

1. Decimals and powers of 10



Content:

- Multiply or divide any number by powers of 10;
- Identify the value of digits in any number
- Use numbers raised to the power zero, including the zero power of 10;
- Convert between currencies;
- 4 operations with decimals;
- Use one calculation to find the answer to another.
- Use index notation for powers of 10, including negative powers;
- Convert large and small numbers into standard form and vice versa;
- Multiply and divide with standard form

Standard form is new content in this topic.

2. Factors and Multiples



Content:

- Recognise odd, even and prime (two digit) numbers;
- Identify factors and multiples
- List factors and multiples systematically;
- Find a prime factor decomposition and write as a product (including using index notation)
- Find common factors and common multiples of two numbers;
- Find the LCM and HCF of two numbers, by listing
- Solve simple problems using HCF, LCM and prime numbers.
- Find the LCM and HCF of two numbers with Venn diagrams
- Understand that prime factor decomposition is unique
- By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals;

HCF and LCM with Venn diagrams is new content.

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3. Accuracy



Content:

- Round to the nearest integer;
- Round to a given power of 10;
- Check answers by rounding
- Write decimal numbers of millions, e.g. 2 300 000 = 2.3 million;
- Round to a given number of decimal places and significant figures;
- Estimate answers to calculations by rounding numbers to 1 significant figure;
- Use inequality notation to specify simple error intervals due to truncation or rounding
- Calculate the upper and lower bounds of numbers given to varying degrees of accuracy;
- Calculate the upper and lower bounds of calculations (including real life situations, perimeters areas and volumes) and express bounds as a (possibly non-symmetrical) inequality

New content: error intervals and calculation with bounds

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4. Algebra recap



Content:

- Manipulate and simplify algebraic expressions by collecting 'like' terms;
- Multiply together two simple algebraic expressions
- Select an expression/equation/formula/identity from a list;
- Understand (and use) the identity $\equiv$ sign;
- Multiply a single number term over a bracket;
- Simplify expressions involving brackets, i.e. expand the brackets, then add/subtract;
- Write expressions to solve problems representing a situation;
- Simplify expressions by cancelling, e.g. $\frac{4x}{2} = 2x$;
- Set up simple equations from word problems and derive simple formulae;
- Factorise algebraic expressions by taking out common factors;
- Expand the product of two linear expressions, i.e. double brackets working up to negatives in both brackets and also similar to $(2x + 3y)(3x - y)$;
- Know that squaring a linear expression is the same as expanding double brackets;
- Simple proofs and use of $\equiv$ in "show that" style questions; know the difference between an equation and an identity;

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5. Indices



Content:

- recall squares up to 10×10 and the corresponding square roots;
- understand the difference between positive and negative square roots;
- Use index notation for squares and cubes;
- recall the cubes of 1, 2, 3, 4, 5 and 10;
- Recognise powers of 2, 3, 4, 5;
- Use index notation for powers of 10, including negative powers;
- Recall that $n^0 = 1$ and $n^{-1} = 1/n$ for positive integers n
- Use the laws of indices to multiply and divide numbers written in index notation;
- Use the square, cube and power keys on a calculator
- estimate powers and roots of any given positive number, e.g. the square root of 42 must be between 6 and 7
- Find the value of calculations using indices including fractional and negative indices
- Understand that the inverse operation of raising a positive number to a power n is raising the result of this operation to the power $1/n$
- Solve problems using index laws

New content: fractional and negative indices

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6. Intro to surds



Content:

- Understand surd notation
- Simplify a surd
- simplify and manipulate algebraic expressions with surds by:
 - collecting like terms
 - multiplying a single term over a bracket
- simplify and manipulate expressions involving surds by:
 - taking out common factors
 - expanding products of two or more binomials

This topic is new to KS3

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7. Equations and Formulae



Content:

- Substitute numbers into a (word) formula
- Use function machines
- Substitute positive and negative numbers into expressions involving brackets and powers
- Derive a simple formula, including those with squares, cubes and roots
- Solve linear equations including those with:
 - Unknowns on both sides
 - Brackets
 - Negative or fraction solutions
 - Fractional coefficients of the unknown
- Substitute into a formula, and solve the resulting equation
- Set up simple equations including forming an equation from a word problem
- Change the subject of a simple formula, i.e. linear one-step, such as $x = 4y$;
- Solve angle or perimeter problems using algebra.
- Change the subject of a formula, including cases involving fractions and small powers of the subject;
- Change the subject of a formula, including cases where the subject occurs on both sides of the formula, or where a power of the subject appears;

