

TCEAT Curriculum & Assessment Overview: Mathematics

Course description and overarching aims (Intent)

Mathematics is a subject with wide-ranging applications that provides us with a powerful language to describe and understand the world around us. Basic numeracy skills are essential and are found in all areas of life, including shopping, cooking, sports, travel, personal finances, and DIY. More advanced Mathematics enables us to make progress in fields such as engineering, finance, technology, medicine, architecture and much more. Mathematics also helps us to develop essential personal skills such as critical thinking, problem solving, resilience, communication and independence. It enables us to analyse data and make informed decisions.

We believe that every student can succeed in Mathematics, and have designed a curriculum that enables them to realise their full potential in the subject. We aim to break difficult Mathematical concepts down into manageable chunks that promote a love of learning. We revisit topics frequently to ensure students become fluent and confident with these and steadily build on prior learning, whilst making clear links across the curriculum. We have also built in regular opportunities for students to reason, communicate mathematically, solve problems and spot patterns; all of which help them develop those all-important personal skills mentioned above.

Curriculum model overview (Implementation)

Our Mathematics curriculum has been backward planned based on the outcomes we hope students to achieve at GCSE. It is broken down into 6 different strands of content, which are

Algebra	Geometry	Number	Probability	Ratio and Proportion	Statistics
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When students arrive in year 7 we focus on number, ratio and proportion, building on KS2 foundations, as this is the knowledge that all future content relies heavily upon. Students get an introduction to each of the other strands in year 7 or year 8. Content is then built upon in a spiral fashion throughout the rest of the curriculum, with each of the strands revisited on a regular basis and covered in more depth.

The skills that we are simultaneously aiming to develop with students in Mathematics are to

- use and apply standard techniques, **(AO1)**
- reason, interpret and communicate mathematically, and **(AO2)**
- solve problems within Mathematics and other contexts **(AO3)**

We enable students to develop these skills by having regular, built in opportunities for them to recall prior learning, practice routine procedures, tackle unfamiliar problems, assess the validity of an argument, spot patterns, discuss mathematical concepts and check the validity of their own solutions.

TCEAT Curriculum & Assessment Overview: Mathematics

Three tiers and three outcomes

Our curriculum is structured so that all students can access the appropriate level of support and challenge. There are three tiers (Core, Higher, Advanced) which cover the same material at increasing levels of challenge. All lessons have three differentiated outcomes (labelled Gold/Silver/Bronze) at KS3 and KS4. These allow the students to have a high ownership of their learning and a sense of purposeful progression. This means not only is it possible for all students to learn the same key content at a level appropriate to their current understanding, but it also allows students to move between tiers at any point with ease. The spiral nature of the curriculum results in students having the opportunity for further developments in these topics the next time the topic is revisited.

Example:

<i>Factorising Single Brackets 1</i>	Bronze	Silver	Gold
Advanced	Factorise two terms with one common factor	Finding highest common factor	Factorising higher powers
Higher	Recap expanding brackets	Factorise two terms with one common factor	Finding highest common factor
Core	Recap expanding brackets	Factorise where an integer is HCF	Factorise where a variable is HCF

TCEAT Curriculum & Assessment Overview: Mathematics

Assessment Objectives

We have overarching objectives which summarise the skills covered, or the handling of content involved. The internal school assessment system has integrated assessment objectives so that students can be aware of and consciously work on the different strands of content and skills within the subject /course. The internal school system uses the same objectives from Year 7 to Year 13 so that students can build the habit of subject specific self-review as a continuous process from KS3 to KS5

AO1: Use and apply standard techniques

- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- accurately carry out routine procedures or set tasks requiring multi-step solutions

AO2: Reason, interpret and communicate mathematically

- make deductions, inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of presenting information

AO3: Solve problems within mathematics and in other contexts

- translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes
- make and use connections between different parts of mathematics
- interpret results in the context of the given problem
- evaluate methods used and results obtained
- evaluate solutions to identify how they may have been affected by assumptions made

The proportion of each assessment objective that appears in our quarterly assessments depends on the year group and tier as laid out below. The aim here is to provide appropriate support/challenge according to the needs of each student, whilst working towards the level of rigour required in the GCSE exam at the end of year 11.

	Year 7	Year 8	Year 9	Year 10	Year 11
Advanced	AO1: 50% AO2/AO3: 50%	AO1: 50% AO2/AO3: 50%	AO1: 40% AO2/AO3: 60%	AO1: 40% AO2/AO3: 60%	AO1: 40% AO2/AO3: 60%
Higher	AO1: 60% AO2/AO3: 40%	AO1: 60% AO2/AO3: 40%	AO1: 50% AO2/AO3: 50%	AO1: 40% AO2/AO3: 60%	AO1: 40% AO2/AO3: 60%
Core	AO1: 70% AO2/AO3: 30%	AO1: 70% AO2/AO3: 30%	AO1: 60% AO2/AO3: 40%	AO1: 50% AO2/AO3: 50%	AO1: 50% AO2/AO3: 50%

TCEAT Curriculum & Assessment Overview: Mathematics

Knowledge:

- Substantive knowledge - The main categories that account for the accepted conventions and facts of our subject. In Mathematics we break this down into two further categories
 - Declarative knowledge: Mathematical facts, terminology, definitions and notation **(AO1)**
 - Procedural knowledge: routine procedures or set tasks requiring multi-step solutions **(AO1)**

	Declarative Knowledge	Procedural Knowledge
Examples	<ul style="list-style-type: none"> ✓ “I know that” the prime numbers are 2, 3, 5, 7, 11, ... ✓ “I know that” angles in a triangle sum to 180° ✓ “I know that” the formula for the area of a triangle is $\frac{\text{base} \times \text{height}}{2}$ ✓ “I know that” a parallelogram has two pairs of parallel sides with opposite angles equal in length “I know that” the definition of a term, expression, equation, formula, identity is... 	<ul style="list-style-type: none"> ✓ “I know how” to solve an equation ✓ “I know how” to substitute into a formula ✓ “I know how” to multiply a two-digit integer by another two-digit integer ✓ “I know how” to factorise an expression ✓ “I know how” to calculate the median of a set of numbers ✓ “I know how” to add two fractions together

- Disciplinary knowledge - The main subject skills, procedures, thinking structures and behaviours of our subject. In Mathematics we also refer to this as “Conditional Knowledge”, and it can usually be prefixed with “I know when...”:
 - Making deductions, inferences and drawing conclusions **(AO2)**
 - Interpreting and communicating information accurately **(AO2)**
 - Presenting arguments and proofs **(AO2)**
 - Assessing the validity of an answer/argument and evaluating a given way of presenting information **(AO2)**
 - Making connections between different areas of Mathematics **(AO3)**
 - Solving problems **(AO3)**
 - Evaluating solutions to identify how they may have been affected by assumptions made **(AO3)**

TCEAT Curriculum & Assessment Overview: Mathematics

- Disciplinary Literacy

In Mathematics we support student literacy through the explicit teaching and assessment of tier 2 and tier 3 vocabulary. We define tier 2 vocabulary as the specific mathematical command words that students need to understand in order to access a question. Some examples are “solve”, “evaluate”, “expand”, “multiply out”, “factorise”, “fully factorise”, “simplify”. Tier 3 vocabulary is then defined as subject specific. In Mathematics, these might be words such as “isosceles”, “hexagon”, “prime”, “pictogram”, “median”, “expression”, “proportion”.

Tier 2 command words are taught explicitly as they first appear in the curriculum, supported by modelling of situations where these words apply. They are also regularly assessed through questioning as they appear later in the curriculum, in standardised assessments, in prep tasks, and in quarterly assessments.

Tier 3 words are also taught explicitly as they first appear in the curriculum and are assessed regularly as they appear again later in the curriculum. We make use of Frayer models when having both examples and non-examples really helps to clarify the definition of a word being taught. These might be appropriate in the case of words like “adjacent”, “polygon”, “expression”, “geometric sequence”, “standard form”, but not necessarily in the case of words like “mean”, “median” and “mode”, “area”, “perimeter”, “volume”, where explicit definitions, followed by modelling of the concepts could be more powerful.

Frayer Model Example				
Definition A number is written in standard form when it is expressed as $A \times 10^b$ where $1 \leq A < 10$ and b is an integer.		Characteristics Standard form can be used to write down very big numbers, in which case b is positive or very small numbers where b is negative. <i>A can be a decimal.</i>		
Examples 1.23×10^{12} 3×10^7 4.3×10^5 6×10^{-4} 8.72×10^{-9}		Standard Form	Non-Examples 34×10^7 $28\ 000\ 000$ $7 \times 10^{1.5}$ 0.52×10^6 5.3×2^8 62.7×10^3	

TCEAT Curriculum & Assessment Overview: Mathematics

In addition to this, we record our tier 3 vocabulary in our knowledge organisers, which students can refer to during lessons as necessary. During class discussion we expect students to use accurate Mathematical vocabulary, and in written work we expect them to use accurate mathematical notation in order to support their mathematical literacy. On occasion, when students are asked to provide written answers, we provide them with concise sentence structures to work within in order to communicate themselves clearly and efficiently.

