

Module (time)	Contents		Notes
Number (9)	Place value in whole numbers Place value, $\times$ , $\div$ of decimals numbers by powers of 10 $\times$ & $\div$ by multiples of powers of 10 <b><math>\times</math> &amp; <math>\div</math> by numbers between 0 &amp; 1</b> Write assorted numbers in order of size Long $\times$ & $\div$ w/o calculator Order of operations $+$ , $-$ , $\times$ & $\div$ decimals 4 – rules using negative numbers rounding off to a given power of 10 interpreting a calculator display		Emphasis clear workings Non – calc methods should show remainders and carries as evidence
Geometry (8)	Calculate angles on a straight line and around a point* Recognise opposite angles at a vertex* Calculate angles in a triangle Use angle properties of isosceles, equilateral and right angle triangles <b><i>Understand the proof that the angle                      sum of triangle is 180 degrees</i></b> <b><i>Understand the proof regarding the                      exterior angles of a triangle</i></b> Recall names and properties of special quadrilaterals Explain why the angle sum of a quadrilateral is 360 degrees Calculate angles in quadrilaterals Interior and Exterior angles of quadrilaterals, <b><i>pentagons, hexagons and                      regular polygons</i></b> Tessellation <b><i>Use parallel lines, alternate angles                      and corresponding angles</i></b> Use the angle properties of parallelograms		Pupils are often confused about the position from which a bearing is measured  Pupils need to measure and draw angles correct to 1 degree

	Measuring bearings		
Numbers and powers (5)	Even/odd/prime numbers Factors and multiples Square and cube numbers Squares and square roots Cubes and cube roots <b><i>Trial and improvement methods</i></b> Powers of numbers Prime factor form Finding the HCF and LCM		All of this module are easily reinforced through starter activities
Collecting and sorting data (3)	Different ways of collecting data Design questionnaire Collect data by sampling Collect data by observation Collect data by experiment Obtain data from databases, tables & lists Sorting and presenting data Design and use two way tables Deal with practical problems when collecting data		Labelled axes and straight lines
Algebra (6) Simplifying and substituting	Use letters to represent numbers Collect like terms Remove a single pair of brackets Multiplying with letters and numbers <b><i>Factorising with a single set of brackets</i></b> <b><i>Simplify expressions by cancelling common factors</i></b> Use word formula Use algebraic formulae Use negative numbers		Emphasise correct use of symbolic notation

Transformations (5)	<p>Co-ordinates in first quadrant  Co-ordinates in four quadrants  Congruent shapes  Line symmetry  Rotational symmetry  <b><i>Planes of symmetry</i></b>  Transforming 2D shapes by reflection and rotation  <b><i>Specify a mirror line parallel to axes</i></b>  <b><i>Rotating shapes</i></b>  Translations  <b><i>Describing transformation <u>in full</u> (rotations, reflections and translation)</i></b></p>		<p>When identifying symmetry add all lines of symmetry to a diagram and identify the centre of rotational symmetry.  Where possible always use the properties of the shape to give clear reasons of explanation</p> <p>Students should be able to draw the mirror line for grade D</p>
Factions (5)	<p>Use diagrams to find equivalent fractions  Cancel fractions  Interchange improper fractions and mixed numbers  Interchange fractions and decimals and <b><i>use recurring decimals</i></b>  Order fractions using common denominators  Add and subtract fractions using common denominators  X &amp; <math>\div</math> fractions  Use fractions in problems involving X,<math>\div</math>  Calculate a fraction of a quantity  Write a given numbers as a fraction of another</p>		<p>Constant revision of this topic is needed  All work needs to be presented clearly with relevant stages of working shown  Non – calculator work with fractions is generally poorly attempted at GCSE</p> <p>Calculations with simple fractions only for grade D</p>

Equations and identities (5)	<p>Inverse operations</p> <p>Simple linear equations</p> <p>Equations combining operations</p> <p>Solving equations with unknown on both sides</p> <p>Solving equations using brackets and negative solutions</p> <p>Set up simple equations</p> <p>Use algebraic equations to solve problems</p> <p><b><i>Solving linear inequalities with one variable and represent solution on a number line</i></b></p>		<p>Pupils need to realise that not all linear equations can be easily solved by observation or trial &amp; improvement, hence a formal method is required</p> <p>Pupils can leave their answer in fractional form where appropriate</p>
Percentages (5)	<p>Understand %</p> <p>Interchange between %, fractions &amp; decimals</p> <p>Find %, and % <b><i>change</i></b></p> <p>Find VAT, % <b><i>profit / loss</i></b></p> <p>Find the added cost of buying goods on credit terms</p>		<p>Money should always be rounded to the nearest penny, except where this may be premature (compound interest)</p> <p>All workings should always be shown</p>
Sequences (3)	<p>Extend diagrammatic sequences</p> <p>Extend number sequences</p> <p>Generate common number sequences</p> <p>Generate sequences using term to term and position to term definition</p> <p>Find the nth term (linear)</p>		<p>Emphasis good notation</p> <p>Pupils should be clear on the description of the pattern in words, the difference between the terms and the algebraic description of the nth term</p>

