

"[Enquiry question]"

[Year 9 Higher Unit 1 , Number Skills]

What previous learning am I building on?	What am I learning that is new?
• Doubling and halving • Rounding and estimating • Positive and negative number rules • Prime factors, HCF, LCM and square roots • There are different mental strategies for multiplication and division, including doubling and halving, which can make calculations more efficient. • Approximate answers can be found in different ways, including rounding numbers to the nearest 10 or to a convenient ("nice") number. • Negative numbers follow specific rules when adding, subtracting, multiplying, and dividing. • Numbers can be expressed as a product of prime factors, and index notation can be used to represent repeated multiplication. • The Highest Common Factor (HCF), Lowest Common Multiple (LCM), square roots, and order of operations (BIDMAS) are important concepts in number calculations. • Use mental strategies, including doubling and halving, to multiply and divide numbers efficiently. • Add, subtract, multiply, and divide positive and negative integers, including calculations involving several operations. • Estimate answers to calculations involving two or more operations by rounding appropriately and applying BIDMAS. • Find the HCF, LCM, prime factor decomposition, and square roots of	• Add, subtract, multiply and divide decimals and whole numbers; • Multiply or divide by any number between 0 and 1; • Put digits in the correct place in a decimal calculation and use one calculation to find the answer to another; • Round numbers to the nearest 10, 100, 1000; • Round to the nearest integer, to a given number of decimal places and to a given number of significant figures; • Identify factors, multiples and prime numbers; • Find the prime factor decomposition of positive integers – write as a product using index notation; • Find common factors and common multiples of two numbers; • Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors – include finding LCM and HCF given the prime factorisation of two numbers; • Solve problems using HCF and LCM, and prime number • Convert large and small numbers into standard form and vice versa; • Add and subtract numbers in standard form; • Multiply and divide numbers in standard form; • Interpret a calculator display using standard form and know how to enter numbers in standard form; • Understand surd notation, e.g. calculator gives answer to $\sqrt{8}$ as $2\sqrt{2}$; • Simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$).

numbers using appropriate methods. Use a calculator accurately to carry out multi-step calculations, including those involving negative numbers and money.			
Learning Journey – lesson title and main activities			
Multiplying and dividing with decimals			
Rounding (decimal places and significant figures)			
Estimation			
Prime Factorisation			
HCF and LCM			
Laws of Indices			
Standard Form			
Surds			
How will I be assessed at the end of this unit?			
Unit test and reflection sheet			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
• Use think-pair-share to encourage discussion of problem-solving strategies. • Use vocabulary walls or glossaries for students to refer to. • Students encouraged to read out loud in class • Teacher models reading aloud and extracting information from worded problems to translate into diagrams and solve.	Sparx HW every week due on Monday 8PM.	Intermediate Maths Challenge.	• Sparx Club Tuesdays lunchtime in room 8 • Maths Club Wednesdays 3:05-4:05 in room 3

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[Maths, Year 9 Higher, Unit 2, Expressions and Formulae]

What previous learning am I building on?	What am I learning that is new?
• How index notation represents repeated multiplication. • The difference between multiplying a variable and raising it to a power. • Why inverse operations are used to solve equations and reverse functions. • How algebraic expressions can be expanded, simplified, and factorised. • How equations model and solve real-life pr • Repeated multiplication can be written using index notation • $2n$ and n^2 different meanings. • Like terms can be collected and simplified. • Equations can be used to represent real-life situations. • Functions and equations can be solved using inverse operations. • Simplify expressions involving multiplication and indices. • Substitute positive values into algebraic expressions. • Apply index laws for positive integer powers. • Expand brackets and factorise simple expressions. • Solve one-step and two-step equations, including using function machines and real-life contexts.	• Substitute positive and negative numbers into expressions such as $3x + 4$ and $2x^3$ and then into expressions involving brackets and powers; • Substitute numbers into formulae from mathematics and other subject using simple linear formula • Use instances of index laws for positive integer powers; • Use index notation (positive powers) when multiplying or dividing algebraic terms; • Use instances of index laws, including use of zero, fractional and negative powers; • Multiply a single term over a bracket; • Recognise factors of algebraic terms involving single brackets and simplify expressions by factorising, including subsequently collecting like terms; • 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; • Factorise quadratic expressions of the form $ax^2 + bx + c$; • Factorise quadratic expressions using the difference of two squares. • Set up simple equations from word problems and derive simple formulae; • Understand the $\neq$ symbol (not equal), e.g. $6x + 4 \neq 3(x + 2)$, and introduce identity $\equiv$ sign; • Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation; • Solve linear equations which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution; • Solve linear equations in one unknown, with integer or fractional coefficients; • Set up and solve linear equations to solve to solve a problem; • Derive a formula and set up simple equations from word problems, then solve these equations, interpreting the solution in the context of the problem;