Curriculum seven-year plan:

The Mathematics curriculum is designed to converge at key points throughout the academic year. Mathematics students all follow the same curriculum map at each of the Trust schools. These can be found via the following links for the [Core tier](#) | the [Higher and Advanced tiers](#).

Approaches to learning

Mathematics lessons within any given unit have been designed with some core principles in mind. These are

- A starter that either promotes retrieval practice of previous content or assesses prior learning required to further a concept.
- A development phase that introduces new concepts and vocabulary gradually, makes links to prior learning, and defines key facts/formulae, principles and rules.
- Opportunities for teacher modelling of methods, algorithms, and procedures in a systematic way.
- Independent tasks to allow time for consolidation of understanding.
- Mathematical questioning and discussion that enables students to develop their reasoning skills.
- Assessment for learning points that allow the teacher to gauge the understanding of the class and adapt their teaching accordingly.
- Students expected to use accurate mathematical vocabulary during class discussion and accurate mathematical notation in written work.
- Opportunities for students to practice problem solving and make links across the curriculum.
- A lesson prep task that further consolidates understanding of the content taught and/or allows retrieval practice of previous content.

TCEAT Curriculum & Assessment Overview: Mathematics

Assessment

The Trust assessment policy is central to support the 10:10 ethic which informs the ethos of all of the Trust's schools. Effective assessment allows students to know when and how they have done well, it identifies areas of weakness and supports students to know where they have got to improve. The school assessment system is entirely formative as all assessments are designed to be diagnostic for both the students and the teacher, designed to provide information on progress and provide feedback on areas for improvement as part of a feedback loop. The delivery of the curriculum in all subjects allows for a range of assessment activities including:

AfL – Assessment for Learning

AfL is critical to learning. Throughout each lesson students will be given opportunities to test their understanding and give their teacher opportunities to identify issues and correct misunderstandings on the spot. All teachers utilise strategies to ensure they can assess whole class progress rapidly & target support within lessons. These strategies include the use of mini whiteboards, green pens (used to distinguish student self-marking /correction from that of the teacher), self-assessment, peer-assessment, circulation, live marking, using a visualiser and various types of questioning. In Mathematics, teachers would routinely expect students to use accurate mathematical vocabulary/notation and would provide students with the opportunity to correct these where necessary.

Prep

Prep is designed to support learners to retain and retrieve information therefore strengthening long-term memory. Preps are short tasks, no longer than 15 minutes in length, set each lesson with a due date of the next timetabled lesson. This work is to be completed outside of the classroom (at home or in study club) and is designed to consolidate learning and prepare students for their next lesson. In Mathematics prep is set via a combination of the online platform Sparx and short written tasks. Sparx sets automatic online tasks for students that are targeted at the level they are currently working at. As time goes by, the question selection becomes more and more personalised to each student, as the software learns about which topics they need more support with. We also set short recall and retention/problem solving tasks that students complete on paper and self-assess at the start of the next lesson.

Standardised assessments

These are longer tasks designed to provide students with a chance to applying work from several lessons. These may be done as homework or in-class tasks. In Mathematics we set these in class at key points throughout the year. They cover one or two units worth of work and provide students with timely feedback on their understanding of recent content. These are marked by teachers and the results are recorded on Go4School for parents and students to see. We emphasise that these are low stakes tests and simply used to provide feedback on how well students have understood recent units of work.

TCEAT Curriculum & Assessment Overview: Mathematics

Quarterly assessments

At fixed points throughout the year students sit exams in a formal setting.

Twice per academic year (December Q2, June Q4) students will sit assessments that take the form of formal exams and examine cumulative skills and content acquisition. These milestones are opportunities for students, staff, parents & carers to take stock of progress and performance at this point. We then have the information and feedback needed to take the next steps in their learning. In Mathematics we assess cumulatively at each quarter, but provide topic lists so that students are able to focus their revision on the particular topics assessed at that quarter. Full details of our assessment structure and topics assessed can be found in our [assessment overview document – COMING SOON](#)

	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
Quarter 1	Formal assessment for Q1 focussing on specific topics as detailed in the assessment overview document linked above. Marks and grades recorded on Go4Schools. Learning habit grades, current grades, on track shown on Go4Schools and grade sheets.						
Quarter 2	Formal assessment for Q2 focussing on specific topics as detailed in the assessment overview document linked above. Marks and grades recorded on Go4Schools. Learning habit grades, current grades, on track shown on Go4Schools and grade sheets.						
Quarter 3	Formal assessment for Q3 focussing on specific topics as detailed in the assessment overview document linked above. Marks and grades recorded on Go4Schools. Learning habit grades, current grades, on track shown on Go4Schools and grade sheets.						
Quarter 4	Formal assessment for Q4 focussing on specific topics as detailed in the assessment overview document linked above. Marks and grades recorded on Go4Schools. Learning habit grades, current grades, on track shown on Go4Schools and grade sheets.						

TCEAT Curriculum & Assessment Overview: Mathematics

Feedback routines.

Students are given feedback throughout the school year so they can improve.

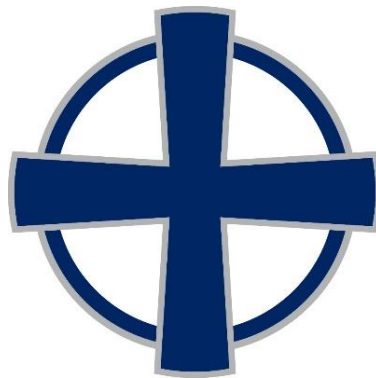
In lessons students will regularly use their mini whiteboards to show their answers and give teachers the opportunity to correct misconceptions. Teachers use a variety of questioning techniques such as no hands up questions, the use of thinking time (e.g. Pose-Pause-Pounce-Bounce), pair talk (e.g. Think-Pair-Share), No opt-out (e.g. reframing the question to the same pupil) and follow up questions (e.g. asking pupil to elaborate, or avoiding paraphrasing pupils- instead pushing for the 'best version' answer). This allows teachers to adapt teaching as necessary.

Formal assessments and Quarterly assessments will be followed by feedback and opportunities to re-check understanding. This will include time for the student to respond to their feedback, time for the teacher to immediately address any significant misconceptions/errors in student understanding, a follow up task or prep that allows students to build on the feedback given and time for students to update their progress tracker at the front of their books.

In Mathematics we have a dedicated lesson following each standardised/quarterly assessment to provide students with feedback on their work. We address the common errors and misconceptions highlighted from marking these assessments and expect students to make corrections/add further annotations to their own work in green pen. Students complete a question level analysis sheet that enables them to quickly see which topics were an issue when planning future revision. They are then provided with a set of similar questions to work through in class/at home to check that their understanding has improved.

External examinations.

KS4 exam board:	AQA GCSE Mathematics specification (8300)
KS5 exam board:	AQA A Level Mathematics specification (7357) [Twyford and William Perkin only], AQA A Level Further Mathematics specification (7367) [Twyford and William Perkin only]
Additional qualifications:	AQA Level 2 Certificate in Further Mathematics specification (8365) AQA Level 1/2 Functional Skills specification (8361/8362) [Ealing Fields and William Perkin only]



Twyford
Cof E
Academies Trust

TWYFORD MATHEMATICS CURRICULUM MAP

Y7-Y11

CORE

TCEAT Curriculum & Assessment Overview: Mathematics

Year 7

Note: topics in **bold** are for Higher/Advanced students only

01 Number 1	N01
Calculation	
Multiply/Divide by Powers of Ten Written Multiplication (inc Decimals) Written Division (inc Decimals) Divisibility Tests Four Operations with Negatives Rounding to Decimal Places Rounding to Significant Figures	
Building On: Primary Foundations	
Leading To: These skills form the foundations of all future units and should be assessed on a regular basis, particularly without a calculator.	

02 Number 2	N02
Types of Number	
Primes, Squares, Cubes and Roots Factors and Multiples Prime Factorisation Lowest Common Multiple Highest Common Factor LCM/HCF of Large Numbers Order of Operations (BIDMAS) Using a Calculator	
Building On: Y7 N01: Types of Calculation (and Primary Foundations)	
Leading To: Y7 A01: Forming Expressions; Substitution; Formulae; Y7 N04: Equivalent Fractions, Four Operations with Fractions; Y7 R01: Equivalent and Simplifying Ratios; Y8 A03: Equations with Squares, Cubes and Roots	

03 Algebra 1	A01
Introduction to Algebra	
Language of Algebra Collecting Like Terms Expanding Brackets and Simplifying Function Machines - Forming Expressions Forming Expressions Substitution and Basic Formulae	
Building On: Y7 N01: Four Operations with Negatives Y7 N02: Squares, Cubes and Roots; Order of Operations; Using a Calculator	
Leading To: <i>Forming expressions will appear regularly in future units.</i> Y7 A02: Solving Equations (including forming); Y7 G01: Formulae for Area and Perimeter; Y8 A04: Generating Sequences with Position-to-Term Rules; Plotting Linear Graphs	

