UNIT A2

Recommended Prior Knowledge Units A1, N1.

Context The ideas of order of operations and brackets are formally introduced, for both number and algebra.

Outline Having established the order of operations, brackets are then used with linear expressions and equations in algebra.

	Learning Outcomes	Suggested Teaching Activities	Resources
9	Use the four operations including correct ordering of operations and use of brackets	Talk about the meaning of e.g. $4 + 3 \times 2$ and establish with students the correct order of operations and the need to use brackets to do $(4 + 3) \times 2$. Similarly the solution of division problems where there is more than one term in the numerator or denominator. Give the students practice in using their calculators efficiently to solve such problems, as well as those which they should do without a calculator.	http://www.ex.ac.uk/cimt/mepres/allgcse/bka6.pdf has work on using brackets and memory on a calculator at section 6.6
23	Use brackets and extract common factors; expand products of the form $a(bx + cy)$; factorise expressions of the form $ax + ay$	Show students the meaning of $6(x + 2y)$ by expanding the brackets. Give them practice in expanding and simplifying linear expressions such as $3x + 5(x + y) - 2(5x - 4y)$. Factorise expressions such as $4a + 6b$. Move on to solving harder linear equations than in unit A1. Include equations involving brackets such as $4(2x + 1) = 16$ and also equations where the unknown appears on both sides, such as $4x + 3 = 2x - 5$.	http://www.ex.ac.uk/cimt/mepres/allgcse/bkb10.pdf has questions of suitable difficulty in section 10.5

UNIT D2

Recommended Prior Knowledge Unit D1

Context This unit moves on from individual data to representing and calculating with simple frequency distributions for discrete data.

Outline This unit includes constructing and interpreting bar charts, pie charts and pictograms. The mean of a discrete frequency distribution is calculated, in preparation for D3, where grouped continuous data will be used.

	Learning Outcomes	Suggested Teaching Activities	Resources
35	Collect, classify and tabulate discrete data. Read, interpret and draw simple inferences from tables and statistical diagrams Construct and use bar charts, pie charts, pictograms. [Calculate the mean of a discrete frequency distribution.]	Look at a chart of each type which has been drawn already. For each one, ask questions about the information which has been shown. Draw attention to the title, labels on axes / bars / sectors and to the key for a pictogram. Ask which is the mode for each diagram. Ask 'How many...?' for each diagram, ensuring that students then realise that a pie chart does not show this, just relative proportions. Get the students to collect some data of their own, tabulate it and represent it. For instance, in preparation for probability work in D4, they could undertake experiments with a biased die or spinner and tabulate the resulting frequencies for each number. Or you may wish them to undertake a survey. As well as drawing diagrams by hand, if one or more computers are available teach them to use a computer program such as Excel or Autograph to represent data. Give the students a list of data with repeats, say 30 items, and ask them to calculate the mean. Whilst they do this, put	Two worksheets on interpreting athletics data are available at http://www.ex.ac.uk/cimt/resource/dint1.htm and http://www.ex.ac.uk/cimt/resource/dint2.htm, with a link to the data file. If you do not have printed charts that you can show, you could draw them yourself on Excel, perhaps using an extract of data from http://www.censusatschool.ntu.ac.uk/ There are some examples at http://www.ex.ac.uk/cimt/mepres/allgcse/bkb8.pdf. http://www.xist.org/ has global and regional statistics e.g. the populations for different districts in a country and also has charts.

		the data into a frequency distribution on the board and add an extra column. Then show them how to get their result using the frequency distribution. Then for the next example, just give the data in the form of a frequency distribution and ask them to calculate the mean.	

UNIT N2

Recommended Prior Knowledge Unit N1.

Context Integers were studied in unit N1. This unit involves fractions and decimals and so completes the basis of working with different types of real number. As with N1, much of this work may be familiar to some students, and so the time taken by the unit will depend on the level at which the class is already.

Outline The concepts of fractions, decimals and percentages and conversions between them are established. The four operations of working with fractions and decimals are used. Percentages of a quantity are found. These number skills are then applied to money and personal finance problems.