New content: unknowns on both sides

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8. 2D and 3D shapes recap



Content:

2D shapes:

- Indicate given values on a scale, including decimal value;
- Convert between units of measure within one system, including time and metric units to metric units of length
- Make sensible estimates of a range of measures in everyday settings;
- Measure shapes to find perimeters and areas
- Find the perimeter of
 - rectangles and triangles;
 - parallelograms and trapezia;
 - compound shapes;
- Find the area of:
 - rectangles and triangles;
 - parallelograms and trapezia;
 - compound shapes;
- Recall the definition of a circle and identify, name and draw parts of a circle
- Recall and use formulae for area and circumference of a circle (including answers in terms of π)
- Use $\pi \approx 3.142$ or use the π button on a calculator;
- Find radius or diameter, given area or perimeter of a circles;
- Find the perimeters and areas of semicircles and quarter-circles;
- Calculate perimeters and areas of composite shapes made from circles and parts of circles; Calculate arc lengths, angles and areas of sectors of circles;

3D shapes:

- Recall and use the formula for the volume of a cuboid;
- Find the volume of a prism, including a triangular prism, cube and cuboid;
- Estimate volumes by rounding measurements to 1 significant figure;
- Form equations involving more complex shapes and solve these equations.

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9. 2D representations of 3D shapes



Content:

Nets and Sketches

- Identify and name common solids: Sketch nets of cuboids and prisms;
- Know the terms face, edge and vertex;
- Draw sketches of 3D solids;
- Use isometric grids to draw 3D solids;
- Understand and draw front and side elevations and plans of shapes made from simple solids;
- Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.
- Identify and sketch planes of symmetry of 3D solids;

Surface Area

- Find the surface area of a prism;
- Find the surface area of a cylinder;
- Estimate surface areas by rounding measurements to 1 significant figure;
- Use the formulae for surface area of spheres and cones;
- Find the surface area of a pyramid;
- Find the surface area of compound solids

Now includes all surface area

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10. Ratio



Content:

- Write ratios in their simplest form;
- Write ratios in form $1:m$ or $m:1$;
- Write/interpret a ratio to describe a situation;
- Share a quantity in a given ratio including three-part ratios;
- use a ratio to find one quantity when the other is known;
- use a ratio to compare a scale model to a real-life object;
- problems involving mixing, e.g. paint colours, cement and drawn conclusions
- Write lengths, areas and volumes of two shapes as ratios in simplest form
- Compare ratios
- Write a ratio as a fraction or linear function
- Express a multiplicative relationship between two quantities as a ratio or a fraction, e.g. when $A:B$ are in the ratio $3:5$, A is $\frac{3}{5}B$. When $4a = 7b$, then $a:b$ is $7:4$
- Solve complex ratio problems

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11. Proportion



Content:

- Understand and use proportion as equality of ratios;
- Solve word problems involving direct and indirect proportion;
- Work out which product is the better buy;
- Scale up recipes;
- Solve proportion problems using the unitary method;
- Recognise when values are in direct proportion by reference to the graph form;
- Understand inverse proportion: as x increases, y decreases (inverse graphs done in later unit);
- Identify direct proportion from a table of values by comparing ratios of values;
- Understand direct proportion ---> relationship $y = kx$.
- Calculate an unknown quantity from quantities that vary in direct or inverse proportion;
- Set up and use equations to solve word and other problems involving direct (and inverse) proportion;
- Relate algebraic solutions to graphical representation of the equations;
- Recognise and interpret graphs showing direct and indirect proportion;
- Use a proportion graph to find the value of k in $y = kx$;

Using formula is new to KS3 and setting up worded problems

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12. Angles



Content:

Recap of Year 7 Angles:

- Recall and use properties of angles at a point, angles at a point on a straight line, right angles, and vertically opposite angles;
- Distinguish between scalene, equilateral, isosceles and right-angled triangles;
- Derive and use the sum of angles in a triangle;
- Use the fact that angle sum of a quadrilateral is 360° ;

New content:

- Use two-letter notation for a line and three-letter notation for an angle;
- Identify parallel and perpendicular lines and use their properties;
- Use three-figure bearings to specify direction;
- Give a bearing between the points on a map or scaled plan by measuring with a protractor
- Find missing angles using properties of corresponding, alternate and co-interior angles;
- Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices;
- Give reasons for angle calculations and show step-by-step deduction when solving problems.
- Understand the proof that the angle sum of a triangle is 180° , and derive and use the sum of angles in a triangle;
- More complex angle problems using algebra;