04 Number 3	N03
Fractions, Decimals and Percentages	
Equivalent Fractions (inc Simplifying) Mixed and Improper Fractions Four Operations with Fractions Fraction of an Amount Converting Between FDP Percentages of an Amount (Non-Calc) Increase/Decrease by a Percentage (Non-Calc)	
Building On: Y7 N01: Four Operations with Negatives; Y7 N02: Primes, Factors and Multiples; HCF/LCM;	
Leading To: Y7 R01: Equivalent and Simplifying Ratios; Converting Between Ratios and Fractions; Y8 R02: Percentages with a Calculator; Reverse Percentages; Y9 R03: Successive Percentage Change; Simple/Compound Interest; Recurring Decimals and Fractions	

05 Algebra 2	A02
Solving Equations	
Function Machines - Solving Equations Solving Equations involving: <ul style="list-style-type: none"> • Negative Numbers • Brackets • Fractions • Unknowns on Both Sides Forming and Solving Equations	
Building On: Y7 A01: Function Machines; Collecting Like Terms; Expanding and Simplifying; Forming Expressions; Substitution	
Leading To: <i>Forming and Solving will appear regularly in future units.</i> Y8 A03: Factorising; Further Forming and Solving of Equations; Y9 A05: Identities and Rearranging; Y9 A07: Simultaneous Equations; Y9 A08: Linear Inequalities and Inequality Regions; Y10 A09/A10: Quadratics and Quadratic Equations	

06 Ratio and Proportion 1	R01
Introduction to Ratio and Proportion	
Direct Proportion (Informal) Inverse Proportion (Informal) Unitary Method Writing Ratios Simplifying Ratios (including 1:n and n:1) Equivalent and Overlapping Ratio Sharing in a Ratio Converting Between Ratios and Fractions	
Building On: Y7 N03: Equivalent Fractions/Simplifying; Converting between FDP;	
Leading To: Y8 R02: Speed/Distance/Time; Rates of Change; Y8 G05: Ratio as a Map Scale; Y9 R03: Converting Between Ratios and Equations; Y10 R04: Direct and Inverse Proportion (Formal); Graphs of Proportion	

07 Geometry 1	G01
Introduction to Geometry	
Identifying 2D Shapes Triangles and Quadrilaterals Converting Metric Units Area and Perimeter of: <ul style="list-style-type: none"> • Rectangles • Triangles • Parallelograms • Trapezia Compound Shapes Measuring and Drawing Angles	
Building On: Primary Foundations	
Leading To: Y8 G02: Volume/Surface Area of a Cuboid; Y8 G03: Basic Angle Facts; Y8 G05: Drawing and Measuring Bearings Y9 G06: Area and Circumference of a Circle; Arcs and Sectors; Volume/Surface Area of a Prism; Y10 G09: Area of a Triangle = 1/2absinC; Y11 G10: Area and Volume SFs; Y11 G11: Volume/Surface Area of Pyramids, Cones and Spheres	

08 Statistics 1	S01
Introduction to Data Handling	
Types of Data Sampling and Inferences Mean, Median, Mode and Range Comparing Data Pictograms Two-Way Tables Reading Graphs/Charts/Timetables Misleading Charts and Graphs	
Building On: Primary Foundations	
Leading To: Y8 S02: Averages and Range from Frequency Tables; Composite Bar Charts and Line Charts; Averages from Graphs/Charts; Y8 P01: Probability from Two-Way Tables; Y9 S03: Scatter Diagrams; Time-Series Graphs; Pie Charts; Cumulative Frequency; Box Plots; Y10 S04: Histograms	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 8

Note: topics in **bold** are for Higher/Advanced students only

01 Algebra 3	A03
Further Equations and Factorising	
Factorising Single Brackets Solving Equations involving: <ul style="list-style-type: none"> • Unknowns on Both Sides • Fractions • Squares, Cubes and Roots Forming and Solving Equations including: <ul style="list-style-type: none"> • Worded Problems • Geometry Problems Substitution and Formulae	
Building On: Y7 A01: Expanding Brackets and Simplifying; Substitution and Basic Formulae Y7 A02: Solving Equations (Negatives, Brackets, Fractions, and Unknowns on Both Sides); Forming and Solving Simple Equations	
Leading To: <i>Forming and Solving will appear regularly in future units.</i> Y8 A04: Generating Sequences from Position-to-Term Rules; Plotting Linear Graphs; Y9 A05: Identities and Rearranging; Y9 A07: Simultaneous Equations; Y9 A08: Linear Inequalities; <u>Y10 A09/A10</u> : Quadratics and Quadratic Equations	

02 Geometry 2	G02
Properties of Shapes, Area and Volume	
Revise Area and Perimeter from Y7 G01 3D Shapes including: <ul style="list-style-type: none"> • Names of Common Shapes • Vertices, Faces, Edges Symmetries (Rotational and Lines) Volume of a Cuboid Surface Area of a Cuboid Plans and Elevations	
Building On: Y7 G01: Defining 2D Shapes; Covering Metric Units; Area/Perimeter of Rectangles, Triangles, Parallelograms and Trapezia; Compound Shapes	
Leading To: Y8 G02: Volume/Surface Area of a Cuboid; Y8 G03: Basic Angle Facts; Y8 G05: Drawing and Measuring Bearings Y9 G06: Area and Circumference of a Circle; Arcs and Sectors; Volume/Surface Area of a Prism; Y10 G09: Area of a Triangle = 1/2absinC ; Y11 G10: Area and Volume SFs ; Y11 G11: Volume/Surface Area of Pyramids, Cones and Spheres	

03 Ratio and Proportion 2	R02
Ratio, Rates and Calculator Percentages	
Revise Ratio from Y7 R01 Speed/Distance/Time Problems Rates of Change Problems including Volume Percentages with a Calculator including: <ul style="list-style-type: none"> • Converting to a Percentage • Percentages of Amounts • Increase/Decrease by a Percentage • Change as a Percentage • Reverse Percentage Change 	
Building On: Y7 N03: Convert Between FDP; Percentage of an Amount (Non-Calc); Increase/Decrease by a Percentage (Non-calc); Direct Proportion (Informal)	
Leading To: Y8 G05: Ratio as a Map Scale; Y9 R03: Successive Percentage Change; Simple/Compound Interest; Convert Between Ratios and Equations; Y11 R05: Density and Pressure; Distance-Time Graphs; Speed-Time Graphs; Estimating Rates from Graphs Estimating Distance from Speed-Time Graphs	

04 Statistics 2	S02
Averages, Frequency Tables and Charts	
Revise Averages and Range from Y7 S01 Revise Comparing Data Reading Ungrouped/Grouped Frequency Tables Averages and Range from Frequency Tables Composite Bar Charts and Line Charts Averages from Graphs/Charts	
Building On: Y7 S01: Mean, Median, Mode and Range; Comparing Data; Reading Graphs/Charts/Timetables	
Leading to: Y9 S03: Scatter Diagrams; Time-Series Graphs; Pie Charts; Cumulative Frequency; Box Plots ; Y10 S04: Histograms	

05 Geometry 3	G03
Angle Facts	
Angle Facts and Problem Solving including: <ul style="list-style-type: none"> • Angles Round a Point • Angles on a Straight Line • Angles in Triangles/Quadrilaterals • Angles in Polygons • Angles in Parallel Lines 	
Building On: Y7 G01: Measuring and Drawing Angles	
Leading To: Y8 G05: Drawing, Measuring and Calculating Bearings; Y9 G07: Trigonometry; Y11 G10: Circle Theorems ; Y11 G12: Constructions and Loci	

06 Probability 1	P01
Introduction to Probability	
The Probability Scale Theoretical Probability of a Single Event Sample Space Diagrams Probability from Two-Way Tables Venn Diagrams including: <ul style="list-style-type: none"> • Construction • Probabilities • Conditional Probability Frequency Trees Experimental Probability Relative Frequency and Sample Size	
Building On: Y7 N03: Converting between FDP; Y7 S01: Two-Way Tables	
Leading To: Y10 P02: Set Notation (Venn Diagrams); Independent Events; Mutually Exclusive Events ; Probability Trees; Product Rule for Counting	

07 Algebra 4	A04
Sequences and Linear Graphs	
Shape and Picture Patterns Recognising Sequences including: <ul style="list-style-type: none"> • Square/Triangular/Cube Numbers • Linear/Arithmetic Sequences • Geometric Sequences • Quadratic Sequences • Fibonacci Sequences Generating Sequences from: <ul style="list-style-type: none"> • Term-to-Term Rules • Position-to-Term Rules Find the nth Term of a Linear Sequence Problem Solving with Fibonacci Sequences Coordinates and Midpoints Plotting Linear Graphs	
Building On: Primary Foundations; <u>Y7 A01/Y8 A03</u> : Substitution and Formulae	
Leading To: Y9 A06: Gradients and $y=mx+c$; Y10 A09/Y10 A10 : Plotting Quadratic Graphs; Y10 A10: Sketching Quadratics ; Quadratic Sequences ; Y10 A11: Equation of a Circle ; Y11 A15: Graphs of Cubic, Reciprocal, Trigonometric and Exponential Functions	

08 Geometry 4	G04
Transformations	
Introduction to Vectors Transformations <ul style="list-style-type: none"> • Translations • Reflections (including in Diagonal Lines) • Rotations • Enlargements Describing Transformations	
Building On: Y8 A04: Coordinates	
Leading To: Y10 G08: Invariant Points ; Drawing and Defining Vectors; Calculating with Vectors; Vector Geometry; Vector Proof ; Y11 G10: Similar Shapes	

