Maths at the Charter school Bermondsey
2023-2024

The Charter School Bermondsey

Year 7

HT topic	HT1 Topic/Unit: Place Value and Proportion	HT2 Topic/Unit: Reasoning with Number	HT3 Topic/Unit: Applications of number	HT4 Topic/Unit: Applications of number	HT5 Topic/Unit: Directed Number and Algebraic Thinking	HT6 Topic/Unit: Algebraic Thinking and Directed Number
Key Content:	**Place value ordering integers and decimals** • Recognise the place value of any digit in an integer up to one billion • Understand and write integers up to one billion in words and figures • Work out intervals on a number line • Position integers on a number line • Round intervals to the nearest power of 10 • Compare two numbers using =, ≠, <, >, ≤ and ≥ • Order a list of integers • Find the range of a set of numbers • Find the median of a set of numbers • Understand place value for decimals • Position decimals on a number line • Compare and order any number up to one billion • Round a number to 1 significant figure • H - Write 10, 100, 1000 etc as powers of 10 • H - Write positive integers in the form A x 10^n • H - Investigate negative powers of 10 • H - Write decimals in the form A x 10^n	**Prime numbers and proof** • Find and use multiples • Identify factors of numbers and expressions • Recognise and identify prime numbers • Recognise square and triangular numbers • Find common factors of a set of numbers including the HCF • Find common multiples of a set of numbers including the LCM • Write a number as a product of its prime factors • H - Use a Venn diagram to calculate the HCF and LCM • Make and test conjectures • Use counterexamples to disprove a conjecture	**Solving problems with addition and subtraction** • Properties of addition and subtraction • Mental strategies for addition and subtraction • Use formal methods for addition of integers • Use formal methods for addition of decimals • Use formal methods for subtraction of integers • Use formal methods for subtraction of decimals • Choose the most appropriate method: mental strategies, formal written or calculator • Solve problems in the context of perimeter • Solve financial maths problems • Solve problems involving tables and timetables • Solve problems with frequency trees • Solve problems with bar charts and line charts • H - Add and subtract numbers given in standard form	**Solving problems with multiplication and division** • Properties of multiplication and division • Understand and use factors • Understand and use multiples • Multiply and divide integers and decimals by powers of 10 • H - Multiply by 0.1 and 0.01 • Convert metric units • Use formal methods to multiply integers • Use formal methods to multiply decimals • Use formal methods to divide integers • Use formal methods to divide decimals • Understand and use order of operations • Solve problems using the area of rectangles and parallelograms • Solve problems using the area of triangles • H - Solve problems using the area of trapezia • Solve problems using the mean • H - Explore multiplication and division in algebraic expressions	**Operations and equations with directed number (A)** • Understand and use representations of directed numbers • Order directed numbers using lines and appropriate symbols • Perform calculations that cross zero • Add directed numbers • Subtract directed numbers • Multiplication of directed numbers • Multiplication and division of directed numbers • Use a calculator for directed number calculations **Understand and use algebraic notation** • Given a numerical input, find the output of a single function machine • Use inverse operations to find the input given the output • Use diagrams and letters to generalise number operations • Use diagrams and letters with single function machines • Find the function machine given a simple expression • Substitute values into single operation expressions • Find numerical inputs and outputs for a series of two function machines • Use diagrams and letters with a series of two function machines • Find the function machine given a two-step expression • Substitute values into two-step expressions • Generate sequences given an algebraic rule • Represent one- and two-step functions graphically	**Equality and equivalence** • Understand the meaning of equality • Understand and use fact families, numerically and algebraically • Solve one-step linear equations involving addition and subtraction using inverse operations • Solve one-step linear equations involving multiplication and division using inverse operations • Understand the meaning of like and unlike terms • Understand the meaning of equivalence • Simplify algebraic expressions by collecting the like term using the ≡ symbol **Operations and equations with directed number (B)** • Evaluate algebraic expressions with directed number • Introduction to two-step equations • Solve two-step equations • Use order of operations with directed numbers • H - Understand that positive numbers have more than one square root • H - Explore higher powers and roots

Year 8

HT topic	HT1 Topic/Unit: Fractional Thinking	HT2 Topic/Unit: Proportional Reasoning	HT3 Topic/Unit: Lines and Angles	HT4 Topic/Unit: Lines and Angles	HT5 Topic/Unit: Place Value and Proportion	HT6 Topic/Unit: Sets and probability
Key Content:	**Addition and subtraction of fractions** • Understand representations of fractions	**Multiplying and dividing fractions** • Represent multiplication of fractions • Multiply a fraction by an integer • Find the product of a pair of unit fractions	**Constructing, measuring and using geometric notation** • Understand and use letter and labelling conventions	**Developing geometric reasoning** • Understand and use the sum of angles at a point	**Fraction, decimal and percentage equivalence** • Represent tenths and hundredths as diagrams	**Sets and probability** • Identify and represent sets • Interpret and create Venn diagrams

