



# FRAMEWORK FOR LEARNING



## CREATIVE

An education where imagination, curiosity and resilience enable us to ignite our learning.

## HAPPY

A shared belief that optimism, empathy and responsibility are the foundations for a respectful, safe and inclusive community.

## SUCCESSFUL

Individuals who are ready to learn, practise being reflective, and are motivated to become champions.

## SUBJECT

### Maths

## INTENT

"Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers." - **Shakuntala Devi**

Maths is a universal language that explains the world around us. The study of Mathematics enables you to make sense of everyday situations, forge links between topics and establish connections to real life context. Maths fosters curiosity, equipping students with various strategies to tackle problems; it empowers students with resilience to take risks, get it wrong, form a new strategy and start again, with determination and drive to reach the final answer. Maths is logical thinking, reasoning, intuition, analysis, construction, generalisation and beauty.



## YEAR GROUP

**YEAR 10**

## RATIONAL / NARRATIVE

Year 10 continues to equip students to problem solve and reason with resilience and determination. Students will consolidate and extend their existing skills gained in Year 9. Students will work on a range of GCSE topics, applying their skills to complex situations and promoting their communication and strategising throughout. Students will become more familiar with the GCSE assessment and expectations.

## TERM KNOWLEDGE

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
<p><u>Ratio and Proportion</u></p> <ul style="list-style-type: none"> <li>• Proportion.</li> <li>• Ratio and scales.</li> <li>• Percentage Change.</li> </ul> <p><u>Equations and Inequalities</u></p> <ul style="list-style-type: none"> <li>• Solving linear equations.</li> <li>• Solving quadratic equations.</li> <li>• Solving simultaneous equations.</li> <li>• Using iterative processes to approximate solutions.</li> <li>• Solving inequalities.</li> </ul>	<p><u>Factors, Powers and Roots</u></p> <ul style="list-style-type: none"> <li>• Factors and multiples.</li> <li>• Prime factor decomposition.</li> <li>• Powers and roots.</li> </ul> <p><u>Graphs 1</u></p> <ul style="list-style-type: none"> <li>• Drawing straight-line graphs.</li> <li>• Equation of straight line.</li> <li>• Kinematic graphs.</li> </ul> <p><u>Pythagoras and Trigonometry</u></p> <ul style="list-style-type: none"> <li>• Pythagoras' Theorem.</li> <li>• Trigonometry.</li> </ul>	<p><u>Preparation for Progress Test</u></p> <ul style="list-style-type: none"> <li>• Revision of key topics covered across.</li> </ul> <p><u>Pythagoras and Trigonometry cont'd</u></p> <ul style="list-style-type: none"> <li>• Pythagoras' Theorem.</li> <li>• Trigonometry.</li> </ul> <p><u>Handling data</u></p> <ul style="list-style-type: none"> <li>• Frequency diagrams.</li> <li>• Averages and spread.</li> <li>• Scatter graphs and correlation.</li> <li>• Time series.</li> </ul>	<p><u>Graphs 2</u></p> <ul style="list-style-type: none"> <li>• Properties of quadratic functions.</li> <li>• Sketching functions.</li> <li>• Real-life Graphs.</li> </ul> <p><u>Vectors</u></p> <ul style="list-style-type: none"> <li>• Column vectors.</li> </ul> <p><u>Calculations 2</u></p> <ul style="list-style-type: none"> <li>• Calculating with roots and indices.</li> <li>• Exact calculations.</li> <li>• Standard For.</li> </ul> <p><u>Constructions cont'd</u></p> <ul style="list-style-type: none"> <li>• Circumference.</li> <li>• Area.</li> <li>• Surface area of 3D shapes such as cones, cylinders.</li> <li>• Arc length and sector area.</li> <li>• Constructions.</li> <li>• Loci.</li> </ul> <p><u>Circles and Constructions</u></p> <ul style="list-style-type: none"> <li>• Circumference.</li> <li>• Area.</li> <li>• Surface area of 3D shapes such as cones, cylinders.</li> <li>• Arc length and sector area.</li> </ul>	<p><u>Circles and Constructions cont'd</u></p> <p><u>Formulae and Functions</u></p> <ul style="list-style-type: none"> <li>• Substituting into Formulae.</li> <li>• Using Standard Formulae.</li> <li>• Equations, Identities and Functions.</li> </ul> <p><u>Units of proportionality</u></p> <ul style="list-style-type: none"> <li>• Compound Units.</li> <li>• Direct Proportion.</li> <li>• Inverse Proportion.</li> <li>• Growth and Decay.</li> </ul>	<p><u>Preparation for Progress Test</u></p> <ul style="list-style-type: none"> <li>• Revision of key topics covered across.</li> </ul> <p><u>Units of proportionality cont'd</u></p> <ul style="list-style-type: none"> <li>• Compound Units.</li> <li>• Direct Proportion.</li> <li>• Inverse Proportion.</li> <li>• Growth and Decay.</li> </ul> <p><u>Working with 3D shapes</u></p> <ul style="list-style-type: none"> <li>• Plans and elevations.</li> <li>• 3D shapes.</li> <li>• Volume of a prism.</li> <li>• Volume and surface area.</li> <li>• Similarity in 2D and 3D.</li> </ul>