09 Geometry 5	G05
Scale and Bearings	
Scale Drawings Ratio as a Map Scale Drawing and Measuring Bearings Calculating Bearings Using Angle Facts	
Building On: Y7 R01/Y8 R02: Writing, Simplifying and Equivalent Ratio Y7 G01: Measuring and Drawing Angles; Y8 G03: Basic Angle Facts; Y8 G04: Enlargement	
Leading To: Y11 G10: Similar Shapes	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 9

Note: topics in **bold** are for Higher/Advanced students only

01 Geometry 6	G06
Circles, Volume and Surface Area	
Parts of a Circle (Definitions)	
Area and Circumference of a Circle	
Arcs and Sectors	
Calculate using Multiples of π	
Volume of a Prism	
Surface Area of a Prism	
Building On:	
Y7 G01/Y8 G02: Area and Perimeter of Triangles, Rectangles, Parallelograms and Trapezia;	
Y8 G02: Volume and Surface Area of Cuboids	
Leading To:	
Y11 G11: Area/Arc Length of a Sector; Volume and Surface Area of Pyramids, Cones and Spheres	

02 Ratio and Proportion 3	R03
Ratios, Fractions and Successive Percentage Change	
Revise Increase/Decrease by a Percentage	
Successive Percentage Change	
Simple Interest	
Compound Interest	
Reverse Percentage Change	
Revise Converting Between Ratios and Fractions	
Converting Recurring Decimals into Fractions	
Building On:	
Y7 N03/Y8 R02: Increase/Decrease by a Percentage (Non-Cal/Calc); Y7 N03: Converting Between FDP;	
Y7 R01: Converting Between Ratios and Fractions;	
Y8 R02: Reverse Percentage Change	
Leading To:	
N/A	

03 Statistics 3	S03
Further Graphs and Charts	
Revise Averages and Range from Y7 S01	
Revise Frequency Tables from Y8 S02	
Scatter Diagrams	
Time-Series Graphs	
Cumulative Frequency	
Box Plots	
Pie Charts	
Building On:	
Y7 G01: Measuring and Drawing Angles; Y7 S01: Averages and Range; Comparing Data; Pictograms; Graphs, Charts and Timetables; Y8 G03: Basic Angle Facts Y8 S02: Averages and Range from Frequency Tables; Composite Bar Charts and Line Graphs	
Leading To:	
Y10 S04: Histograms	

04 Algebra 5	A05
Identities, Rearranging and Equations	
Revise Expanding/Factorising from Y7 A01 and Y8 A03	
Product of Two or More Binomials	
Identities	
Rearranging Formulae:	
<ul style="list-style-type: none"> • Simple Rearranging • Squares, Cubes and Roots • Involving Factorising 	
Forming and Solving Equations with Geometry	
Building On:	
Y7 A01: Expanding Single Brackets and Simplifying	
Y8 A03: Factorising Single Brackets, Forming and Solving Equations	
Leading To:	
Y9 G07: Pythagoras and Trigonometry; Y9 A06: $y=mx+c$	
Y9 A07: Forming and Solving Simultaneous Equations	
Y10 A09: Quadratics; Y10 G09: Sine/Cosine Rule	

05 Geometry 7	G07
Angles, Pythagoras and Trigonometry	
Revise Angles in Polygons	
Pythagoras' Theorem	
Distance Between Two Points	
Simple Trigonometry (SOHCAHTOA)	
Building On:	
Y8 A03: Substitution and Formulae;	
Y9 A05: Rearranging Formulae	
Leading To:	
Y10 G09: Sine Rule, Cosine Rule, $1/2ab\sin C$;	
3D Pythagoras and Trigonometry; Y11 A15: Graphs of Trigonometric Functions; Y11 A14/Y11 A15: Exact Trigonometric Values	

06 Algebra 6	A06
Further Linear Graphs	
Revise Plotting Linear Graphs from Y8 A04	
Calculating Gradients	
$y=mx+c$ including Implicit Form	
Finding the Equation of a Line	
<ul style="list-style-type: none"> • From a Graph • From a Given Point and Gradient • From Two Given Points • Associated with Parallel Lines • Associated with Perpendicular Lines 	
Building On:	
Y8 A03: Substitution and Formulae; Y8 A04: Plotting Linear Graphs; Y9 A05: Rearranging Formulae	
Leading To:	
Y9 A08: Inequality Regions; Y10 A09/Y10 A10: Plotting Quadratic Graphs; Y10 A10: Sketching Quadratics; Y10 A11: Equation of a Circle; Y11 A15: Graphs of Cubic, Reciprocal, Trigonometric and Exponential Functions	

07 Algebra 7	A07
Simultaneous Equations	
Solving Simultaneous Equations	
<ul style="list-style-type: none"> • Equating Coefficients • Substitution • Graphically 	
Forming and Solving Simultaneous Equations	
Building On:	
Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations;	
Y9 A05: Rearranging Formulae; Y9 A06: $y=mx+c$ including implicit form	
Leading To:	
Y11 A13 (Core): Further Linear Simultaneous Equations;	
Y11 A12: Simultaneous Equations (One Linear, One Non-Linear)	

08 Algebra 8	A08
Inequalities	
Representing Inequalities on a Number Line	
Solving Linear Inequalities	
Solving Combined Inequalities	
Integer Solutions to Inequalities	
Inequality Regions	
Building On:	
Y7 A02/Y8 A03/Y9 A05: Solving Equations;	
Y9 A06: $y=mx+c$ including implicit form	
Leading To:	
Y9 N04: Error Intervals; Y11 A12: Quadratic Inequalities	

09 Number 4	N04
Estimation, Bounds and Standard Form	
Significant Figures	
Estimating Calculations	
Estimating Square Roots	
Upper and Lower Bounds	
Error Intervals	
Calculations Involving Bounds	
Writing Numbers in Standard Form	
Calculations Using Standard Form	
Building On:	
Y7 N01: rounding to Decimal Places/ Significant Figures ;	
Y7 N02: Order of Operations; Squares, Cubes and Roots; Y9 R03: Successive Percentage Change	
Leading To:	
Y10 N05: Laws of Indices - Multiplying, Dividing, Negative and Fractional	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 10 Core

01 Algebra 9	A09
Linear and Quadratic Equations	
Revise Solving Equations involving: <ul style="list-style-type: none"> • Unknowns on Both Sides • Brackets • Fractions Forming and Solving Equations Product of Two Binomials Factorising Quadratics (a=1) Solving Quadratics by Factorising Difference of Two Squares	
Building On: Y7 A01: Expanding Single Brackets and Simplifying; Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations; Y8 A03: Factorising Single Brackets	
Leading To: Y10 A10: Roots of Quadratic Graphs	

02 Algebra 10	A10
Graphs and Inequalities	
Revise Linear Graphs from Y9 A06 Plotting Quadratic Graphs Roots of Quadratic Graphs $f(x) = 0$ Revise Inequalities on a Number Line Revise Solving Linear Inequalities Revise Solving Combined Inequalities Revise Integer Solutions to Inequalities	
Building On: <i>Most of this is revision of content covered in previous years, but some builds on the following:</i> Y7 A01/Y8 A03: Substitution and Formulae; Y8 A04/Y9 A06: Plotting Linear Graphs	
Leading To: Y11 A14: Graphs of $y = x^3 + k$ and $y = 1/x$	

03 Probability 2	P02
Further Probability	
Revise Theoretical Probability of a Single Event Revise Sample Space Diagrams Revise Probability from Two-Way Tables Venn Diagrams including: <ul style="list-style-type: none"> • Probability • Set Notation Revise Frequency Trees Independent Events Probability Trees Revise Experimental Probability Revise Relative Frequency	
Building On: <i>Most of this is revision of content covered in previous years, but some builds on the following:</i> Y8 P01: Theoretical Probability of a Single Event; Sample Space Diagrams; Constructing/Interpreting Venn Diagrams	
Leading To: N/A	

04 Geometry 8	G08
Transformations and Vectors	
Revise Transformations <ul style="list-style-type: none"> • Translations • Reflections (including in Diagonal Lines) • Rotations • Enlargements (including Fractions, <u>not</u> Negatives) Revise Describing Transformations Drawing/Interpreting Vectors Calculations with Column Vectors Vector Diagrams (not Proof)	
Building On: Y8 G04: Translations, Reflections (excluding diagonal lines), Rotations and Enlargements (excluding fractional scale factors); Introduction to Vectors	
Leading To: N/A	

05 Number 5	N05
Indices	
Revise Prime Factorisation HCF and LCM of Large Numbers Calculating with Indices Negative Indices Laws of Indices including: <ul style="list-style-type: none"> • Multiplying • Dividing • Brackets 	
Building On: Y7 N02: LCM and HCF (simple); Prime Factorisation; Squares, Cubes and Roots; Y8 P01/Y10 P02: Venn Diagrams; Y9 R03: Successive Percentage Change; Y9 N04: Standard Form	
Leading To: N/A	