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	• Convert between mixed numbers and fractions • Add and subtract unit fractions with the same denominator • Add and subtract fractions with the same denominator • Add and subtract fractions from integers expressing the answer as a single fraction • Understand and use equivalent fractions • Add and subtract fractions where denominators share a simple common multiple • Add and subtract fractions with any denominator • Add and subtract improper fractions and mixed numbers • Use fractions in algebraic contexts • Use equivalence to add and subtract decimals and fractions • H - Add and subtract simple algebraic fractions	• Find the product of a pair of any fractions • Divide an integer by a fraction • Divide a fraction by a unit fraction • Understand and use the reciprocal • Divide any pair of fractions • H - Multiply and divide improper and mixed fractions • H - Multiply and divide algebraic fractions **Reasoning with Number** **Developing number sense** • Know and use mental addition and subtraction strategies for integers • Know and use mental multiplication and division strategies for integers • Know and use mental strategies for decimals • Know and use mental strategies for fractions • Use factors to simplify calculations • Use estimation as a method for checking mental calculations • Use known number facts to derive other facts • Use known algebraic facts to derive other facts • Know when to use a mental strategy, formal written method or a calculator	including those for geometric figures • Draw and measure line segments including geometric figures • Understand angles as a measure of turn • Classify angles • Measure angles up to 180 degrees. • Draw angles up to 180 degrees. • Draw and measure angles between 180 and 360 degrees • Identify parallel and perpendicular lines. • Recognise types of triangles • Identify polygons up to decagons. • Recognise types of quadrilaterals • Construct triangles using SSS • Construct triangles using SSS, SAS and ASA • Construct more complex polygons • Interpret simple pie charts using proportion • Interpret pie charts using a protractor • Draw pie charts	• Understand and use the sum of angles on a straight line • Understand and use the equality of vertically opposite angles • Know and apply the sum of angles in a triangle • Know and apply the sum of angles in a quadrilateral • Solve angle problems using properties of triangles and quadrilaterals • Solve complex angle problems • H - Find and use the angle sum of any polygon • H - Investigate angles in parallel lines • H - Understand and use parallel line angle rules • H - Use known facts to obtain simple proofs	• Represent tenths and hundredths on number lines • Interchange between fractional and decimal number lines • Convert between fractions and decimals - tenths and hundredths • Convert between fractions and decimals - fifths and quarters • H - Convert between fractions and decimals - eighths and thousandths • Understand the meaning of percentage using a hundred square • Convert fluency between simple fractions, decimals and percentages • Use and interpret pie charts • Represent any fraction as a diagram • Represent fractions on number lines • Identify and use simple equivalent fractions • Simplify fractions (no small step on this - but this is in the assessment) • Understand fractions as division • Convert fluently between FDP • H - Explore fractions above one, decimals and percentages **Fractions and Percentages of Amounts** • Find a fraction of a given amount • Use a given fraction to find the whole and/or other fractions • Find a percentage of a given amount using mental methods • Find a percentage of a given amount using a calculator • H - Solve problems with fractions greater than 1 and percentages greater than 100%	• Understand and use the intersection of sets • Understand and use the union of sets • H - Understand and use the complement of sets • Know and use the vocabulary of probability • Generate sample spaces for single events • Calculate the probability of a single event • Understand and use the probability scale • Know that the sum of probabilities of all possible outcomes is 1 **Tables & Probability** • Construct sample spaces for 1 or more events • Find probabilities from sample space • Find probabilities from two-way tables • Find probabilities from Venn diagrams • H - Use the product rule for finding the total number of possible outcomes

Year 9						
HT topic	**HT1 Topic/Unit:** **Proportional Reasoning**	**HT2 Topic/Unit:** **Representations** and **Algebraic Techniques**	**HT3 Topic/Unit:** **Algebraic Thinking** and **Algebraic Techniques**	**HT4 Topic/Unit:** **Developing Number**	**HT5 Topic/Unit:** **Developing Geometry**	**HT6 Topic/Unit:** **Reasoning with Data**
Key Content:	**Ratio and scale** • Understanding the meaning and representation of ratio • Understand and use ratio notation • Solve problems involving ratios of the form 1:n or n:1 • Solve proportional problems involving the ratio m:n	**Representing data** • Draw and interpret scatter graphs • Understand and describe linear correlation • Draw and use line of best fit (1) • Draw and use line of best fit (2) • Identify non-linear relationships • Identify different types of data	**Sequences** • Describe and continue a sequence given diagrammatically • Predict and check the next term(s) of a sequence • Represent sequences in tabular and graphical forms	**Fractions and percentages** • Convert between decimals and percentages more than 1/100% • Percentage decrease with a multiplier • Calculate percentage increase and decrease using a multiplier	**Angles in parallel lines and polygons** • REVIEW STEP - Understand basic angle rules and notation • Investigate angles between parallel lines and the transversal	**The data handling cycle** • Set up a statistical enquiry • Design and criticise questionnaires • Draw and interpret pictograms, bar charts and vertical line charts • Draw and interpret multiple bar charts

