UNIT A1

Recommended Prior Knowledge Familiarity with the ideas of using letters to represent unknown numbers.

Context This is a basic algebra unit for the start of the O level course. Much of this unit will be revision for some students. It enables an opportunity to check their prior knowledge and to move them forward at an appropriate pace.

Outline The basic algebraic processes of substitution, manipulation and solving simple linear equations are introduced.

	Learning Outcomes	Suggested Teaching Activities	Resources
22 23	Use letters to represent generalised numbers and express basic arithmetic processes algebraically, substitute numbers for words and letters in formulae Basic algebraic manipulation, simplifying algebraic expressions, manipulating directed numbers	Use word formulae representing practical situations, such as costs – substitute numbers into these, then show that the same situation can be represented generally using letters to represent the variables. Move on to substituting numbers into formulae. Simplify expressions such as $4a + 3b - 6a + 5b$, $4a \times 3b$. Introduce multiplication and division of directed numbers. Give students practice in using the four operations with positive and negative integers.	http://www.ex.ac.uk/cimt/mepres/allgcse/bka2.pdf has work on formulae http://www.ex.ac.uk/cimt/mepres/allgcse/bkb10.pdf has work on directed numbers, simplifying and simple equations
25	Solve simple linear equations in one unknown	Puzzles such as 'I think of a number, I multiply it by 2, then add 1; the answer is 7. What number did I think of?' can be used to introduce the ideas of inverse operations. Then represent the same situation by an equation, showing how to set out the algebraic solution. Formulae can be used again here, substituting a number this time for the subject of the formula and solving an equation to find the unknown variable.	see above, but the questions in section 10.5 also include some needing brackets etc (see unit A2)

UNIT D1

Recommended Prior Knowledge A basic competence with number operations.

Context This is a basic data handling unit for the start of the O level course. Much of this unit will be revision for some students. It enables an opportunity to check their prior knowledge and to move them forward at an appropriate pace.

Outline The averages of mean, median and mode are met for individual data. The appropriate use of each of these averages is also taught.

	Learning Outcomes	Suggested Teaching Activities	Resources
35	Calculate the mean, median and mode for individual data and distinguish between the purposes for which they are used	Give students a simple set of unordered data and ask them to find the 'average' – use the term 'mean' from then onwards. Give them a set of data in context which is clearly skewed, such as 4, 4, 4, 5, 6, 6, 20 and ask them for the mean and to comment on the result. (For instance, using the context of wages may help them to see the median may be more appropriate to use as an average, whilst some may wish to use the mode). Define median and mode and give practice in obtaining all three averages. Discuss that, depending on who wishes to use the data and for what purpose, more than one average may be used. You may wish to look at examples of how data are used, for instance the class could look in a newspaper to find articles where averages have been used.	Data suitable for use could be an extract from http://www.censusatschool.ntu.ac.uk/ Or use data collected by the class (such as their heights in unit S1). Mean, median and mode are dealt with at http://www.ex.ac.uk/cimt/mepres/allgcse/bkb9.pdf. Data from a local newspaper.

UNIT N1 Integers

Recommended Prior Knowledge A basic competence with number operations

Context This is a basic number unit for the start of the O level course. Much of this unit will be revision for some students. It enables an opportunity to check their prior knowledge and to move them forward at an appropriate pace.

Outline Starting with integers, the unit moves on to consider powers (positive integers only at this stage) and square root, leading to introducing different types of number.

	Learning Outcomes	Suggested Teaching Activities	Resources
1	Use natural numbers, integers (positive, negative and zero), prime numbers, common factors and common multiples	Define prime numbers and obtain the primes up to 100 using the Sieve of Eratosthenes method (see right-hand column). Talk about multiples, factors and prime factors and use division or a factor tree method to write any integer as a product of its prime factors. This is a good point to introduce indices. Move on to common factors and common multiples, in particular to obtaining the highest common factor and lowest common multiple	http://www.utm.edu/research/primes/ is an excellent site from which to explore prime numbers. The 'Sieve of Eratosthenes' method for obtaining prime numbers: write integers, say up to 100 in a 10 by 10 grid, then cross out 1 (1 is not a prime), cross out all the multiples of 2 except 2 itself, cross out all the multiples of 3 except 3 itself etc. The remaining integers are the prime numbers. Students could extend this to obtain larger primes. The scores in various games, attendance at matches etc are good sources of data for calculations.
24	Use and interpret positive integer indices		
9	Use the four operations for calculations with whole numbers	Check the students competence in the four operations with integers, both mentally and using written methods. . Teach methods such as long multiplication and long division if necessary.	http://www.ex.ac.uk/cimt/mepres/allgcse/bka6.pdf has exercises on long multiplication and division, for example, at section 6.4.
5	Use directed numbers in practical situations (e.g. temperature change, tide levels)	Use a number line to show positive and negative integers and to aid addition and subtraction of negative numbers.	http://www.ex.ac.uk/cimt/mepres/allgcse/bkb10.pdf has work on directed numbers. World-wide tide predictions may be found at:

			http://www.ukho.gov.uk/easytide.html Temperatures and other weather statistics for cities worldwide may be found at http://www.weatherbase.com/
4 1	Calculate squares, square roots, cubes and cube roots of numbers Use rational and irrational numbers, real numbers	Students should be familiar already with the area of a square and the volume of a cube: using them to obtain square and cube numbers gives meaning to the terms. Activity: It has been proved that every whole number is the sum of at most 4 square numbers. Students could work in pairs, one choosing a number and the other expressing it as the sum of squares Lead on to calculator use for obtaining eg 12.4^3 and $\sqrt{10}$. These can be used to introduce the ideas of rational and irrational numbers and real numbers	http://www.counton.org/explorer/number/sqnbs.shtml is a basis for this activity

NIT S1

Recommended Prior Knowledge Basic concepts of time, length, area, volume and capacity, angle measurement, mass.

Context This is a basic measures unit for the start of the O level course. Much of this unit will be revision for some students. It enables an opportunity to check their prior knowledge and to move them forward at an appropriate pace.

Outline There is some practical work in this unit, checking that students can interpret scales and use rulers and protractors.

	Learning Outcomes	Suggested Teaching Activities	Resources
28 16	Measure lines and angles Calculate time in terms of the 12-hour and 24-hour clock; read clocks, dials and timetables	Check that students can use rulers and protractors competently. Give the students practice in using different measuring instruments e.g. in measuring their heights or how much they weigh (these data could be used in units D1 and D3) or the volume of a jug of water, as well as clocks. Give students practice in finding information from timetables. Calculate times, making sure that students can convert between hours, minutes and seconds, as well as find the sum and difference of times.	The beginning section of http://www.ex.ac.uk/cimt/mepres/allgcse/bka3.pdf has examples on measuring angles. The beginning of http://www.ex.ac.uk/cimt/mepres/allgcse/bkb7.pdf has work on measuring lines Use different mass, length and capacity measures available in the school or in local domestic use. Use locally- published timetables e.g. for buses or trains. Practice in using timetables is at http://www.ex.ac.uk/cimt/mepres/allgcse/bkb8.pdf.
15	Use current units of mass, length, area, volume and capacity in practical situations and express quantities in terms of larger or smaller units	Check that students can convert competently between length units. Progress to finding the area of a rectangle in different units, and give students practice in converting from one area unit to another eg cm^2 to m^2. Similarly, apply this process to volume and capacity. Find the mass of an object in different units.	http://www.ex.ac.uk/cimt/mepres/allgcse/bkb7.pdf has work on units