06 Ratio 4	R04
Ratio and Percentages Revision	
Increase/Decrease by a Percentage Change as a Percentage Reverse Percentage Change Simple Interest Compound Interest Sharing in a Ratio Further Ratio Problems inc. Best Buy	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: Y11 R05: Conversion Graphs	

07 Statistics 4	S04
Statistics Revision	
Types of Data Sampling and Inferences Pie Charts Revision of Averages and Range Averages/Range from Frequency Tables: <ul style="list-style-type: none"> • Ungrouped • Grouped Scatter Diagrams and Correlation	
Building On: <i>This is all revision of content covered in previous years (except Types of Data, Sampling and Inferences)</i>	
Leading To: N/A	

08 Geometry 9	G09
Geometry Revision	
Angles in: <ul style="list-style-type: none"> • Parallel Lines • Polygons Area and Perimeter Pythagoras' Theorem Trigonometry (SOHCAHTOA) <ul style="list-style-type: none"> • Side Lengths • Angles 	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: Y11 G11: Area/Arc Length of a Sector; Volume and Surface Area of Pyramids, Cones and Spheres	

09 Algebra 11	A11
Linear Graphs Revision	
Revision of $y=mx+c$ from A06 $y=mx+c$ from Implicit Form Finding the Equation of a Line <ul style="list-style-type: none"> • From a Graph • From a Given Point and Gradient • From Two Given Points • Associated with Parallel Lines 	
Building On: <i>This is all revision of content covered in previous years (except $y=mx+c$ from Implicit Form and Finding the Equation of a Line From Two Given Points)</i>	
Leading To: Y11 A13: Solving Simultaneous Equations Graphically Y11 A14: Graphs of $y = x^3 + k$ and $y = 1/x$	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 11 Core

01 Algebra 12	A12
Algebra Revision	
Expanding Single Brackets	
Factorising Single Brackets	
Expanding Double Brackets	
Factorising Quadratics	
Solving Quadratics	
Plotting Quadratics	
Plotting Linear Graphs	
Linear Sequences	
Special Sequences	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: N/A	

02 Algebra 13	A13
Further Simultaneous Equations	
Revise Solving Linear Equations	
Revise Forming and Solving Equations	
Solving Simultaneous Equations	
<ul style="list-style-type: none"> Equating Coefficients Graphically 	
Forming and Solving Simultaneous Equations	
Building On: Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations; Y9 A07: Solving Simultaneous Equations without Scaling; Y9 A06: $y=mx+c$;	
Leading To: N/A	

03 Ratio and Proportion 5	R05
Time and Compound Measures	
Problems Involving Time	
Revise Direct Proportion from Y7 R01	
Inverse Proportion	
Recognise Equations of Direct and Inverse Proportion	
Compound Units:	
<ul style="list-style-type: none"> Speed/Distance/Time Density/Mass/Volume Pressure/Force/Area 	
Distance-Time Graphs	
Real Life Graphs	
Conversion Graphs	
Building On: Y7 R01: Direct Proportion (Informal); Y8 R02: Speed/Distance/Time Problems; Y9 A06: $y=mx+c$	
Leading To: N/A	

04 Geometry 10	G10
Angles, Similarity and Congruence	
Revise Angles in:	
<ul style="list-style-type: none"> Parallel Lines Polygons 	
Similar Shapes	
Definition of Congruence	
Conditions for Congruent Triangles	
Building On: Y8 G04/Y10 G08: Enlargement; Y8 G03: Angle Facts; Y8 G05: Scale Drawings;	
Leading To: N/A	

05 Number 6	N06
Money and Number Revision	
Bank Statements	
Converting to/between FDP	
Comparing FDP	
Calculations with Fractions	
Fraction/Percentage of an Amount	
Percentage Skills	
<ul style="list-style-type: none"> Increase/Decrease/Change Simple Interest Compound Interest Reverse Percentage Change 	
Index Laws	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: N/A	

06 Geometry 11	G11
Further Area and Volume	
Circle Problems	
Area of a Sector	
Arc Length/Perimeter of a Sector	
Revise Volume of a Prism	
Revise Surface Area of a Prism	
Volume and Surface Area of:	
<ul style="list-style-type: none"> Pyramids Cones Spheres 	
Building On: Y7 G01/Y8 G02: Area and Perimeter of Triangles, Rectangles, Parallelograms and Trapezia; Y8 G02: Volume and Surface Area of Cuboids; Y9 G06: Area/Circumference of Circles; Arcs and Sectors; Volume/Surface Area of a Prism	
Leading To: N/A	

07 Algebra 14	A14
Graphs and Trigonometry	
Sketching Graphs of:	
<ul style="list-style-type: none"> $y = x^3 + k$ $y = 1/x$ 	
Reading Values from Graphs	
Revise Trigonometry (SOHCAHTOA)	
Exact Trigonometric Values	
Building On: Y9 G06: Simple Trigonometry (SOHCAHTOA); Y9 A06: $y=mx+c$ and the Equation of a Line; Y10 A10: Plotting Quadratic Graphs	
Leading To: N/A	

08 Probability 3	P03
Probability Revision	
Sample Space Diagrams	
Probability from Two-Way Tables	
Frequency Trees	
Venn Diagrams	
Probability Trees	
Experimental Probability	
Relative Frequency	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: N/A	

09 Geometry 12	G12
Constructions and Loci	
Locus of Points	
<ul style="list-style-type: none"> Equidistant from a Point Equidistant from a Line 	
Constructing Triangles	
Perpendicular Bisectors	
Perpendicular to/from a Line from/to a point	
Construct an Angle of 60°	
Angle Bisectors	
Combined Loci Problems	
Building On: Y7 G01: Measuring and Drawing Angles	
Leading To: N/A	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Key Stage 2: Year 5/6 Programme of Study (for Reference)

Number - Number and place value

Pupils should be taught to:

Year 5

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Year 6

- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.

Number - Addition and subtraction, multiplication and division

Pupils should be taught to:

Year 5

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Year 6

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.



TCEAT Curriculum & Assessment Overview: Mathematics

Number - Fractions (including decimals and percentages)

Pupils should be taught to:

Year 5

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

Year 6

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]
- divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Ratio and proportion

Pupils should be taught to:

Year 6

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving similar shapes where the scale factor is known or can be found
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Algebra

Pupils should be taught to:

Year 6

- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables.

TCEAT Curriculum & Assessment Overview: Mathematics

Measurement

Pupils should be taught to:

Year 5

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Year 6

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles
- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units [for example, mm³ and km³].

Geometry – properties of shapes

Pupils should be taught to:

Year 5

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Year 6

- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Geometry – position and direction

Pupils should be taught to:

Year 5

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Year 6

- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Statistics

Pupils should be taught to:

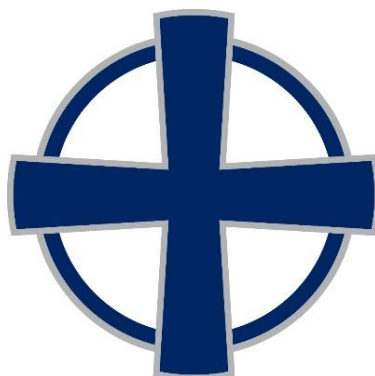
Year 5

- solve comparison, sum and difference problems using information presented in a line graph
- complete, read and interpret information in tables, including timetables.

Year 6

- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average.





Twyford
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Academies Trust

TWYFORD MATHEMATICS CURRICULUM MAP

Y7-Y11

ADVANCED/HIGHER

TCEAT Curriculum & Assessment Overview: Mathematics

Year 7

Note: topics in **bold** are for Higher/Advanced students only

01 Number 1	N01
Calculation	
Multiply/Divide by Powers of Ten Written Multiplication (inc Decimals) Written Division (inc Decimals) Divisibility Tests Four Operations with Negatives Rounding to Decimal Places Rounding to Significant Figures	
Building On: Primary Foundations	
Leading To: These skills form the foundations of all future units and should be assessed on a regular basis, particularly without a calculator.	