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	• Divide a value into a given ratio • Express ratios in their simplest integer form • H - Express ratios in the form 1:n • Compare ratios and related fractions • Understand pi as the ratio between diameter and circumference • H - Understand gradient of a line as a ratio **Multiplicative change** • Solve problems involving direct proportion • Explore conversion graphs • Convert between currencies • H - Explore direct proportion graphs • Explore relationships between similar shapes • Understand scale factors as multiplicative relationships • Draw and interpret scale diagrams • Interpret maps using scale factors and ratio **Representations** **Working in the Cartesian plane** • Work with coordinates in all four quadrants • Identify and draw lines that are parallel to the axes • Recognise and use the line y=x • Recognise and use lines of the form y=kx • Link y=kx to direct proportion problems • H - Explore the gradient of the line y=kx • Recognise and use lines of the form y=x+a • Explore graphs with negative gradients (y=-kx, y=a-x, x+y=a) • Link graphs to linear sequences • Plot graphs of the form y=mx+c • H - Explore non-linear graphs • H - Find the midpoint of a line segment	• Read and interpret ungrouped frequency tables • Read and interpret grouped frequency tables • Represent grouped discrete data • Represent continuous data grouped into equal classes • Represent data in two-way tables **Brackets, equations and inequalities** • Form algebraic expressions • Use directed number with algebra • Multiply out a single bracket • Factorise into a single bracket • Expand multiple single brackets and simplify • H - Expand a pair of binomials • Solve equations, including with brackets • Form and solve equations with brackets • Understand and solve simple inequalities • Form and solve inequalities • H - Solve equations and inequalities with unknowns on both sides • H - Form and solve equations and inequalities with unknowns on both sides • Identify and use formulae, expressions, identities and equations	• Recognise the difference between linear and non-linear sequences • Continue numerical linear sequences • Continue numerical non-linear sequences • Explain the term-to-term rule of numerical sequences in words • H - Find missing numbers within sequences **Indices** • Adding and subtracting expressions with indices • Simplifying algebraic expressions by multiplying indices • Simplifying algebraic expressions by dividing indices • Using the addition law for indices • Using the addition and subtraction laws for indices • H - Exploring powers of powers	• Express one number as a fraction or a percentage of another without a calculator • Express one number as a fraction or a percentage of another using calculator methods • Work with percentage change • Choose appropriate methods to solve percentage problems • H - Find the original amount given the percentage less than 100% • H - Find the original amount given the percentage more than 100% • H - Choose appropriate methods to solve complex percentage problems **Standard index form** • Work with numbers greater than 1 in standard form • Investigate negative powers of 10 • Work with numbers between 0 and 1 in standard form • Compare and order numbers in standard form • Mentally calculate with numbers in standard form • Add and subtract numbers in standard form • Multiply and divide numbers in standard form • Use a calculator to work with numbers in standard form • H - Understand and use negative indices • H - Understand and use fractional indices **Number sense** • Round numbers to a number of decimal places • H - Understand and use error interval notation • Calculate with money • Convert metric units of weight and capacity • H - Convert metric units of area • H - Convert metric units of volume • Solve problems involving time and the calendar	• Identify and calculate with alternate and corresponding angles • Identify and calculate with co-interior, alternate and corresponding angles • Solve complex problems with parallel line angles • Construct triangles and special quadrilaterals • Identify and calculate with sides and angles in special quadrilaterals. • H - Understand and use the properties of diagonals of quadrilaterals • Understand and use the sum of exterior angles of any polygon • Understand and use the sum of interior angles of any polygon • Calculate missing interior angles in regular polygons • H - Prove simple geometric facts • H - Construct an angle bisector • H - Construct a perpendicular bisector of a line segment **Area of trapezia and circles** • Calculate the area of triangles, rectangles and parallelograms • Calculate the area of a trapezium • Calculate the perimeter and area of compound shapes (1) • REVIEW: Calculate the circumference of a circle • Investigate the area of a circle • Calculate the area of a circle and parts of a circle without a calculator • Calculate the area of a circle and parts of a circle with a calculator • Calculate the perimeter and area of compound shapes (2) **Line symmetry and reflection** • Recognise line symmetry • Reflect a shape in a horizontal or vertical line 1 (shapes touching the line) • Reflect a shape in a horizontal or vertical line 2 (shapes not touching the line) • Reflect a shape in a diagonal line 1 (shapes touching the line)	• Draw and interpret pie charts • Draw and interpret line graphs • Choose the most appropriate diagram for given set of data • Represent and interpret grouped quantitative data • Find and interpret the range • Represent and interpret grouped quantitative data • Find and interpret the range **Measures of location** • Understand and use the mean, median and mode • Choose the most appropriate average • H - Find the mean from an ungrouped frequency table • H - Find the mean from a grouped frequency table • Identify outliers • Compare distributions using averages and the range