New content:
angles in
parallel lines,
bearings

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13.FDP recap



Content:

- Understand that a percentage is a fraction in hundredths;
- Recall the fraction-to-decimal conversion and convert fractions (including non-terminating) to decimals;
- Convert fractions, decimals and percentages to other forms
- Use conversions to make a calculation easier, e.g. $0.25 \times 8 = \frac{1}{4} \times 8$, or $\frac{3}{8} \times 10 = 0.375 \times 10$;
- Compare and order fractions, decimals, percentages and integers, using inequality signs;
- Express a given number as a percentage of another number;
- Calculate percentage profit or loss;

14. Percentage multipliers



Content:

- Find a simple percentage of a quantity without a calculator
- Find a percentage of a quantity, including using a multiplier
- Calculate percentage increase/decrease, including using a multiplier
- Price after VAT;
- Simple interest;
- Use percentages to solve problems, including comparisons of two quantities using percentages
- Understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents, and choose fractions, decimals or percentages appropriately for calculations.
- Describe percentage increase/decrease with fractions, e.g. 50% increase means 1.5 times as big;
- Use calculators for reverse percentage calculations by doing an appropriate division;

New content: percentage multipliers

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15. Probability and Systematic Listing



Content:

- List all outcomes for single events systematically;
- Distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur;
- Mark events and/or probabilities on a probability scale of 0 to 1;
- The product rule for counting
- Write probabilities in words or fractions, decimals and percentages
- Find the probability of an event happening using theoretical probability
- Work out probabilities from frequency tables, frequency trees
- Add simple probabilities
- Identify different mutually exclusive outcomes and know that the sum of the probabilities of all outcomes is 1
- Draw sample space diagrams and use them for adding simple probabilities
- Using $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring;
- Use experimental measures of probability, including relative frequency
- Estimate the number of times an event will occur, given the probability and the number of trials
- Find the probability of successive events, such as several throws of a single dice;
- List all outcomes for combined events systematically

New content:
product rule
for counting

Support
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16.Constructions



Content:

- use the standard conventions for labelling the sides and angles of triangle ABC.
- Know and use the criteria for congruence of triangles
- Identify and construct congruent triangles (SSS, ASA SAS)
- Construct:
- perpendicular bisector of a line segment,
- constructing a perpendicular to a given line from/at a given point,
- bisecting a given angle);
- recognise and use the perpendicular distance from a point to a line as the shortest distance to the line

Constructions of congruent triangles

17. Quadratic Sequences



Content:

Recap Y7 sequences:

- Find the next term or missing terms in simple linear sequences (including pattern sequences)
- Recap simple algebraic substitution
- Identify different types of sequence (linear, geometric, Fibonacci etc)
- Generate terms of a sequence using a term to term or position to term rule
- Write an expression to describe the n th term of a linear sequence
- Use substitution to generate a specific term in a sequence given the n th term
- Use the n th term of a sequence to deduce if a given number is in a sequence
- Generate any sequence using n th term (Quadratic etc)

New:

- Find the n th term of quadratic sequences

New: finding the n th term of quadratic sequences

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18. Factorising Quadratics



Content:

Recap Quadratics Content from Y8 Algebra:

- Recognise factors of algebraic terms involving single brackets;
- Factorise algebraic expressions by taking out common factors;
- Define a 'quadratic' expression / equation;
- Multiply together two algebraic expressions with brackets;
- Square a linear expression, e.g. $(x + 1)^2$;
- Factorise quadratic expressions of the form $x^2 + bx + c$;

New content:

- Solve quadratic equations by factorising;
- (Set up and) solve quadratic equations by factorisation, including equations that need rearranging;
- Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares;
- Factorise quadratic expressions in the form $ax^2 + bx + c$;

19. Pythagoras and Trigonometry



Content:

- Understand, recall and use Pythagoras' Theorem in 2D
- Calculate the length of the hypotenuse and of a shorter side in a right-angled triangle, including decimal and surd lengths and a range of units;
- Justify if a triangle is right-angled or not;
- Calculate the length of a line segment AB given pairs of points; (Crucial that this is done in this unit as it is **not** in a graphs unit)
- Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures;
- Use the trigonometric ratios to solve 2D problems including angles of elevation and depression;
- Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid;
- Apply Pythagoras Theorem in 3D

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