02 Number 2	N02
Types of Number	
Primes, Squares, Cubes and Roots Factors and Multiples Prime Factorisation Lowest Common Multiple Highest Common Factor LCM/HCF of Large Numbers Order of Operations (BIDMAS) Using a Calculator	
Building On: Y7 N01: Types of Calculation (and Primary Foundations)	
Leading To: Y7 A01: Forming Expressions; Substitution; Formulae; Y7 N04: Equivalent Fractions, Four Operations with Fractions; Y7 R01: Equivalent and Simplifying Ratios; Y8 A03: Equations with Squares, Cubes and Roots	

03 Algebra 1	A01
Introduction to Algebra	
Language of Algebra Collecting Like Terms Expanding Brackets and Simplifying Function Machines - Forming Expressions Forming Expressions Substitution and Basic Formulae	
Building On: Y7 N01: Four Operations with Negatives Y7 N02: Squares, Cubes and Roots; Order of Operations; Using a Calculator	
Leading To: <i>Forming expressions will appear regularly in future units.</i> Y7 A02: Solving Equations (including forming); Y7 G01: Formulae for Area and Perimeter; Y8 A04: Generating Sequences with Position-to-Term Rules; Plotting Linear Graphs	

04 Number 3	N03
Fractions, Decimals and Percentages	
Equivalent Fractions (inc Simplifying) Mixed and Improper Fractions Four Operations with Fractions Fraction of an Amount Converting Between FDP Percentages of an Amount (Non-Calc) Increase/Decrease by a Percentage (Non-Calc)	
Building On: Y7 N01: Four Operations with Negatives; Y7 N02: Primes, Factors and Multiples; HCF/LCM;	
Leading To: Y7 R01: Equivalent and Simplifying Ratios; Converting Between Ratios and Fractions; Y8 R02: Percentages with a Calculator; Reverse Percentages; Y9 R03: Successive Percentage Change; Simple/Compound Interest; Recurring Decimals and Fractions	

05 Algebra 2	A02
Solving Equations	
Function Machines - Solving Equations Solving Equations involving: <ul style="list-style-type: none"> • Negative Numbers • Brackets • Fractions • Unknowns on Both Sides Forming and Solving Equations	
Building On: Y7 A01: Function Machines; Collecting Like Terms; Expanding and Simplifying; Forming Expressions; Substitution	
Leading To: <i>Forming and Solving will appear regularly in future units.</i> Y8 A03: Factorising; Further Forming and Solving of Equations; Y9 A05: Identities and Rearranging; Y9 A07: Simultaneous Equations; Y9 A08: Linear Inequalities and Inequality Regions; Y10 A09/A10: Quadratics and Quadratic Equations	

06 Ratio and Proportion 1	R01
Introduction to Ratio and Proportion	
Direct Proportion (Informal) Inverse Proportion (Informal) Unitary Method Writing Ratios Simplifying Ratios (including 1:n and n:1) Equivalent and Overlapping Ratio Sharing in a Ratio Converting Between Ratios and Fractions	
Building On: Y7 N03: Equivalent Fractions/Simplifying; Converting between FDP;	
Leading To: Y8 R02: Speed/Distance/Time; Rates of Change; Y8 G05: Ratio as a Map Scale; Y9 R03: Converting Between Ratios and Equations; Y10 R04: Direct and Inverse Proportion (Formal); Graphs of Proportion	

07 Geometry 1	G01
Introduction to Geometry	
Identifying 2D Shapes Triangles and Quadrilaterals Converting Metric Units Area and Perimeter of: <ul style="list-style-type: none"> • Rectangles • Triangles • Parallelograms • Trapezia Compound Shapes Measuring and Drawing Angles	
Building On: Primary Foundations	
Leading To: Y8 G02: Volume/Surface Area of a Cuboid; Y8 G03: Basic Angle Facts; Y8 G05: Drawing and Measuring Bearings Y9 G06: Area and Circumference of a Circle; Arcs and Sectors; Volume/Surface Area of a Prism; Y10 G09: Area of a Triangle = 1/2absinC; Y11 G10: Area and Volume SFs; Y11 G11: Volume/Surface Area of Pyramids, Cones and Spheres	

08 Statistics 1	S01
Introduction to Data Handling	
Types of Data Sampling and Inferences Mean, Median, Mode and Range Comparing Data Pictograms Two-Way Tables Reading Graphs/Charts/Timetables Misleading Charts and Graphs	
Building On: Primary Foundations	
Leading To: Y8 S02: Averages and Range from Frequency Tables; Composite Bar Charts and Line Charts; Averages from Graphs/Charts; Y8 P01: Probability from Two-Way Tables; Y9 S03: Scatter Diagrams; Time-Series Graphs; Pie Charts; Cumulative Frequency; Box Plots; Y10 S04: Histograms	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 8

Note: topics in **bold** are for Higher/Advanced students only

01 Algebra 3	A03
Further Equations and Factorising	
Factorising Single Brackets Solving Equations involving: <ul style="list-style-type: none"> • Unknowns on Both Sides • Fractions • Squares, Cubes and Roots Forming and Solving Equations including: <ul style="list-style-type: none"> • Worded Problems • Geometry Problems Substitution and Formulae	
Building On: Y7 A01: Expanding Brackets and Simplifying; Substitution and Basic Formulae Y7 A02: Solving Equations (Negatives, Brackets, Fractions, and Unknowns on Both Sides); Forming and Solving Simple Equations	
Leading To: <i>Forming and Solving will appear regularly in future units.</i> Y8 A04: Generating Sequences from Position-to-Term Rules; Plotting Linear Graphs; Y9 A05: Identities and Rearranging; Y9 A07: Simultaneous Equations; Y9 A08: Linear Inequalities; <u>Y10 A09/A10</u> : Quadratics and Quadratic Equations	

02 Geometry 2	G02
Properties of Shapes, Area and Volume	
Revise Area and Perimeter from Y7 G01 3D Shapes including: <ul style="list-style-type: none"> • Names of Common Shapes • Vertices, Faces, Edges Symmetries (Rotational and Lines) Volume of a Cuboid Surface Area of a Cuboid Plans and Elevations	
Building On: Y7 G01: Defining 2D Shapes; Covering Metric Units; Area/Perimeter of Rectangles, Triangles, Parallelograms and Trapezia; Compound Shapes	
Leading To: Y8 G02: Volume/Surface Area of a Cuboid; Y8 G03: Basic Angle Facts; Y8 G05: Drawing and Measuring Bearings Y9 G06: Area and Circumference of a Circle; Arcs and Sectors; Volume/Surface Area of a Prism; Y10 G09: Area of a Triangle = 1/2absinC ; Y11 G10: Area and Volume SFs ; Y11 G11: Volume/Surface Area of Pyramids, Cones and Spheres	

03 Ratio and Proportion 2	R02
Ratio, Rates and Calculator Percentages	
Revise Ratio from Y7 R01 Speed/Distance/Time Problems Rates of Change Problems including Volume Percentages with a Calculator including: <ul style="list-style-type: none"> • Converting to a Percentage • Percentages of Amounts • Increase/Decrease by a Percentage • Change as a Percentage • Reverse Percentage Change 	
Building On: Y7 N03: Convert Between FDP; Percentage of an Amount (Non-Calc); Increase/Decrease by a Percentage (Non-calc); Direct Proportion (Informal)	
Leading To: Y8 G05: Ratio as a Map Scale; Y9 R03: Successive Percentage Change; Simple/Compound Interest; Convert Between Ratios and Equations; Y11 R05: Density and Pressure; Distance-Time Graphs; Speed-Time Graphs; Estimating Rates from Graphs Estimating Distance from Speed-Time Graphs	

04 Statistics 2	S02
Averages, Frequency Tables and Charts	
Revise Averages and Range from Y7 S01 Revise Comparing Data Reading Ungrouped/Grouped Frequency Tables Averages and Range from Frequency Tables Composite Bar Charts and Line Charts Averages from Graphs/Charts	
Building On: Y7 S01: Mean, Median, Mode and Range; Comparing Data; Reading Graphs/Charts/Timetables	
Leading to: Y9 S03: Scatter Diagrams; Time-Series Graphs; Pie Charts; Cumulative Frequency; Box Plots ; Y10 S04: Histograms	

05 Geometry 3	G03
Angle Facts	
Angle Facts and Problem Solving including: <ul style="list-style-type: none"> • Angles Round a Point • Angles on a Straight Line • Angles in Triangles/Quadrilaterals • Angles in Polygons • Angles in Parallel Lines 	
Building On: Y7 G01: Measuring and Drawing Angles	
Leading To: Y8 G05: Drawing, Measuring and Calculating Bearings; Y9 G07: Trigonometry; Y11 G10: Circle Theorems ; Y11 G12: Constructions and Loci	

06 Probability 1	P01
Introduction to Probability	
The Probability Scale Theoretical Probability of a Single Event Sample Space Diagrams Probability from Two-Way Tables Venn Diagrams including: <ul style="list-style-type: none"> • Construction • Probabilities • Conditional Probability Frequency Trees Experimental Probability Relative Frequency and Sample Size	
Building On: Y7 N03: Converting between FDP; Y7 S01: Two-Way Tables	
Leading To: Y10 P02: Set Notation (Venn Diagrams); Independent Events; Mutually Exclusive Events ; Probability Trees; Product Rule for Counting	

07 Algebra 4	A04
Sequences and Linear Graphs	
Shape and Picture Patterns Recognising Sequences including: <ul style="list-style-type: none"> • Square/Triangular/Cube Numbers • Linear/Arithmetic Sequences • Geometric Sequences • Quadratic Sequences • Fibonacci Sequences Generating Sequences from: <ul style="list-style-type: none"> • Term-to-Term Rules • Position-to-Term Rules Find the nth Term of a Linear Sequence Problem Solving with Fibonacci Sequences Coordinates and Midpoints Plotting Linear Graphs	
Building On: Primary Foundations; <u>Y7 A01/Y8 A03</u> : Substitution and Formulae	
Leading To: Y9 A06: Gradients and $y=mx+c$; Y10 A09/Y10 A10 : Plotting Quadratic Graphs; Y10 A10: Sketching Quadratics ; Quadratic Sequences ; Y10 A11: Equation of a Circle ; Y11 A15: Graphs of Cubic, Reciprocal, Trigonometric and Exponential Functions	

