



# YEAR 12 FM Autumn TERM 1

'An ambitious curriculum that meets the needs of all'

## Medium Term Planning – Decision 1: Ch 1-4

Algorithms, Graphs and Networks, Algorithms on Graphs, Route Inspection

## Medium Term Planning – Core Pure 1: Ch1-3

Complex Numbers 1, Argand Diagrams, Series

### Curriculum Intent

#### Decision 1: Ch 1 Algorithms

#### Skills/Assessment Objective Links

Chapter 1: Algorithms: **Chapter 1: Algorithms**

D1 I can use and understand an algorithm given in words
D2 I understand how flow charts can be used to describe algorithms
D3 I can carry out a bubble sort
D4 I can carry out a quick sort
D5 I can carry out the three bin packing algorithms and understand their strengths and weaknesses
D6 I can determine the order of an algorithm

#### Prior knowledge

- **Function Machines (GCSE)**
- **Direct Proportion (GCSE)**

### Skills/Assessment Objective Links

#### Learning further developed in the future in:

- 

### Prior Knowledge

#### Decision 1: Ch 2 Graphs and Networks

### Current learning to be developed in the future

#### Skills/Assessment Objective Links

Chapter 2: Graphs and networks: **Chapter 2: Graphs and networks**

D7 I know how graphs and networks can be used to create mathematical models
D8 I am familiar with basic terminology used in graph theory
D9 I know some special types of graph
D10 I understand how graphs and networks can be represented using matrices
D11 I can use the planarity algorithm to determine whether or not a given graph is planar

#### Prior knowledge

- **Geometric proof (GCSE)**

#### Learning further developed in the future in:

- Algorithms on Graphs (Decision 1 Ch3)
- Route Inspection (Decision 1 Ch4)

## **Decision 1: Ch3 Algorithms on Graphs**

### **Skills/Assessment Objective Links**

#### **Chapter 3: Algorithms on graphs: Chapter 3: Algorithms on graphs**

D12 I can use Kruskal's algorithm to find a minimum spanning tree
D13 I can use Prim's algorithm on a network to find a minimum spanning tree
D14 I can apply Prim's algorithm to a distance matrix
D15 I can use Dijkstra's algorithm to find the shortest path between two vertices in a network
D16 I can use Floyd's algorithm

### **Prior knowledge**

- Graphs and networks (Decision 1 Ch 2)

### **Learning further developed in the future in:**

- The travelling Salesman (Decision 1 Ch 5)

## **Decision 1: Ch4 Route Inspection**

### **Skills/Assessment Objective Links**

#### **Chapter 4: Route inspection: Chapter 4: Route inspection**

D17 I can use the order of nodes to determine whether a graph is Eulerian, semi-Eulerian or neither
D18 I can use the route inspection (Chinese postman) algorithm to find the shortest route in a network
D19 I can use the route inspection algorithm in networks with more than four odd nodes

### **Prior knowledge**

- Graphs and networks (D1: Chapter 2)

### **Learning further developed in the future in:**

## **Core Pure 1: Ch 1 Complex Numbers 1**

### **Skills/Assessment Objective Links**

## Chapter 1: Complex Numbers: Chapter 1: Complex Numbers

FM1 I understand and can use the definitions of imaginary and complex numbers
---

FM2 I can add and subtract complex numbers
--

FM3 I can multiply complex numbers
------------------------------------

FM4 I understand the definition of a complex conjugate
--

FM5 I can divide complex numbers
----------------------------------

FM6 I can solve quadratic equations that have complex roots
---

FM7 I can solve cubic or quartic equations that have complex roots
--

### Prior knowledge

- Surds (Pure Y1 Ch1)
- Solving quadratics and the Discriminant (Pure Y1 Ch2)

### Learning further developed in the future in:

- Complex Numbers 2 (Core Pure 2 Ch 1)

## Core Pure 1: Ch 2 Argand Diagrams

### Skills/Assessment Objective Links

#### Chapter 2: Argand diagrams: Chapter 2: Argand diagrams

FM8 I can show complex numbers on an Argand diagram
---

FM9 I can find the modulus and argument of a complex number
---

FM10 I can write a complex number in modulus-argument form
--

FM11 I can represent loci on an Argand diagram
--

FM12 I can represent regions on an Argand diagram
---

### Prior knowledge

- Circle Geometry (Pure Y1 Ch6)
- SOHCAHTOA (GCSE)
- Complex Numbers (Core Pure 1 Ch1)

### Learning further developed in the future in:

- Complex Numbers 2 (Core Pure 2 Ch 1)

## Core Pure 1: Ch 3 Series

### Skills/Assessment Objective Links

#### Chapter 3: Series: Chapter 3: Series

FM13 I can use standard results for $\sum 1$ and $\sum r$
---

FM14 I can use standard results for $\sum r^2$ and $\sum r^3$
---

FM15 I can evaluate and simplify series of the form $\sum f(r)$ where $f(r)$ is linear, quadratic or cubic
--

### Prior knowledge

	<ul style="list-style-type: none"> <li>Factorising (Pure Y1 Ch1)</li> </ul> <p><b>Learning further developed in the future in:</b></p> <ul style="list-style-type: none"> <li>Series 2 (Core Pure 2 Ch2)</li> </ul>
<b>Spiritual, moral, social, and cultural development</b>	<p><b>SMSC:</b> 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.</p> <p><b>PSHE/British Values:</b> Working collaboratively, being respectful during discussion and valuing contributions made by others</p> <p><b>Skills Builder: Key skills in numeracy used in all topic areas.</b></p>
<b>Numeracy</b>	<b>Focus on key skills.</b>
<b>Literacy</b>	<p><b>Vocabulary Tier 2:</b> Command words displayed in the classroom and italicized/bold font used in shared resources/presentations. These are a constant focus in discussion and questioning,</p> <p><b>Vocabulary Tier 3:</b> Title slide in all shared resource presentations show the key vocabulary for each topic.</p> <p><b>Reading:</b> Underlining command words,</p> <p><b>Writing:</b> Modelling solutions</p> <p><b>Oracy:</b> Think, pair, share, discussion, verbal feedback (peer to peer), questioning, student modelling</p>
<b>Becoming future ready</b>	<p><b>Personal Skills:</b> 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><b>Employability:</b> 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>
<b>Adaptation</b>	<ul style="list-style-type: none"> <li>By progressive questioning: exploring pupils' understanding through interactive dialogue.</li> <li>By outcome: different learners will produce different outcomes.</li> <li>By resource: worksheets are clearly presented and accessible.</li> <li>By intervention: by providing different levels of supervision and support.</li> <li>By offering optional activities: In class or as homework, to extend learning.</li> </ul>
<b>QFT/SEND Provision</b>	
<b>Implementation Curriculum Delivery</b>	See curriculum intent
<b>Learning Outcomes (Knowledge)</b>	
<b>Assessment</b>	Refer to assessment maps for formative and summative assessment opportunities.

**Impact**

Attainment and Progress – Refer to assessment results / data review documentation.