



YEAR 11 Autumn TERM 2

'An ambitious curriculum that meets the needs of all'

Medium Term Planning – Units 4, 5, 6 and 7

Gradients and Lines Non-linear Graphs Using Graphs

UNIT 4 (WRM 2) : Non-Linear Graphs **F & H (8 hours)**

Previously met: Y9 (Quadratics, exponential, SDT)

To be able to:

- plot graphs of quadratic functions
- plot graphs of simple cubic functions
- plot the reciprocal function $y = \frac{1}{x}$
- **plot exponential graphs**
- recognise, sketch and interpret all the above (**including exponential functions**)
- find approximate solutions using graphs
- identify and interpret roots, intercepts of quadratic functions graphically
- **recognise and use the equation of a circle with centre at the origin**

Links and interleaving

- Solving equations, simultaneous equations (one linear and one quadratic)

UNIT 5 (WRM 3): Using Graphs **F & H (8 hours)**

Previously met: Y8, Y9 and Y10 (simultaneous equations and parallel lines)

To be able to

- To be able to reflect a shape in a given line
- To be able to plot and interpret conversion graphs
- To be able to plot and interpret real-life graphs in a context such as travel graphs and time series graphs
- **Interpret the gradient at a point as the instantaneous rate of change and relate this to velocity, acceleration and finance**
- **Estimate the area under a graph and interpret the result in context (distance on a speed/time graph)**

Links and interleaving

Reflection, currency conversion, standard unit conversions, area of compound shapes and trapezium, kinematics (speed, distance and time), time.

Curriculum Intent

Skills/Assessment
Objective Links

CHS UNIT 6 : Functions **H(8 hours) and F(4 hours)**

To be able to

- Find inputs and outputs
- Write algebraic expressions from a context/problem
- Solve problem involving formulae
- **Work with composite functions**
- **Work with inverse functions**

Links and interleaving

Negative numbers, function machines, substitution, graphs, powers and roots, order of operations,

UNIT 7: Multiplicative reasoning **F (12 hours) H (8 hours)** **(continue in Spring 1)**

**Previously met: Y10 similarity, ratio Y9: Rates:
compound measures**

To be able to:

- Use scale effectively in diagrams (including enlargement)
- Understand ratio
- Work with direct and indirect proportion
- **Solve proportion questions involving powers**
- Calculate with pressure and density
- Solve problem relating to best buys, currency conversions, unit conversions and other problems in a context

Links and interleaving

Substitution, graphs, linear equations, graph transformations, roots, simultaneous equations.

**Spiritual, moral,
social, and
cultural
development**

SMSC: Making choices, looking for patterns which may reflect the natural world, supporting and collaborating with each other, realisation that mathematics is an international language and making cultural links as we explore the history of mathematics.

PSHE/British Values: Working collaboratively, being respectful during discussion and valuing contributions made by others

Skills Builder: Key skills in numeracy used in all topic areas.

Numeracy

Focus on key skills.

Literacy

Vocabulary Tier 2: Command words displayed in the classroom and italicized/bold font used in shared resources/presentations. These are a constant focus in discussion and questioning,

Vocabulary Tier 3: Title slide in all shared resource presentations show the key vocabulary for each topic.

Reading: Underlining command words,

Writing: Modelling solutions

Oracy: Think, pair, share, discussion, verbal feedback (peer to peer), questioning, student modelling

<p>Becoming future ready</p>	<p>Personal Skills: As a Mathematics student you will learn many skills: you will gain opportunities to listen to others supportively and to use questioning to develop your own understanding, you will learn how to cope with challenging questions and how to build up your resilience, you will get the chance to work on your own and with others. You will develop problem solving skills and you will learn how to break a problem down into smaller more manageable steps. You will learn how to collaborate with others when solving problems and you will learn how to articulate your solution to a problem.</p> <p>Employability: Mathematical skills are invaluable in the workplace. There are many transferable skills which are much valued by employers. Specific career paths for each topic are discussed at the beginning of each unit of work.</p>
<p>Adaptation</p>	<ul style="list-style-type: none"> • By progressive questioning: exploring pupils' understanding through interactive dialogue. • By outcome: different learners will produce different outcomes. • By resource: worksheets are clearly presented and accessible. • By intervention: by providing different levels of supervision and support. • By grouping/setting: according to prior attainment, gender, social preference, preferred learning style. • By offering optional activities: In class or as homework, to extend learning.
<p>QFT/SEND Provision</p>	
<p>Implementation Curriculum Delivery</p>	<p><u>Unit 4 (WRM 2) Non-Linear Graphs</u></p> <p>Pre-requisites</p> <ul style="list-style-type: none"> • Coordinates • Plotting points • Axes and scale • Substitution with negative numbers. <p>Foundation Tier (up to Grade 5)</p> <ul style="list-style-type: none"> • Quadratic graphs. • Cubic graphs. • Reciprocal graphs. • Roots of quadratics. <p>Additional content for Higher Tier (up to Grade 9)</p> <ul style="list-style-type: none"> • Exponential graphs • Equation of a circle. • Tangents to curves. • Add trigonometric graphs (unit 10) • Add graph transformations (revisit unit 10) <p><u>Unit 5 (WRM 3) Using Graphs</u></p> <p>Pre-requisites</p> <ul style="list-style-type: none"> • Reflection • Scale/axis • Coordinates • Units • Linear and quadratic graphs <p>Foundation Tier (up to Grade 5)</p> <ul style="list-style-type: none"> • Conversion graphs (including currency) • Travel graphs: (speed-time and distance-time) • Using graphs to find approximate solutions to equations. <p>Additional content for Higher Tier (up to Grade 9)</p> <ul style="list-style-type: none"> • Estimate area under a curve. • Recap gradient to a curve.
<p>Learning Outcomes (Knowledge)</p>	

	<p><u>Unit 6 Functions</u></p> <p>Pre-requisites</p> <ul style="list-style-type: none"> • Substitution • Negative numbers • Order of operations • Rearranging formulas • Function machines <p>Foundation (up to Grade 5)</p> <ul style="list-style-type: none"> • Substitution into formula • Function notation <p>Additional content for Higher Tier (up to Grade 9)</p> <ul style="list-style-type: none"> • Composite Functions • Inverse functions • Solving quadratic inequalities <p><u>Unit 7 Multiplicative Reasoning (continue into Spring 1)</u></p> <p>Pre-requisites</p> <ul style="list-style-type: none"> • Multiplication tables • Units • Ratio tables • Area and volume <p>Foundation Tier (up to Grade 5)</p> <ul style="list-style-type: none"> • Scale factors and recap of similarity. • Currency conversion and best buy problems. • Speed, distance time questions • Mass, density and Volume • Pressure, area and volume • Ratio problems • Inverse proportion in context (eg three workers take 5 hours....) <p>Additional content for Higher Tier (up to Grade 9)</p> <ul style="list-style-type: none"> • Direct proportion • Inverse proportion • Complex ratio
Current learning to be developed in the future within:	A Level mathematics: Graphs, transformations, modelling
Assessment	Refer to assessment maps for formative and summative assessment opportunities.
Impact	Attainment and Progress – Refer to assessment results / data review documentation.