08 Geometry 4	G04
Transformations	
Introduction to Vectors Transformations <ul style="list-style-type: none"> • Translations • Reflections (including in Diagonal Lines) • Rotations • Enlargements Describing Transformations	
Building On: Y8 A04: Coordinates	
Leading To: Y10 G08: Invariant Points ; Drawing and Defining Vectors; Calculating with Vectors; Vector Geometry; Vector Proof ; Y11 G10: Similar Shapes	

09 Geometry 5	G05
Scale and Bearings	
Scale Drawings Ratio as a Map Scale Drawing and Measuring Bearings Calculating Bearings Using Angle Facts	
Building On: Y7 R01/Y8 R02: Writing, Simplifying and Equivalent Ratio Y7 G01: Measuring and Drawing Angles; Y8 G03: Basic Angle Facts; Y8 G04: Enlargement	
Leading To: Y11 G10: Similar Shapes	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 9

Note: topics in **bold** are for Higher/Advanced students only

01 Geometry 6	G06
Circles, Volume and Surface Area	
Parts of a Circle (Definitions)	
Area and Circumference of a Circle	
Arcs and Sectors	
Calculate using Multiples of π	
Volume of a Prism	
Surface Area of a Prism	
Building On:	
Y7 G01/Y8 G02: Area and Perimeter of Triangles, Rectangles, Parallelograms and Trapezia;	
Y8 G02: Volume and Surface Area of Cuboids	
Leading To:	
Y11 G11: Area/Arc Length of a Sector; Volume and Surface Area of Pyramids, Cones and Spheres	

02 Ratio and Proportion 3	R03
Ratios, Fractions and Successive Percentage Change	
Revise Increase/Decrease by a Percentage	
Successive Percentage Change	
Simple Interest	
Compound Interest	
Reverse Percentage Change	
Revise Converting Between Ratios and Fractions	
Converting Recurring Decimals into Fractions	
Building On:	
Y7 N03/Y8 R02: Increase/Decrease by a Percentage (Non-Cal/Calc); Y7 N03: Converting Between FDP;	
Y7 R01: Converting Between Ratios and Fractions;	
Y8 R02: Reverse Percentage Change	
Leading To:	
N/A	

03 Statistics 3	S03
Further Graphs and Charts	
Revise Averages and Range from Y7 S01	
Revise Frequency Tables from Y8 S02	
Scatter Diagrams	
Time-Series Graphs	
Cumulative Frequency	
Box Plots	
Pie Charts	
Building On:	
Y7 G01: Measuring and Drawing Angles; Y7 S01: Averages and Range; Comparing Data; Pictograms; Graphs, Charts and Timetables; Y8 G03: Basic Angle Facts Y8 S02: Averages and Range from Frequency Tables; Composite Bar Charts and Line Graphs	
Leading To:	
Y10 S04: Histograms	

04 Algebra 5	A05
Identities, Rearranging and Equations	
Revise Expanding/Factorising from Y7 A01 and Y8 A03	
Product of Two or More Binomials	
Identities	
Rearranging Formulae:	
<ul style="list-style-type: none"> • Simple Rearranging • Squares, Cubes and Roots • Involving Factorising 	
Forming and Solving Equations with Geometry	
Building On:	
Y7 A01: Expanding Single Brackets and Simplifying	
Y8 A03: Factorising Single Brackets, Forming and Solving Equations	
Leading To:	
Y9 G07: Pythagoras and Trigonometry; Y9 A06: $y=mx+c$	
Y9 A07: Forming and Solving Simultaneous Equations	
Y10 A09: Quadratics; Y10 G09: Sine/Cosine Rule	

05 Geometry 7	G07
Angles, Pythagoras and Trigonometry	
Revise Angles in Polygons	
Pythagoras' Theorem	
Distance Between Two Points	
Simple Trigonometry (SOHCAHTOA)	
Building On:	
Y8 A03: Substitution and Formulae;	
Y9 A05: Rearranging Formulae	
Leading To:	
Y10 G09: Sine Rule, Cosine Rule, $1/2ab\sin C$;	
3D Pythagoras and Trigonometry; Y11 A15: Graphs of Trigonometric Functions; Y11 A14/Y11 A15: Exact Trigonometric Values	

06 Algebra 6	A06
Further Linear Graphs	
Revise Plotting Linear Graphs from Y8 A04	
Calculating Gradients	
$y=mx+c$ including Implicit Form	
Finding the Equation of a Line	
<ul style="list-style-type: none"> • From a Graph • From a Given Point and Gradient • From Two Given Points • Associated with Parallel Lines • Associated with Perpendicular Lines 	
Building On:	
Y8 A03: Substitution and Formulae; Y8 A04: Plotting Linear Graphs; Y9 A05: Rearranging Formulae	
Leading To:	
Y9 A08: Inequality Regions; Y10 A09/Y10 A10: Plotting Quadratic Graphs; Y10 A10: Sketching Quadratics; Y10 A11: Equation of a Circle; Y11 A15: Graphs of Cubic, Reciprocal, Trigonometric and Exponential Functions	

07 Algebra 7	A07
Simultaneous Equations	
Solving Simultaneous Equations	
<ul style="list-style-type: none"> • Equating Coefficients • Substitution • Graphically 	
Forming and Solving Simultaneous Equations	
Building On:	
Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations;	
Y9 A05: Rearranging Formulae; Y9 A06: $y=mx+c$ including implicit form	
Leading To:	
Y11 A13 (Core): Further Linear Simultaneous Equations;	
Y11 A12: Simultaneous Equations (One Linear, One Non-Linear)	

08 Algebra 8	A08
Inequalities	
Representing Inequalities on a Number Line	
Solving Linear Inequalities	
Solving Combined Inequalities	
Integer Solutions to Inequalities	
Inequality Regions	
Building On:	
Y7 A02/Y8 A03/Y9 A05: Solving Equations;	
Y9 A06: $y=mx+c$ including implicit form	
Leading To:	
Y9 N04: Error Intervals; Y11 A12: Quadratic Inequalities	

09 Number 4	N04
Estimation, Bounds and Standard Form	
Significant Figures	
Estimating Calculations	
Estimating Square Roots	
Upper and Lower Bounds	
Error Intervals	
Calculations Involving Bounds	
Writing Numbers in Standard Form	
Calculations Using Standard Form	
Building On:	
Y7 N01: rounding to Decimal Places/ Significant Figures ;	
Y7 N02: Order of Operations; Squares, Cubes and Roots; Y9 R03: Successive Percentage Change	
Leading To:	
Y10 N05: Laws of Indices - Multiplying, Dividing, Negative and Fractional	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 10 Higher/Advanced

01 Algebra 9	A09
Quadratics 1	
Plotting Quadratic Graphs Solving Equations Using Quadratic Graphs Revise Product of Two or More Binomials Factorising Quadratics (a=1) inc. D.O.T.S Solving Quadratics by Factorising Quadratic Formula Forming and Solving Quadratics	
Building On: Y7 A01: Expanding Single Brackets and Simplifying; Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations; Y8 A03: Factorising Single Brackets; Y7 A01/Y8 A03: Substitution and Formulae; Y8 A04/Y9 A06: Plotting Linear Graphs	
Leading To: Y10 A10: Factorising and Solving Quadratics (a≠1); Completing the Square and Turning Points; Sketching Quadratics; Y11 A12: Simultaneous Equations (One Linear, One Non-Linear); Quadratic Inequalities; Quadratic Equations involving Algebraic Fractions	

02 Algebra 10	A10
Quadratics 2	
Factorising Quadratics (a≠1) inc. D.O.T.S Solving Quadratics by Factorising Completing the Square (a=1) Completing the Square (a≠1) Solving Quadratics by Completing the Square Turning Points of Quadratics Sketching Quadratics Quadratic Sequences	
Building On: Y8 A04: nth Term of a Linear Sequence; Continuing Quadratic Sequences; Y10 A09: Factorising and Solving Quadratics (a=1); Plotting Quadratic Graphs	
Leading To: Y10 A11: Equation of a Circle; Y11 A12: Simultaneous Equations (One Linear, One Non-Linear); Quadratic Inequalities; Quadratic Equations Involving Algebraic Fractions	

03 Probability 2	P02
Further Probability	
Product Rule for Counting Mutually Exclusive Events Independent Events Probability Trees: <ul style="list-style-type: none"> • Independent Probabilities • Dependent Probabilities Constructing and Interpreting Venn Diagrams Set Notation Probability from Venn Diagrams	
Building On: Y8 P01: Theoretical Probability of a Single Event; Sample Space Diagrams; Constructing/Interpreting Venn Diagrams	
Leading To: N/A	

04 Geometry 8	G08
Transformations and Vectors	
Revise Transformations <ul style="list-style-type: none"> • Translations • Reflections (including in Diagonal Lines) • Rotations • Enlargements • Invariant Points Drawing and Defining Vectors Calculating with Vectors Vector Geometry Vector Proofs	
Building On: Y8 G04: Translations, Reflections, Rotations and Enlargements; Introduction to Vectors; Y7 R01/Y9 R03: Converting Between Ratios and Fractions	
Leading To: Y11 G10: Similar Shapes; Area and Volume Scale Factors	

