverse the inequality sign. For example, 5 > 3 but −5 < −3  Equations and formulae can be rearranged using the same method as for solving equations.  Example 3    Rearrange to make the subject.  You can solve linear simultaneous equations using the **elimination** method, as shown in Example 4. The solutions to simultaneous equations give the point of intersection between the lines represented by the two equations.  Example 4 |

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| Solve the simultaneous equations  Calculator      The example shows you that the lines 5*x* − 4*y* =17 and 3*x* +8*y* = 5 intersect at the point  If you are given the equation of two lines where *y* is the subject then the easiest way to solve these simultaneously is to use the **substitution** method as shown in the next example.  Example 5 |

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| Find the point of intersection between the lines and  Calculator    1. Solve each of these linear equations. |

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| 2. Solve each of these linear equalities. |

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| 3. Rearrange each of these formulae to make the subject. |

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| 4. Use algebra to solve each of these pairs of simultaneous equations. |

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| 5. Use algebra to find the point of intersection between each pair of lines. |

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