<b>SKILLS</b>				<ul style="list-style-type: none"> <li>• Constructions.</li> <li>• Loci.</li> </ul>		
	<p>Multiplying and dividing by powers of ten Percentage multipliers Visualising and drawing shapes Reading maps and scales Ability to answer problem-solving questions</p> <p>Collecting like terms Simplifying expressions Expanding brackets Factorising expressions Drawing inequalities on a number line</p>	<p>Recalling factors, multiples and primes Square numbers Cube numbers Reading axes Drawing and labelling axes Ability to answer problem-solving questions Plotting coordinates Reading from graphs accurately Substitution Multiplication Division Addition Subtraction Use of square numbers Use of a calculator Index laws</p>	<p>Substitution Recalling formulae Pattern recognition Trends and relationships Multiplication Division Addition Subtraction Ability to mathematically reason Use of square numbers Use of a calculator Index laws</p>	<p>Reading axes Drawing and labelling axes Substitution Calculator skills Number skills Ability to answer problem-solving questions Recalling formulae Ability to mathematically reason Recognising different parts of shapes Use of mathematical equipment</p>	<p>Recognising different parts of shapes Use of mathematical equipment</p> <p>Recalling and manipulating of key formulae Substitution Ability to spot patterns Ability to answer problem-solving questions Use of powers and roots Use of a calculator</p>	<p>Recognising different parts of shapes</p> <p>Recalling and manipulating of key formulae Substitution Ability to spot patterns Ability to answer problem-solving questions Ability to mathematically reason Use of powers and roots Use of a calculator</p>
	<b>ASSESSMENT</b>	<p>1 x Ratio and Proportion assessment 1 x Equations and Inequalities assessment 1 x Seen Papers (teacher assessed) 1 x Seen Papers (self/peer assessed)</p>	<p>1 x Factors, Powers and Roots assessment 1 x Graphs 1 assessment 2 x Seen Papers (self/peer assessed)</p>	<p>1 x Pythagoras and Trigonometry unit assessment 1 x Spring Progress Test 1 x Seen Papers (teacher assessed)</p>	<p>1 x Graphs 2 assessment 1 x Seen Papers (teacher assessed) 1 x Seen Papers (self/peer assessed)</p>	<p>1 x Circles and constructions unit assessment 1 x Functions and Formulae unit assessment 2 x Seen Papers (self/peer assessed)</p>
<b>HOME LEARNING</b>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p> <p>Sparx revision focuses on Progress tests preparation.</p>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p>	<p>Fortnightly home learning set through Sparx Maths based upon topics covered in the previous term. Fortnightly home learning set to revise Seen Papers which are tested the following week.</p> <p>Sparx revision focuses on Progress tests preparation.</p>



## READING, WRITING, TALK, NUMERACY

exposure to problem-solving questions that require algebraic skills. In this half term, they develop skills in forming and solving equations from worded questions.

Students to create their own worded questions which require their partner to form and solve algebraic equations.

students to download a fascinating talk from Nira Chamberlain (President for the Institute of Mathematics and its Applications) on how Maths is used to solve real world problems.

When does a crowd or people become unsafe? How well will Manchester United do next season? When is it cost effective to change a kitchen?

<https://www.bbc.co.uk/programmes/m000w4rr>

‘Fermat’s Last Theorem’ by Simon Singh.

Visualisation - get students to work in pairs. Get one student to describe a 3D shape using correct mathematical language and get the other student to draw.

Parents can encourage students to download inspiring TED Talks about the how Statistics fool juries:

<http://www.mathsinsider.com/ted-ed/>

Read all about one of Manchester’s famous Mathematicians, Alan Turing and discover the contributions he made to Mathematics

<https://www.britannica.com/biography/Alan-Turing>

Building Connections: Provide tasks so that students can explore solving quadratics, e.g. use of graphs, completing the square, factorising.