05 Number 5	N05
Indices and Surds	
Basic Laws of Indices Negative Indices Fractional Indices Equations with Indices Surds including: <ul style="list-style-type: none"> • Multiplying and dividing • Simplifying • Expanding • Rationalising 	
Building On: Y9 R03: Successive Percentage Change; Y9 N04: Standard Form; Estimating Square Roots	
Leading To: Y11 A15: Exponential Functions; Exact Trigonometric Values	

06 Ratio and Proportion 4	R04
Percentages and Proportion	
Revise Percentages from Y9 R03 Revise Successive Percentage Change Changing Ratio by Scaling or Using Algebra Direct Proportion (Formal) Inverse Proportion (Formal) Graphs of Direct and Inverse Proportion	
Building On: Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations; Y7 R01: Equivalent and Overlapping Ratio; Direct/Inverse Proportion (Informal);	
Leading To: Y11 A15: Graphs of Reciprocal Functions	

07 Statistics 4	S04
Data and Histograms	
Revise Sampling and Inferences Revise <ul style="list-style-type: none"> • Cumulative Frequency • Box Plots Histograms including: <ul style="list-style-type: none"> • Constructing • Interpreting • Comparing • Calculations from Histograms, eg: <ul style="list-style-type: none"> - Estimating the Mean - Estimating the Median - Interquartile Range 	
Building On: Y7 S01: Mean, Median, Mode and Range; Comparing Data; Y8 S02/Y9 S03: Averages and Range from Frequency Tables; Y8 S02: Bar Charts and Line Charts	
Leading To: N/A	

08 Geometry 9	G09
Further Trigonometry and Pythagoras	
Sine Rule Cosine Rule Area of a Triangle Using Sine 3D Trigonometry 3D Pythagoras	
Building On: Y9 G07: Pythagoras' Theorem; Simple Trigonometry (SOHCAHTOA)	
Leading To: Y11 A15: Graphs of Trigonometric Functions; Exact Trigonometric Values	

09 Algebra 11	A11
Equation of a Circle	
Revise $y=mx+c$ Revise Finding the Equation of a Line: <ul style="list-style-type: none"> • From a Graph • From a Given Point and Gradient • From Two Given Points • Associated with Parallel Lines • Associated with Perpendicular Lines Equation of a Circle Tangents to Circles	
Building On: Y9 A06: $y=mx+c$ and Finding the Equation of a Line; Y10 A06: Plotting Quadratic Graphs; Y10 A10: Sketching Quadratic Graphs	
Leading To: Y11 A15: Graphs of Cubic, Reciprocal, Trigonometric and Exponential Functions	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Year 11 Higher/Advanced

01 Algebra 12	A12
Further Algebra	
Simultaneous Equations (One Linear, One Non-Linear) Revise Solving Equations Using Quadratic Graphs Quadratic Inequalities Algebraic Fractions <ul style="list-style-type: none"> • Simplifying • Adding/Subtracting • Multiplying/Dividing • Solving Equations 	
Building On: Y7 N03: Four Operations with Fractions Y7 A02/Y8 A03/Y9 A05: Forming and Solving Equations Y9 A07: Linear Simultaneous Equations Y10: A09/A10: Solving Quadratic Equations	
Leading To: N/A	

02 Algebra 13	A13
Iteration and Functions	
Trial and Improvement Sequences from Subscript Notation Iterative Formulae Functions including: <ul style="list-style-type: none"> • Function Notation • Composite Functions • Inverse Functions 	
Building On: Y7 A01/Y8 A03: Substitution and Formulae; Y8 A04: Generating Sequences from Term-to-Term Rules; Y9 A05: Rearranging Formulae	
Leading To: N/A	

03 Ratio and Proportion 5	R05
Rates of Change and Travel Graphs	
Compound Units <ul style="list-style-type: none"> • Speed/Distance/Time • Density/Mass/Volume • Pressure/Force/Area Converting between Units of Speed Distance-Time Graphs Speed-Time Graphs Estimating Rates of Change from Graphs Estimating Distances from Speed-Time Graphs	
Building On: Y7 G01/Y8 G02: Area and Perimeter of Triangles, Rectangles, Parallelograms and Trapezia; Y8 G02: Volume and Surface Area of Cuboids; Y8 R02: Speed/Distance/Time Problems; Y9 G06: Definition of a Tangent; Area/Circumference of Circles; Arcs and Sectors; Volume/Surface Area of a Prism; Y9 A06: Gradients	
Leading To: N/A	

04 Geometry 10	G10
Similarity, Circle Theorems and Congruence	
Similar Shapes Area and Volume Scale Factors (including Ratios) Circle Theorems Congruent Triangles	
Building On: Y7 R01: Equivalent Ratios; Converting Between Ratios and Fractions; Y8 G04/Y10 G08: Enlargement; Y8 G03: Angle Facts; Y8 G05: Scale Drawings	
Leading To: N/A	

05 Algebra 14	A14
Proof	
Geometric Proof Proof including Circles Theorems Algebraic Proof	
Building On: Y7 A01: Expanding and Simplifying; Forming Expressions; Y8 A03: Factorising Single Brackets; Y8 G03: Angle Facts; Y9 A05: Product of Two or More Binomials; Y10 A09/A10: Factorising Quadratics/Completing the Square	
Leading To: N/A	

06 Geometry 11	G11
Segments and Further Volume	
Area and Perimeter of a Segment Volume and Surface Area of: <ul style="list-style-type: none"> • Cones • Spheres • Frustums • Pyramids Solving Density Problems	
Building On: Y7 G01/Y8 G02: Area and Perimeter of Triangles, Rectangles, Parallelograms and Trapezia; Y8 G02: Volume and Surface Area of Cuboids; Y9 G06: Area/Circumference of Circles; Arcs and Sectors; Volume/Surface Area of a Prism; Y11 R05: Density	
Leading To: N/A	

07 Algebra 15	A15
Graphs and Exact Trig Values	
Graphs of: <ul style="list-style-type: none"> • Cubic Functions of the Form $y=x^3+k$ • Reciprocal Functions • Trigonometric Functions • Exponential Functions Transformations of Graphs: <ul style="list-style-type: none"> • Translations • Reflections Exact Trigonometric Values	
Building On: Y9 G06: Simple Trigonometry (SOHCAHTOA); Y8 A04: Plotting Linear Graphs; Y8 G04/Y10 G08: Transformations of 2D Shapes - Translation/Reflection; Y9 A06: $y=mx+c$ and the Equation of a Line; Y10 A09/Y10 A10: Plotting/Sketching Quadratic Graphs; Y10 A11: The Equation of a Circle	
Leading To: N/A	

08 Probability 3	P03
Probability Revision	
Venn Diagrams and Set Notation <ul style="list-style-type: none"> • Conditional Probability Probability Trees: <ul style="list-style-type: none"> • Independent • Dependent Experimental Probability Relative Frequency	
Building On: <i>This is all revision of content covered in previous years</i>	
Leading To: N/A	

09 Geometry 12	G12
Constructions and Loci	
Locus of Points <ul style="list-style-type: none"> • Equidistant from a Point • Equidistant from a Line Constructing Triangles Perpendicular Bisectors Perpendicular to/from a Line from/to a point Construct an Angle of 60° Angle Bisectors Combined Loci Problems	
Building On: Y7 G01: Measuring and Drawing Angles	
Leading To: N/A	

Key
Algebra
Geometry
Number
Probability
Ratio and Proportion
Statistics

TCEAT Curriculum & Assessment Overview: Mathematics

Key Stage 2: Year 5/6 Programme of Study (for Reference)

Number - Number and place value

Pupils should be taught to:

Year 5

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- solve number problems and practical problems that involve all of the above
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Year 6

- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.

Number - Addition and subtraction, multiplication and division

Pupils should be taught to:

Year 5

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Year 6

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.



TCEAT Curriculum & Assessment Overview: Mathematics

Number - Fractions (including decimals and percentages)

Pupils should be taught to:

Year 5

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

Year 6

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$]
- divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Ratio and proportion

Pupils should be taught to:

Year 6

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison
- solve problems involving similar shapes where the scale factor is known or can be found
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Algebra

Pupils should be taught to:

Year 6

- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables.

TCEAT Curriculum & Assessment Overview: Mathematics

Measurement

Pupils should be taught to:

Year 5

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Year 6

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- convert between miles and kilometres
- recognise that shapes with the same areas can have different perimeters and vice versa
- recognise when it is possible to use formulae for area and volume of shapes
- calculate the area of parallelograms and triangles
- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units [for example, mm³ and km³].

Geometry – properties of shapes

Pupils should be taught to:

Year 5

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes
- estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Year 6

- draw 2-D shapes using given dimensions and angles
- recognise, describe and build simple 3-D shapes, including making nets
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Geometry – position and direction

Pupils should be taught to:

Year 5

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

Year 6

- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Statistics

Pupils should be taught to:

Year 5

- solve comparison, sum and difference problems using information presented in a line graph
- complete, read and interpret information in tables, including timetables.

Year 6

- interpret and construct pie charts and line graphs and use these to solve problems
- calculate and interpret the mean as an average.



TCEAT Curriculum & Assessment Overview: Mathematics



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