

4.3 Learning Objectives for Key Stage 3 (S1 - S3)

4.3.1 Number and Algebra Dimension (Key Stage 3)

Unit	Learning objectives	Suggested time ratio
Number and Number Systems		
Directed Numbers and the Number Line	<ul style="list-style-type: none"> understand and accept intuitively the concept and uses of negative numbers have simple ideas of ordering on the number line explore and discuss the manipulation of directed numbers manipulate directed numbers 	12
Numerical Estimation	<ul style="list-style-type: none"> be aware of the need to use estimation strategies in real-life situations and appreciate the past attempts to approximate values such as π determine whether to estimate values or to compute the exact values select and use estimation strategies to estimate values and to judge the reasonableness of results choose appropriate means for calculation such as mental computation, calculators or paper and pencil etc. 	5
Approximation and Errors	<ul style="list-style-type: none"> acquire further concepts and skills of rounding off numbers to a required number of significant figures understand the meaning of scientific notation use scientific notation in practical problems be aware of the size of errors during estimation and approximation; understand and calculate different types of errors such as absolute errors, relative errors and percentage errors. 	7

Note: The objectives with asterisk (**) are exemplars of **enrichment topics**.

The objectives underlined are considered as **non-foundation** part of the syllabus.

Unit	Learning objectives	Suggested time ratio
Rational and Irrational Numbers	<ul style="list-style-type: none"> • be aware of the existence of irrational numbers and surds • explore the representations of irrational numbers in the number line • <u>manipulate commonly encountered surds including the rationalization of the denominator in the form of \sqrt{a}</u> • <u>appreciate the expressions of surds could be expressed in a more concise form</u> <p>Note: The formal hierarchy of the real-number system need not be mentioned in this unit.</p>	6
Comparing Quantities		
Using Percentages	<ul style="list-style-type: none"> • understand the meaning of percentages and percentage changes • apply percentage changes to solve simple selling problems • apply percentages to solve problems involving simple and compound interests, growth and depreciation. 	17
More about Percentages	<ul style="list-style-type: none"> • apply percentages to solve further practical problems involving successive and component changes • apply percentages to solve simple real-life problems involving taxation and rates 	7
Rate and Ratio	<ul style="list-style-type: none"> • understand the meaning of rate and ratio • recognize the notation of $a : b$, $a : b : c$ • apply the ability in using rate, ratio to solve real-life problems including mensuration problems 	8

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Unit	Learning objectives	Suggested time ratio
Observing Patterns and Expressing Generality		
Formulating Problems with Algebraic Language	<ul style="list-style-type: none"> • appreciate the use of letters to represent numbers • understand the language of algebra including translating word phrases into algebraic expressions or write descriptive statement for algebraic expressions • note the differences between the language of arithmetic and the language of algebra • recognize some common and simple formulas which can be expressed as algebraic forms and be able to substitute values • formulate simple algebraic equations/ inequalities to solve problems • investigate, appreciate and observe the patterns of various number sequences such as polygonal numbers, arithmetic and geometric sequences, Fibonacci sequence etc. • use algebraic symbols to represent the number patterns • obtain a preliminary idea of function such as input-processing-output concept 	14
Manipulations of Simple Polynomials	<ul style="list-style-type: none"> • recognize polynomial as a special example of algebraic expressions • recognize the meaning of the terminology involved • add, subtract, multiply polynomials involving more than one variable 	10
Laws of Integral Indices	<ul style="list-style-type: none"> • extend and explore the meaning of the index notation of numbers with negative exponents • explore, understand and use the laws of integral indices to simplify simple algebraic expressions (up to 2 variables only) • <u>understand and compare numbers expressed in various bases in real-life situations</u> • <u>foster a sense of place values in different numeral systems</u> • <u>inter-convert between simple binary/hexadecimal numbers to decimal numbers</u> 	10

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Unit	Learning objectives	Suggested time ratio
Factorization of Simple Polynomials	<ul style="list-style-type: none"> understand factorization as a reverse process of expansion factorize polynomials by using common factors and grouping of terms factorize polynomials by using identities including difference of two squares; perfect square expressions; <u>difference and sum of two cubes</u> factorize polynomials by cross-method 	15
Algebraic Relations and Functions		
Linear Equations in One Unknown	<ul style="list-style-type: none"> formulate and solve linear equations in one unknown **solve literal equations 	7
Linear Equations in Two Unknowns	<ul style="list-style-type: none"> plot and explore the graphs of linear equations in 2 unknowns formulate and solve simultaneous equations by algebraic and graphical methods be aware of the approximate nature of the graphical method **explore simultaneous equations that are inconsistent or that have no unique solution 	15
Identities	<ul style="list-style-type: none"> explore the meaning of identities and distinguish between equations and identities discover and use the identities : difference of two squares; the perfect square expression; <u>difference and sum of two cubes</u> 	8
Formulas	<ul style="list-style-type: none"> manipulate algebraic fractions with linear factors as denominators develop an intuitive idea of factorization of polynomials explore familiar formulas and substitute values of formulas perform change of subject in simple formulas but not including radical sign 	14

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The objectives underlined are considered as **non-foundation** part of the syllabus.

Unit	Learning objectives	Suggested time ratio
Linear Inequalities in One Unknown	<ul style="list-style-type: none"> • understand the meaning of inequality signs \geq, $>$, \leq and $<$ • explore the fundamental properties and some laws of inequalities • solve simple linear inequalities in one unknown and represent the solution on the number line 	7

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The objectives being underlined are considered as **non-foundation** part of the syllabus.