

Mathematics overview: Stage 7

Unit	Hours	KNOWLEDGE
Numbers and the number system	6	<ul style="list-style-type: none"> use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 (7) use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem (7) appreciate the infinite nature of the sets of integers, real and rational numbers (7) order positive and negative integers, decimals and fractions (7) use the symbols =, ≠, <, >, ≤, ≥ (7,9)
Counting and comparing	3	<ul style="list-style-type: none"> understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals) (7) apply the four operations, including formal written methods, to integers and decimals and simple fractions (proper and improper) and mixed numbers (7,8) recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions) (7,8,9)
Calculating	9	<ul style="list-style-type: none"> use conventional terms and notations: points, lines, vertices, edges, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries (7) use the standard conventions for labelling and referring to the sides and angles of triangles (7,9) draw diagrams from written description (7)
Visualising and constructing	6	<ul style="list-style-type: none"> identify properties of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres the faces, surfaces, edges and vertices of (7,8) derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language (7) find unknown angles in any triangles, quadrilaterals and regular polygons (7,8)
Investigating properties of shapes	6	<ul style="list-style-type: none"> understand and use the concepts and vocabulary of identities, expressions, equations, formulae and terms (7,8) use and interpret algebraic notation, including: ab in place of $a \times b$, $3y$ in place of $y + y + y$ and $3 \times y$, a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a/b in place of $a \div b$, brackets (7,8) simplify and manipulate algebraic expressions by collecting like terms and multiplying a single term over a bracket (7,8,9) substitute numerical values into formulae and expressions (7,8) express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 (7) express one quantity as a percentage of another (7,8)
Algebraic proficiency: tinkering	9	<ul style="list-style-type: none"> associate a fraction with division and calculate decimal fraction equivalents (for example 0.375) for a simple fraction (for example 3/8) (7,8) recall and use equivalencies between simple fractions, decimals and percentages, including in different contexts (7,8) use ratio notation, including reduction to simplest form (7) divide a given quantity into two parts in a given part: part or part: whole ratio (7,8) deduce expressions to calculate the nth term of linear sequences (7,8) generate terms of a sequence from either a term-to-term or a position-to-term rule (7,8)
Exploring fractions, decimals and percentages	6	<ul style="list-style-type: none"> use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate (7) apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles (7) interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively (7,8) compare two quantities using percentages (7,8) solve problems involving percentage change, including percentage increase/decrease (7,8) rearrange formulae to change the subject (7,8) solve linear equations in one unknown algebraically (7)#
Proportional reasoning	3	<ul style="list-style-type: none"> know and apply formulae to calculate area of triangles, parallelograms, trapezia (7) calculate surface area of cuboids (7,8) know and apply formulae to calculate volume of cuboids (7) round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) (7) estimate answers; check calculations using approximation and estimation, including answers obtained using technology (7)
Pattern sniffing	3	<ul style="list-style-type: none"> work with coordinates in all four quadrants (7,8)

Measuring space	3	<ul style="list-style-type: none"> • <i>understand and use lines parallel to the axes, $y = x$ and $y = -x$</i> (7,8) • identify properties, and describe the results of, translations, rotations and reflections applied to given figures (7) • relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale (7) • record describe and analyse the frequency of outcomes of probability experiments using tables (7,8) • construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities (7,8,9) • apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments (7,8) • interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data and know their appropriate use (7,9) • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean and mode) and spread (range) (7,8,9) <p><u>Key Stage 4 Content</u></p> <ul style="list-style-type: none"> • convert between miles and kilometres (KS4) • describe translations as 2D vectors (KS4)
Investigating angles	3	
Calculating fractions, decimals and percentages	9	
Solving equations and inequalities	6	
Calculating space	9	
Checking, approximating and estimating	3	
Mathematical movement	6	
Understanding Risk 1	3	
Presentation of data	6	
Measuring data	3	

<i>Numbers and the number system</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 (7) • use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem (7) • appreciate the infinite nature of the sets of integers, real and rational numbers (7) 	
<i>Counting and comparing</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • order positive and negative integers, decimals and fractions (7) • use the symbols =, ≠, <, >, ≤, ≥ (7,9) 	
<i>Calculating</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals) (7) • apply the four operations, including formal written methods, to integers and decimals and simple fractions (proper and improper) and mixed numbers (7,8) • recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions) (7,8,9) 	
<i>Visualising and constructing</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • use conventional terms and notations: points, lines, vertices, edges, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries (7) • use the standard conventions for labelling and referring to the sides and angles of triangles (7,9) • draw diagrams from written description (7) 	
<i>Investigating properties of shapes</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • identify properties of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres the faces, surfaces, edges and vertices of (7,8) • derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language (7) • find unknown angles in any triangles, quadrilaterals and regular polygons (7,8) 	
<i>Algebraic proficiency: tinkering</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • understand and use the concepts and vocabulary of identities, expressions, equations, formulae and terms (7,8) • use and interpret algebraic notation, including: ab in place of $a \times b$, $3y$ in place of $y + y + y$ and $3 \times y$, a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a/b in place of $a \div b$, brackets (7,8) • simplify and manipulate algebraic expressions by collecting like terms and multiplying a single term over a bracket (7,8,9) • substitute numerical values into formulae and expressions (7,8) 	
<i>Exploring fractions, decimals and percentages</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 (7) • express one quantity as a percentage of another (7,8) • associate a fraction with division and calculate decimal fraction equivalents (for example 0.375) for a simple fraction (for example 3/8) (7,8) • recall and use equivalencies between simple fractions, decimals and percentages, including in different contexts (7,8) 	
<i>Proportional reasoning</i>	
<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • use ratio notation, including reduction to simplest form (7) • divide a given quantity into two parts in a given part: part or part: whole ratio (7,8) 	
<i>Pattern sniffing</i>	

KNOWLEDGE

- deduce expressions to calculate the n th term of linear sequences (7,8)
- generate terms of a sequence from either a term-to-term or a position-to-term rule (7,8)

[Measuring space](#)

KNOWLEDGE

- use (and convert) standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate (7)
- convert between miles and kilometres (KS4 ONLY)

[Investigating angles](#)

KNOWLEDGE

- apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles (7)

[Calculating fractions, decimals and percentages](#)

KNOWLEDGE

- interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively (7,8)
- compare two quantities using percentages (7,8)
- solve problems involving percentage change, including percentage increase/decrease (7,8)

[Solving equations and inequalities](#)

KNOWLEDGE

- rearrange formulae to change the subject (7,8)
- solve linear equations in one unknown algebraically (7)

[Calculating space](#)

KNOWLEDGE

- know and apply formulae to calculate area of triangles, parallelograms, trapezia (7)
- calculate surface area of cuboids (7,8)
- know and apply formulae to calculate volume of cuboids (7)

[Checking, approximating and estimating](#)

KNOWLEDGE

- round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) (7)
- estimate answers; check calculations using approximation and estimation, including answers obtained using technology (7)

Mathematical movement

KNOWLEDGE

- work with coordinates in all four quadrants (7,8)
- understand and use lines parallel to the axes, $y = x$ and $y = -x$ (7,8)
- identify properties, and describe the results of, translations, rotations and reflections applied to given figures (7)
- describe translations as 2D vectors (KS4)

Understanding risk

KNOWLEDGE

- relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale (7)
- record describe and analyse the frequency of outcomes of probability experiments using tables (7,8)
- construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities (7,8,9)
- apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments (7,8)

Presentation of data

KNOWLEDGE

- interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data and know their appropriate use (7,9)

Measuring data

KNOWLEDGE

- interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean and mode) and spread (range) (7,8,9)