- Substitute positive and negative numbers into a formula, solve the resulting equation including brackets, powers or standard form;
- Use and substitute formulae from mathematics and other subjects.
- Change the subject of a simple formula, i.e. linear one-step, such as $x = 4y$;
- Change the subject of a formula, including cases where the subject is on both sides of the original formula, or involving fractions and small powers of the subject;
- Simple proofs and use of $\equiv$ in “show that” style questions; know the difference between an equation and an identity;
- Use iteration to find approximate solutions to equations, for simple equations in the first instance, then quadratic and cubic equations.
- Recognise simple sequences including at the most basic level odd, even, triangular, square and cube numbers and Fibonacci-type sequences (including those involving numbers in standard form or index form);
- Generate sequences of numbers, squared integers and sequences derived from diagrams;
- Describe in words a term-to-term sequence and identify which terms cannot be in a sequence;
- Generate specific terms in a sequence using the position-to-term rule and term-to-term rule;
- Find and use (to generate terms) the n th term of an arithmetic sequence;
- Use the n th term of an arithmetic sequence to decide if a given number is a term in the sequence, or find the first term above or below a given number;
- Identify which terms cannot be in a sequence by finding the n th term;
- Continue a quadratic sequence and use the n th term to generate terms;
- Find the n th term of quadratic sequences;
- Distinguish between arithmetic and geometric sequences;
- Use finite/infinite and ascending/descending to describe sequences;
- Recognise and use simple geometric progressions (rn where n is an integer, and r is a rational number > 0 or a surd);
- Continue geometric progression and find term to term rule, including negative, fraction and decimal terms;
- Solve problems involving sequences from real life situations.

Learning Journey – lesson title and main activities			
Collecting like terms and simplifying			
Expanding Single Brackets			
Factorising			
Solving Linear Equations			
Substitution			
Changing the subject			
Expanding double brackets			
Factorising Quadratics			
Linear Sequence (nth term)			
Quadratic Sequence			
How will I be assessed at the end of this unit?			
Unit test and reflection sheet			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
• Use think-pair-share to encourage discussion of problem-solving strategies. • Use vocabulary walls or glossaries for students to refer to.	Sparx HW every week due on Sunday 8PM	Junior Maths Challenge.	• Sparx Club Tuesdays lunchtime in room 8 • Maths Club Wednesdays 3:05-4:05 in room 3

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[Maths, Year 9 Higher, Unit 3, Interpreting and Representing Data]

What previous learning am I building on?	What am I learning that is new?
• How different representations (charts, tables, graphs) show the same data in different ways. • Why the total angle in a pie chart is always 360° and must represent the full data set. • How averages and range help compare two sets of data. • That correlation describes how two variables are related (positive, negative or none). • That graphs can be misleading if scales or labels are missing or unclear. • Data can be shown in different ways such as pie charts, tables, graphs and diagrams. • A pie chart represents proportions of a whole using angles. • A two-way table shows relationships between two sets of data. • Mean, median, mode and range are different types of averages and measures of spread. • Scatter graphs show relationships (correlation) between two variables. • Calculate angles and draw accurate pie charts. • Interpret pie charts and extract information from them. • Complete and interpret two-way tables. • Calculate the mean from simple and grouped frequency tables. • Create and interpret grouped frequency tables • Draw and interpret stem-and-leaf diagrams and compare data sets using mode, median and range. • Compare data sets using mean and range and decide which average is most appropriate.	• Design and use two-way tables for discrete and grouped data; • Use information provided to complete a two-way table; • Sort, classify and tabulate data and discrete or continuous quantitative data; • Calculate mean and range, find median and mode from small data set; • Use a spreadsheet to calculate mean and range, and find median and mode; • Recognise the advantages and disadvantages between measures of average; • Construct and interpret stem and leaf diagrams (including back-to-back diagrams): • find the mode, median, range, as well as the greatest and least values from stem and leaf diagrams, and compare two distributions from stem and leaf diagrams (mode, median, range); • Calculate the mean, mode, median and range from a frequency table (discrete data); • Construct and interpret grouped frequency tables for continuous data: • for grouped data, find the interval which contains the median and the modal class; • estimate the mean with grouped data; • understand that the expression ‘estimate’ will be used where appropriate, when finding the mean of grouped data using mid-interval values. • Know which charts to use for different types of data sets; • Produce and interpret composite bar charts; • Produce and interpret comparative and dual bar charts; • Produce and interpret pie charts: • find the mode and the frequency represented by each sector; • compare data from pie charts that represent different-sized samples; • Produce and interpret frequency polygons for grouped data: • from frequency polygons, read off frequency values, compare distributions, calculate total population, mean, estimate greatest and least possible values (and range); • Produce frequency diagrams for grouped discrete data:

• Draw and interpret line graphs and use them to compare data sets. • Draw scatter graphs, describe correlation, and draw a line of best fit by eye. • Identify misleading graphs caused by scale, missing labels or poor presentation.	• read off frequency values, calculate total population, find greatest and least values; • Produce histograms with equal class intervals: • estimate the median from a histogram with equal class width or any other information, such as the number of people in a given interval; • Produce line graphs: • read off frequency values, calculate total population, find greatest and least values; • Construct and interpret time–series graphs, comment on trends; • Compare the mean and range of two distributions, or median or mode as appropriate; • Recognise simple patterns, characteristics relationships in bar charts, line graphs and frequency polygons. • Draw and interpret scatter graphs; • Interpret scatter graphs in terms of the relationship between two variables; • Draw lines of best fit by eye, understanding what these represent; • Identify outliers and ignore them on scatter graphs; • Use a line of best fit, or otherwise, to predict values of a variable given values of the other variable; • Distinguish between positive, negative and zero correlation using lines of best fit, and interpret correlation in terms of the problem; • Understand that correlation does not imply causality, and appreciate that correlation is a measure of the strength of the association between two variables and that zero correlation does not necessarily imply ‘no relationship’ but merely ‘no linear correlation’; • Explain an isolated point on a scatter graph; • Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing.
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Learning Journey – lesson title and main activities
Two Way Tables
Venn Diagrams
Averages – mean,mode,median,range
Grouped frequency and frequency tables
Comparative bar charts
Pie Charts
Time Series graphs
Scatter Graphs

How will I be assessed at the end of this unit?			
Unit test and reflection sheet			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
• Use think-pair-share to encourage discussion of problem-solving strategies. • Use vocabulary walls or glossaries for students to refer to	Sparx HW every week due on Sunday 8PM	Junior Maths Challenge.	• Sparx Club Tuesdays lunchtime in room 8 • Maths Club Wednesdays 3:05-4:05 in room 3

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[Maths, Year 4, unit 4, Fractions, Decimals and Percentages]

What previous learning am I building on?	What am I learning that is new?
• Why fractions need a common denominator for addition and subtraction. • The effect of multiplying a number by a fraction less than 1 How cancelling common factors makes fraction multiplication more efficient. • How equivalent fractions, decimals and percentages can be used to compare values. • How inverse operations can be used to check calculations and solve percentage problems. • Fractions, decimals and percentages are different representations of the same proportion. • Adding two positive fractions gives an answer greater than either fraction. • Subtracting a positive fraction gives an answer smaller than the starting fraction. • Fractions can be written as equivalent fractions with different denominators. • Percentages can be calculated using multipliers, unitary methods and inverse operations. • Add and subtract fractions using common denominators and check answers using inverse operations. • Multiply integers and fractions, including Change an improper fraction to a mixed number • Simplify fractions by cancelling common factors • Calculate with fractions mentally • Use different strategies to calculate with fractions mentally • Begin to add and subtract simple fractions	• Express a given number as a fraction of another; • Find equivalent fractions and compare the size of fractions; • Write a fraction in its simplest form, including using it to simplify a calculation. • Find a fraction of a quantity or measurement, including within a context; • Convert a fraction to a decimal to make a calculation easier; • Convert between mixed numbers and improper fractions; • Add, subtract, multiply and divide fractions; • Multiply and divide fractions, including mixed numbers and whole numbers and vice versa; • Add and subtract fractions, including mixed numbers; • Understand and use unit fractions as multiplicative inverses; • By writing the denominator in terms of its prime factors, decide whether fractions can be converted to recurring or terminating decimals; • Convert a fraction to a recurring decimal; • Convert a recurring decimal to a fraction; • Find the reciprocal of an integer, decimal or fraction.

• Calculate simple fractions of quantities • Express one number as a fraction of another • Convert a percentage to a number of hundredths or tenths • Find simple percentages of whole number quantities • Calculate simple percentages • Interpret the display of a calculator in different contexts (percentages) • Calculate with percentages mentally • Use different strategies to calculate with percentages mentally • Express one number as a percentage of another • multiplying two fractions with and without cancelling. • Order and compare fractions by converting them to decimals or equivalent forms. • Find equivalent fractions, decimals and percentages, including decimal percentages and percentages ending in 0.5. • Calculate percentages using multipliers, unitary methods and inverse operations.			
Learning Journey – lesson title and main activities			
Fractions (Basics)			
Multiplying and dividing fractions			
Adding and subtracting fractions			
Recurring Decimals			
Percentages (Basics)			
Percentage Increase and decrease			
Reverse Percentages			
Percentage Profit/Loss			
Simplifying Ratios			
Dividing in Ratio			
Exchange Rates			
How will I be assessed at the end of this unit?			
Unit test and Reflection Sheet			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