Shape ,volume and surface area (7)	<p>Construct triangles</p> <p>Construct 2D shapes</p> <p>Find areas of plane shapes using formula*</p> <p>Use the language of 3D shapes</p> <p>Construct 3D shapes</p> <p>Nets of simple solids</p> <p>Develop, know and use the formula for the volume of a cuboid*</p> <p>Find volumes of solids made from cuboids</p> <p>Use the formulae for the volume of a cuboid to solve problems</p> <p><b><i>Find the volume of a prism*</i></b></p> <p><b><i>Find the surface area of solids with triangular and rectangular faces*</i></b></p>		There is a need to constantly revise expressions for area/volume of shapes
Probability (4)	<p>List systematically outcomes for single events or two successive events</p> <p>Write probability as numbers</p> <p>Equally likely and <b><i>mutually exclusive events</i></b></p> <p>The probability of an event not happening</p> <p>Use the sum of probabilities = 1</p> <p>Predicting outcomes using simple probabilities*</p> <p>Estimate probability by experimenting*</p> <p>Sample spaces and theoretical probabilities*</p> <p>Design and use two way tables</p>		Students are sometimes unsure of the relationship between $P(\text{not } A) = 1 - P(A)$ Only fractions decimals and % should be used for probability
Circles (5)	<p>Recall terms relating to a circle</p> <p><b><i>Inscribe regular polygons in a circle</i></b></p> <p>Calculate circumference</p> <p>Calculate areas of circles</p> <p>Recall formulae for the area of a circle</p>		$\pi$ can be taken as 3 or 3.14 or $\frac{22}{7}$ depending on accuracy or style of answer required.

Ratio and proportion (5)	<p>Basic ideas of ratio Simplifying ratio Relating ratio form to fractions Dividing into a given ratio Unitary method Using direct proportion Convert between units given conversion factors Use &amp; interpret maps &amp; scale drawings Know and use metric equivalents of common imperial units <b><i>Calculate speed and density</i></b></p>		Care must be taken to ensure that pupils are able to deal with ratios that use more than two quantities
Displaying data (6)	<p>Group data in tally tables and grouped frequency tables Interpreting frequency diagrams Line graphs for discrete and continuous data Construct and interpret stem and leaf diagrams Calculate angles for a pie chart Draw pie charts Calculate using pie charts</p>		<p>Clearly label all axes and use a ruler Angles should be drawn to two degrees</p> <p>Box plots may still be used for coursework if appropriate</p>
Approximation (4)	<p>Round to the nearest 10,100,1000 Carry out appropriate rounding given the context Approximate to d p and sig figs <b><i>Check answers by rounding to 1sf</i></b> <b><i>Maximum and minimum values for rounded measurements*</i></b> <b><i>Recognise the limitations on the accuracy of measurements</i></b> Read a calc display to appropriate accuracy Use a calculator efficiently for complex calculations</p>		<p>Pupils should be encouraged to include more accurate answers in their working out before rounding to ensure marks for correct calculation even if rounding is correct Pupils need to be aware that rounding will lead to a number of the same magnitude as the original answer</p>

Average & spread (5)	Find the mode, median, mean and range from simple data Select the most appropriate average Find the mode from a discrete frequency table Calculate the total frequency from a discrete frequency table Calculate the mean from a discrete frequency table <b>Mean and median for continuous data</b> <b>Modal class for continuous data</b>		Pupils tend to select modal class but identify it by its frequency rather than the class description. Explain that the median of grouped data is not always in the middle class. The choice of midpoints for finding the mean from a grouped frequency table can cause problems.
Transformations (5)	Enlarge assorted shapes using various centres of enlargement and integer and <b>non integer scale factors</b> Enlargement calculations <b>Similar triangles*</b> Similarity of standard shapes Translations Understand and use vector notation* Describe translations <b>in full</b> (enlargements and translations)		Emphasis must be given to ensure that pupils describe transformations fully
Substitution and formulae (4)	Substitute into expressions involving squares or cubes <b>Use trial and improvement to find approximate solutions of equations</b> Generate formulas Rearrange simple formulae		<i>When using Trial &amp; Improvement, care should be taken to set the work out in a manner where the result of each trial is clear and the final trial is identified. If an answer to 1dp is required then at least one value between the two choices should be made.</i>
Pythagoras theorem (4)	<b>Use Pythagoras to find the hypotenuse</b> <b>Use Pythagoras to find the shorter sides</b> <b>Use Pythagoras to solve problems</b> <b>Calculate lengths of lines on a grid*</b>		Consult GCSE papers for types of questions. The orientation of the triangle may differ.