Pre-reading: Give students one – three pieces of information about a problem they need to solve.

Ask them to use this to predict what they might have to calculate.

‘The curious incident of the dog in the night-time’ by Mark Haddon

Reading, linking topics such as growth and decay to news articles such as R rate associated COVID19.

Marcus du Sautoy gives a captivating talk on how Fibonacci numbers (1, 1, 2, 3, 5..) were actually discovered by Indian musicians investigating the numbers of rhythms made by long and short beats.

<https://www.youtube.com/watch?v=vZ2d3Njax8g>

Once students are proficient with the skills of finding angles in polygons, ask them to write a question for their partner to test their knowledge.

Give students an image from an exam question Ask them to think about 3 things that it makes them think or imagine. Get them to share with a partner.

## TIER 2 VOCABULARY

Deduce, prove.

Command words in exams: Evaluate, complete, solve, calculate, investigate, prove, show, describe, estimate, sketch, construct, expand, factorise, simplify.

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## TIER 3 VOCABULARY

Scale factors, compound interest, variable, quadratic, factorising, iteration, inequality, region

Prime factor decomposition, highest common factor, lowest common multiple, irrational numbers, surds, linear, quadratic, bisector, intercept, function

Cubic, reciprocal, exponential, trigonometric functions, gradients, hypotenuse, vectors, sine, cosine, tangent, frequency, quartiles, spread, centrality, box plot, interquartile range,

Area, circumference, arc, sector, segment, chord, tangent, perpendicular, locus, compound, direct, inverse, rate, plan, elevation, net, prism, vertex, edge, face, frustrum

Substitute, function, inverse, composite, equation, identity, proportion, growth, interest, depreciation, decay.

Volume, surface area, cross section, prism, acute, obtuse, reflex, interior, exterior, congruence, similarity, plan, elevation.



## PSPSMC, BRITISH VALUES AND DIVERSITY

			correlation, anomaly, time series			
	<p><u>Economic Wellbeing</u> Interest rates, mortgages, tax.</p> <p><u>Economic Wellbeing</u> data and equations for the linear graph can be based upon energy prices, bulk buying costs, bank account interest, etc. Students can plot the graphs for two different companies and compare/decide which is cheaper.</p> <p><u>British Values</u> are promoted throughout the curriculum. During lessons students are encouraged to reflect on right from wrong and accept responsibility for their behaviour. Students are encouraged to respect their peers and to respect democracy.</p> <p><u>Personal</u> Use of formulae in everyday life such as calculating the cost of calling out a plumber with a fixed charge and hourly rate and taxi rates with a fixed charge and rate per mile.</p>	<p><u>Cultural</u> Coordinates were thought up one day in the 1600s while Descartes lying in bed as a sick child watching a fly crawl on the ceiling. He wanted to find a way of stating exactly where the fly was positioned. He started off by drawing two lines at right angles to each other.</p> <p><u>Economic Wellbeing</u> Debt. How are prime factors keeping online transactions secure? <u>Cultural</u> explore number systems from different and historical cultures.</p>	<p><u>British Values</u> Collecting data on preferences or public opinions before elections. Ensuring samples are not biased.</p> <p><u>Self-confidence</u> Through marking feedback, students develop their self-confidence and self-esteem.</p> <p><u>Moral</u> Hans Rosling show data which looks at countries' populations over 200 years. Discussion point for impact of WW1, WW2, the population and economic growth of Eastern Asia.</p> <p><a href="http://www.youtube.com/watch?feature=player_embedded&amp;v=jbkSRLYS0jo">http://www.youtube.com/watch?feature=player_embedded&amp;v=jbkSRLYS0jo</a></p>	<p><u>Social</u> Use of the internet and historic house price data for Manchester to investigate the trends of house prices in the Manchester area over the last 50 years.</p> <p><u>Cultural</u> Moving objects (cars, boats, aeroplanes) when you have the speed and direction of motion.</p>	<p><u>Cultural/ Citizenship</u> abstract art, who discovered pi? Cultural – Constructions are useful for a range of jobs including engineering, architecture and town planning. Discussion of why engineers use triangles in constructions such as bridges.</p> <p><u>Social</u> Use of the internet and historic house price data for Manchester to investigate the trends of house prices in the Manchester area over the last 50 years.</p>	<p><u>Social</u> Use of the internet and historic house price data for Manchester to investigate the trends of house prices in the Manchester area over the last 50 years.</p>