• Use think-pair-share to encourage discussion of problem-solving strategies. • Use vocabulary walls or glossaries for students to refer to.	Sparx HW every week due on Sunday 8PM	Junior Maths Challenge.	• Sparx Club Tuesdays lunchtime in room 8 • Maths Club Wednesdays 3:05-4:05 in room 3
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[Maths, Year 9, Unit 5, Angles and Trigonometry]

What previous learning am I building on?	What am I learning that is new?
- Coordinates link to graphs e.g. a table of values becomes points like (0,1),(1,3) - Gradient changes the steepness of a line e.g. $y=x$ is less steep than $y=3x$ - Angle rules are always consistent e.g. alternate angles are equal in parallel lines - Reasoning explains why answers are correct e.g. “angles on a straight line add to 180° so missing angle is 110°” - Accuracy matters in drawing and measuring e.g. a 60° angle drawn slightly wrong gives incorrect shapes - Coordinates are used to locate points on a grid e.g. point A is at (3,2) - Straight-line graphs can be written as $y=mx+c$ - Gradient shows how steep a line is e.g. a line going up 2 for every 1 across has gradient 2 - Angle rules work in shapes and parallel lines e.g. angles in a triangle always add to 180° - Polygons have fixed angle totals e.g. a pentagon interior angles add to 540° - Plot and interpret graphs e.g. plot $y=2x+1$ or read a value like when $x=2$ $y=5$ - Find gradients, midpoints, equations e.g. midpoint of (2,4) and (6,8) is (4,6) - Estimate from graphs e.g. read that when $x=3$, $y \approx 7$	- Classify quadrilaterals by their geometric properties and distinguish between scalene, isosceles and equilateral triangles; - Understand ‘regular’ and ‘irregular’ as applied to polygons; - Understand the proof that the angle sum of a triangle is 180°, and derive and use the sum of angles in a triangle; - Use symmetry property of an isosceles triangle to show that base angles are equal; - Find missing angles in a triangle using the angle sum in a triangle AND the properties of an isosceles triangle; - Understand a proof of, and use the fact that, the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices; - Explain why the angle sum of a quadrilateral is 360°; - Understand and use the angle properties of quadrilaterals and the fact that the angle sum of a quadrilateral is 360°; - Understand and use the angle properties of parallel lines and find missing angles using the properties of corresponding and alternate angles, giving reasons; - Use the angle sums of irregular polygons; - Calculate and use the sums of the interior angles of polygons; use the sum of angles in a triangle and use the angle sum in any polygon to derive the properties of regular polygons; - Use the sum of the exterior angles of any polygon is 360°; - Use the sum of the interior angles of an n-sided polygon; - Use the sum of the interior angle and the exterior angle is 180°; - Find the size of each interior angle, or the size of each exterior angle, or the number of sides of a regular polygon, and use the sum of angles of irregular polygons; - Calculate the angles of regular polygons and use these to solve problems; - Use the side/angle properties of compound shapes made up of triangles, lines and quadrilaterals, including solving angle and symmetry problems for

Measure and draw angles accurately e.g. draw a 75° angle using a protractor Solve angle problems in shapes e.g. find missing angle in a triangle when two angles are 50° and $60^\circ \rightarrow 70^\circ$	shapes in the first quadrant, more complex problems and using algebra; - Use angle facts to demonstrate how shapes would 'fit together', and work out interior angles of shapes in a pattern. - Understand, recall and use Pythagoras' Theorem in 2D; - Given three sides of a triangle, justify if it is right-angled or not; - Calculate the length of the hypotenuse in a right-angled triangle (including decimal lengths and a range of units); - Find the length of a shorter side in a right-angled triangle; - Calculate the length of a line segment AB given pairs of points; - Give an answer to the use of Pythagoras' Theorem in surd form; - 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; - Find angles of elevation and depression; - Know the exact values of $\sin \vartheta$ and $\cos \vartheta$ for $\vartheta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°; know the exact value of $\tan \vartheta$ for $\vartheta = 0^\circ, 30^\circ, 45^\circ$ and 60°.
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Learning Journey – lesson title and main activities

Properties of triangles, quadrilaterals and polygons

Angles in triangles

Angles in quadrilaterals

Angles in Parallel lines

Angles with Algebra

Angles in Polygons

Pythagoras Theorem

Sin, Cos, Tan

Exact Values in Trig

How will I be assessed at the end of this unit?

Unit Test and Reflection Sheet

How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
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• Use think-pair-share to encourage discussion of problem-solving strategies. • Use vocabulary walls or glossaries for students to refer to.	Sparx HW every week due on Sunday 8PM	Junior Maths Challenge.	• Sparx Club Tuesdays lunchtime in room 8 • Maths Club Wednesdays 3:05-4:05 in room 3
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