Scatter diagrams (3)	Plot and interpret scatter diagrams Describe a correlation from a scatter graph Draw and use lines of best fit		Pupils should realise that the line of best fit should have the same gradient as the correlation of the data
Probability (4)	Estimate probability from theoretical models Use relative frequency Use the vocabulary of probability to interpret results Use probability estimates to compare results Understand the effect of sample size on probability estimates <b><i>Calculate with mutually exclusive events</i></b> <b><i>Recognise independent events</i></b>		Pupils lose marks due to an inability to manipulate fractions Pupils do not always appreciate that some descriptions of probabilities cover more than one outcome, eg, tossing two coins and obtaining one of each.
Quadratics (4)	<b><i>Expand brackets – the product of two linear expressions</i></b> <b><i>Plot the graph of a quadratic function</i></b> <b><i>Find approximate soln to quadratics using graphs</i></b>		There may be a need to remove the HCF (numerical) before factorising to make the factorisation more obvious <b><i>Be aware of using a calc to calculate negative numbers raised to a power</i></b>
Algebraic graphs (7)	Plot graphs of functions where y is expressed in terms of x, leading to a straight line <b><i>Find gradients of straight lines, and explore gradients of parallel lines*</i></b> <b><i>Recognise the y intercept of a straight line*</i></b> <b><i>Explore graphs of the function <math>y=mx+c</math>*</i></b> <b><i>Plot linear graphs from real life problems</i></b> Interpret graphs from real life problems <b><i>Recognise characteristics of graphs*</i></b>		Links with the science department may be beneficial.



Percentages (4)	Understand percentage as an operator Calculate simple and <b>compound interest</b> for two or more time periods <b>Solve problems involving compound interest</b> <b>Interpret social statistics including index numbers</b>		Pupils tend to answer compound interest questions incorrectly, either by using simple interest or calculating over a wrong number of years
Constructions (5)	Construct triangles <b>Construct a perpendicular bisector and find the midpoint of a line segment</b> <b>Construct perpendiculars to a line</b> <b>Bisect an angle</b> <b>Find loci</b> <b>Construct graphs of simple loci</b>		Accurate and clear drawings to be encouraged, a sturdy pair of compasses is essential.
Indices and surds (7)	Use index notation Recall integer cubes, squares and corresponding square roots Use indices in expressions <b>Use index laws for multiplication and division (integer powers)</b> <b>Simplify expressions using the rules of indices</b> Convert between different units of area and volume Understand the dimensions of formula for perimeter, area and volume		Pupils should work with powers of both numbers and algebraic variables
3D, volumes and surface area (5)	2D representation of 3D objects plans and elevations <b>Find the surface area of cuboids with triangular and rectangular faces</b> Solve problems involving surface area Investigate the geometry of cubes, cuboids & shapes made from cuboids Solve problems involving vol. of prisms		Accurate drawing skills need to be re-inforced  Grade D – simple problems only

GCSE Foundation (*Italics – extension work for higher foundation*)

Standard index form (3)	Use standard index form Convert between ordinary and standard form representations Use a calculator for standard index form		When transferring an answer from a calculator, pupils forget to write x 10 before the power of ten. Pupils must read a calculator display
Algebra (8)	<b><i>Solve simultaneous equations using elimination</i></b> <b><i>Solve linear inequalities in one variable</i></b> <b><i>Solve simultaneous equations using a graphical method</i></b> <b><i>Find approximate solutions to quadratics using graphs</i></b>		
Co-ordinates and transformations (4)	Co-ordinates in 1,2 and <b>3</b> dimensions <b><i>Find midpoints of lines</i></b> Understand similarity of plane figures Transform 2D shapes by translation, rotation, enlargement and reflection		Pupils can lose marks for neglecting to mention one part of a transformation, eg the name of a line of symmetry or centre of enlargement
Data handling (3)	<b><i>Calculate and interpret a moving average for a time series</i></b> Compare shapes of distribution Compare distributions using measures of range and spread Use a calculator for statistical calculations		All workings should be presented clearly, with descriptions of trends expressed as clearly as possible.