					• Reflect a shape in a diagonal line 2 (shapes not touching the line)	

Getting GCSE Ready – Students in Set 4

UNIT 1: Number, powers, roots, decimals and rounding to 10,100,1000

- 1a Integers and place value
- 1b Decimals
- 1c Indices, powers and roots
- 1d Factors, multiples and primes

UNIT 2: Fractions, decimals and percentages

- 2a Fractions
- 2b Percentages
- 2c Fractions, decimals and percentages

UNIT 3: Drawing and interpreting tables and charts

- Time & timetables
- Tables (data collection)
- Questionnaires
- Pictograms
- Line Graphs
- Bar charts
- Stem & Leaf

UNIT 4: Mensuration & Properties of 2D shapes

- Measurement and units
- Circles
- 2D Shapes
- Symmetry
- Simple constructions

UNIT 5: Perimeter and area, Angles, 3D forms shapes

- Perimeter & Area
- Simple Angle Facts
- 3D Forms

UNIT 6: Expressions & substituting into simple formulae

- 6a Algebra: the basics
- 6b Expressions and substitution into formulae

UNIT 7: Probability .

- 7a Probability Scale
- 7b Theoretical Probability.

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Foundation Tier/Crossover Topics – All students

Unit	Topic
01	Two Way Tables
02	Frequency Trees
03	Rounding and Error Intervals
04	Estimation
05	Use of Calculator
06 / 07	Product of Primes/HCF/LCM
08	Real-life Multiples
09 / 10	Fractions
11 / 12	Ratio
13	Direct Proportion
14 15 16	Proportion - Best Value
	Proportion - Recipes
	Proportion - Exchange Rates
17	Inverse Proportion
18 / 19	Percentages
20 / 21	Interest and Growth
	Depreciation and Decay
22	Reverse Percentages

Unit	Topic
27	Solving Equations
28 / 29	Forming and Solving Equations
30 / 31	Factorising
32	Changing the Subject
33 / 34	Standard Index Form
35	Angles in Parallel Lines
36	Interior and Exterior Angles
37	Plans and Elevations
38	Constructions and Loci
39	Bearings
	Pythagoras' Theorem
40 - 45	Trig - Finding Sides
	Trig - Finding Angles
	Trig - Non Calculator
	Pythagoras with Trig
46 - 48	Circles
	Arcs and Sectors
49 / 50	Surface Area and Volume

Unit	Topic
55	Frequency Diagrams
56	Scatter Graphs
57	Time Series
58	Pie Charts
59 / 60	Coordinate Geometry
61	Straight Line Graphs
62	Non-linear Graphs
63 / 64	Speed, Distance, Time
	Compound Measures
65	Real-life Graphs
66 / 67	Congruence
	Similar Shapes
68 - 72	Reflections
	Rotations
	Translations
	Enlargements
	Combined Transformations
73	Vectors

23	Index Laws
24	Expand and Simplify
25	Sequences
26	Inequalities

51	Sampling
52	Averages
53 / 54	Averages from a Table Averages from Grouped Data

74	Probability from a Table
75 / 76	Probability Trees
77	Venn Diagrams
78 / 79	Simultaneous Equations

Higher Tier Topics

Unit	Topic	Unit	Topic
1	a. Recurring fractions	10	Similarity in 2D & 3D
	b. Fractional/negative indices	11	a. Graphs of trig functions
	c. Product rule		b. Further trigonometry
	d. Upper & lower bounds	12	a. Sampling
	e. Surds including rationalising		b. Cumulative frequency & box plots
2	a. Expanding & factorising		c. Histograms
	b. Rearranging equations	13	a. Using graphs of circles, cubes and quadratics
	c. Sequences (including quadratics)		b. Gradient and area under graphs
3	Coordinate geometry	14	Circle geometry – gradients/tangents
4	Surface area & volume - cylinders, cones, spheres & frustums	15	Circle theorems
5	Transformations	16	Algebraic fractions
6	Quadratics including the formula & iteration	17	Functions
7	Simultaneous equations	18	Algebraic Proof
8	Conditional probability	19	Congruence and geometric proof
9	Direct and inverse proportion	20	Vectors

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