Mathematics overview: Stage 6*

Unit	Hours	KNOWLEDGE
Numbers and the number system	6	• 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 (6*) • read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (6*) • use negative numbers in context, and calculate intervals across zero (including addition and subtraction of negative numbers) (6*) • identify common factors, common multiples and prime numbers (6*,7*)
Calculating	6	• perform mental calculations, including with mixed operations and large numbers (6*) • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why (6*,7*) • multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication (6*) • solve problems involving addition, subtraction, multiplication and division (6*,7*) • use the symbols =, ≠, <, >, ≤, ≥ (6*,7*)
Calculating: division	6	• divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division; interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context (6*,7*) • use written division methods in cases where the answer has up to two decimal places (6*,7*)
Visualising and constructing	6	• recognise, describe and build simple 3-D shapes, including making nets (6*) • use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries (6*,7*) • use the standard conventions for labelling and referring to the sides and angles of triangles (6*,7*) • compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles and quadrilaterals (6*,7*) • draw diagrams from written descriptions (6*,7*)
Investigating properties of shapes	9	• illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius (6*,7*)
Algebraic proficiency: tinkering	9	• understand and use the concepts and vocabulary of expressions, equations, formulae, terms and factors (6*,7*) • use and interpret algebraic notation, including: ab in place of a × b, 3y in place of y + y + y and 3 × y, a^2 in place of a × a, a^3 in place of a × a × a, a/b in place of a ÷ b, brackets (6*,7*,8*) • substitute numerical values into formulae and expressions (6*,7*)
Exploring fractions, decimals and percentages	9	• use common factors to simplify fractions; use common multiples to express fractions in the same denomination (6*) • compare and order fractions, including fractions > 1 (6*,7*) • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8] (6*,7*) • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts (6*) • solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts (6*)
Proportional reasoning	6	• use ratio notation, including reduction to simplest form (6*,7*) • divide a given quantity into two parts in a given part:part or part:whole ratio (6*,7*,8*) • generate and describe linear number sequences (6*) • generate terms of a sequence from a term-to-term rule (6*)
Pattern sniffing	3	• 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 (6*,7*) • use standard units of mass, length, time, money and other measures using decimal quantities where appropriate (6*)
Measuring space	3	• recognise angles (and apply the properties) where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles (6*,7*)
Investigating angles	3	• add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions (6*,7*) • multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $^1/_4 \times {}^1/_2 = {}^1/_8$] (6*,7*) • divide proper fractions by whole numbers [for example, $^1/_3 \div 2 = {}^1/_6$] (6*,7*) • solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison (6*,7*)
Calculating fractions, decimals and percentages	9	• express missing number problems algebraically (6*) • find pairs of numbers that satisfy an equation with two unknowns (6*) • calculate the area of parallelograms and triangles (6*)

Solving equations and inequalities	3	• calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3] (6*) • calculate perimeters of 2D shapes (6*) • solve problems which require answers to be rounded to specified degrees of accuracy (6*,7*) • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy (6*,7*) • describe positions on the full coordinate grid (all four quadrants) (6*,7*) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes (6*,7*) • solve geometric problems on coordinate axes (6*,7*) • interpret and construct pie charts and line graphs and use these to solve problems (6*) • 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) (6*,7*) • Relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale (6*,7*)
Calculating space	9	
Checking, approximating and estimating	3	
Mathematical movement	3	
Presentation of data	3	
Measuring data	3	
Understanding Risk 1	3	

Numbers and the number system

KNOWLEDGE

- 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 (6*)
- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit (6*)
- use negative numbers in context, and calculate intervals across zero (including addition and subtraction of negative numbers) (6*)
- identify common factors, common multiples and prime numbers (6*,7*)

Calculating

KNOWLEDGE

- perform mental calculations, including with mixed operations and large numbers (6*)
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why (6*,7*)
- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication (6*)
- solve problems involving addition, subtraction, multiplication and division (6*,7*)
- use the symbols =, ≠, <, >, ≤, ≥ (6*,7*)

Calculating: division

KNOWLDGE

- divide numbers up to 4 digits by a two-digit whole number using the formal written method of division; interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context (6*,7*)
- use written division methods in cases where the answer has up to two decimal places (6*,7*)

Visualising and constructing

KNOWLEDGE

- recognise, describe and build simple 3-D shapes, including making nets (6*)
- use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries (6*,7*)
- use the standard conventions for labelling and referring to the sides and angles of triangles (6*,7*)

Investigating properties of shapes

KNOWLEDGE

- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles and quadrilaterals (6*,7*)
- draw diagrams from written descriptions (6*,7*)
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius (6*,7*)

Algebraic proficiency: tinkering

KNOWLDGE

- understand and use the concepts and vocabulary of expressions, equations, formulae, terms and factors (6*,7*)
- use and interpret algebraic notation, including: ab in place of a × b, 3y in place of y + y + y and 3 × y, a^2 in place of a × a, a^3 in place of a × a × a, a/b in place of a ÷ b, brackets (6*,7*,8*)
- substitute numerical values into formulae and expressions (6*,7*)

Exploring fractions, decimals and percentages

KNOWLDGE

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination (6*)
- compare and order fractions, including fractions > 1 (6*,7*)
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8] (6*,7*)
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts (6*)

Proportional reasoning	
KNOWLDGE • **solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts (6*)** • **use ratio notation, including reduction to simplest form (6*,7*)** • **divide a given quantity into two parts in a given part:part or part:whole ratio (6*,7*,8*)**	

Pattern sniffing	
KNOWLDGE • **generate and describe linear number sequences (6*)** • **generate terms of a sequence from a term-to-term rule (6*)**	

Measuring space	
KNOWLDGE • **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 (6*,7*)** • **use standard units of mass, length, time, money and other measures using decimal quantities where appropriate (6*)**	

Investigating angles	
KNOWLEDGE • **recognise angles (and apply the properties) where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles (6*,7*)**	

Calculating fractions, decimals and percentages	
KNOWLDGE • **add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions (6*,7*)** • **multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $^1/_4 \times {}^1/_2 = {}^1/_8$] (6*,7*)** • **divide proper fractions by whole numbers [for example, $^1/_3 \div 2 = {}^1/_6$] (6*,7*)** • **solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison (6*,7*)**	

Solving equations	
KNOWLEDGE • **express missing number problems algebraically (6*)** • **find pairs of numbers that satisfy an equation with two unknowns (6*)**	

Calculating space	
KNOWLEDGE • **calculate the area of parallelograms and triangles (6*)** • **calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3] (6*)** • **calculate perimeters of 2D shapes (6*)**	

Checking, approximating and estimating	
KNOWLEDGE • **solve problems which require answers to be rounded to specified degrees of accuracy (6*,7*)** • **use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy (6*,7*)**	

Mathematical movement	
KNOWLEDGE • **describe positions on the full coordinate grid (all four quadrants) (6*,7*)** • **draw and translate simple shapes on the coordinate plane, and reflect them in the axes (6*,7*)** • **solve geometric problems on coordinate axes (6*,7*)**	

Presentation of data	
KNOWLEDGE • **interpret and construct pie charts and line graphs and use these to solve problems (6*)**	

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) (6*,7*)**	

Understanding risk	
KNOWLEDGE • **Relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale (6*,7*)**	