	Learning Outcomes	Suggested Teaching Activities	Resources
6	Use the language and notation of simple vulgar and decimal fractions and percentages in appropriate contexts; recognise equivalence and convert between these forms.	Revise the concepts of equivalence e.g. asking how 0.8 might be expressed differently. Give students practice in simplifying fractions and in converting between fractions, decimals and percentages. Include the fact that all terminating and recurring decimals may be expressed as fractions and so are rational, and that non-recurring decimals are irrational.	http://www.mathsnet.net/fractions/index.html gives some fractions practice, and gives solutions http://www.ex.ac.uk/cimt/mepres/allgcse/bka6.pdf has exercises and worked examples for decimals, http://www.ex.ac.uk/cimt/mepres/allgcse/bkb11.pdf deals with fractions after percentages.
1	Use rational and irrational numbers.		
9	Use the four operations for calculations with decimal fractions and vulgar (and mixed) fractions.	Check the students' level of competence in the four operations with fractions and decimals. Give appropriate teaching and practice.	
13	Calculate a given percentage of a quantity; express one quantity as a percentage of another, calculate percentage increase or decrease.	Begin by asking orally for 50% of 200g, 10% of $50 etc and progress to formal methods of finding a percentage of a quantity. Similarly use questions such as 'What fraction of 40 cm is 8 cm?' to progress to expressing one quantity as a percentage of another. Calculate percentage increase and decrease, using contexts such as length,	http://www.ex.ac.uk/cimt/mepres/allgcse/bkb11.pdf covers this work.

		time or mass as well as money (see also below).	
17 18	Solve problems involving money and convert from one currency to another. Use given data to solve problems on personal and household finance involving earnings, simple interest, discount, profit and loss; extract data from tables and charts	Use the context of shopping to set money problems, giving students practice in solving them without a calculator, as well as with one when the difficulty is appropriate. Use conversions between currencies, using conversion graphs as well as conversion rates. Calculate simple interest, discounts, profit and loss. Calculate earnings and solve other personal and household finance problems, including using tables and charts	Currency conversions are at http://finance.yahoo.com/m3?u Use local tax rates for goods and wages and other local contexts for personal finance Mail-order catalogues and order forms are another good source of data.

UNIT S2

Recommended Prior Knowledge Unit N1, S1.

Context This unit could be studied before S1 if wished, by introducing the units for area here. Much of this unit should already be familiar to students, so check their knowledge and move forward at an appropriate pace.

Outline This unit concerns lines and angles, triangles and quadrilaterals. The basic geometrical terms associated with them are introduced and unknown angles are calculated using angle properties. Triangles and quadrilaterals are classified, including the symmetry properties of different types. Areas of triangles, rectangles and parallelograms are calculated.

	Learning Outcomes	Suggested Teaching Activities	Resources
27 30	Use and interpret the geometrical terms: point, line, plane, parallel, perpendicular, right angle, acute, obtuse and reflex angles. Use and interpret vocabulary of triangles, special quadrilaterals. Recognise line and rotational symmetry (including order of rotational symmetry) in two dimensions and properties of triangles and quadrilaterals directly related to their symmetries.	Students could be reminded of this terminology by showing them a picture of a pattern such as a tiled floor using different shapes and asking them to identify an obtuse angle, a kite, perpendicular lines etc Show students pictures of shapes and logos which have line or rotational symmetry and ask them to identify how many lines of symmetry the shape has and what its order of rotational symmetry is. Move on to the symmetry properties of isosceles and equilateral triangles and special quadrilaterals.	For instance there are geometrical patterns, including a gallery of pictures of artworks at http://www.salaam.co.uk/themeofthemonth/march02_index.php?l=3 http://www.ex.ac.uk/cimt/mepres/allgcse/bka3.pdf has useful work on symmetry as well as angles http://www.bbc.co.uk/schools/gcsebitesize/maths/shape/symmetryrev2.shtml has interactive demonstrations and information about symmetry
31	Calculate unknown angles and give simple explanations using the following geometrical properties: (a) angles on a straight line (b) angles at a point (c) vertically opposite angles (d) angles formed by parallel lines (e) angle properties of triangles and quadrilaterals	The class could make a poster showing the angle and symmetry properties of special triangles and quadrilaterals. Make sure the students know the angle properties (a) to (d) then move on to solve angle problems for each of types (a) to (e), asking the students to give their reasons for each calculation.	http://www.bbc.co.uk/schools/gcsebitesize/maths/shape/anglesrev2.shtml has clear diagrams http://www.ex.ac.uk/cimt/mepres/allgcse/bka3.pdf has plenty of examples and exercise
33	Solve problems involving (i) the perimeter and area of a rectangle	It may be helpful to show students how the area formulae for a parallelogram and a	http://www.ex.ac.uk/cimt/mepres/allgcse/bkb7.pdf has work on the area and perimeter of squares, rectangles and

	and triangle (ii) the area of a parallelogram and a trapezium	trapezium may be obtained by splitting them into two triangles. After this, encourage them to work with the area formulae. Give them practice in finding areas and perimeters, making sure that they give the appropriate units in their answers.	triangles at section 7.6.