EDEXCEL AS Level Mathematics
D1 Scheme of Work

Approximately 28 lessons of teaching time (these allocated lessons depend upon the needs of the class and are to be used as a guide)
There should be four or five weeks that can be used to practice past papers.

Matchings (3 lessons)

Topic	**Syllabus**	**Text book** Discrete Mathematics 1	**Lessons**
Matchings	Candidates should be able to: Model matching problems using a bipartite graph	Ex 7A 0152-153	1
Maximum matching algorithm	Candidates should be able to use the maximal matching algorithm to solve problems involving matching the elements of one set to the elements of the other.	Ex 7B p157-161	2
Assessment – D1 Matchings			

LINEAR PROGRAMMING – Graphical Solutions to LP problems (8-10 lessons)

Students should independently review solving inequalities and regions from GCSE prior to commencement of this unit

Topic	**Syllabus**	**Text book** Discrete Mathematics 1 – Chapter 7	**Lessons**
LP problems	Candidates should be able to: (a) formulate in algebraic terms a real-world problem posed in words, including the identification of relevant variables, constraints and objective function; (b) set up a linear programming formulation in the form 'maximise (or minimise) objective, subject to inequality constraints and trivial constraints of the form *variable* ≥ 0 ';	Ex 6A p119-120	1-2
Assessment – D1 LP [1] – Setting up problem			
Graphical solutions	Illustrate a two variable linear programming problem graphically clearly identifying the feasible region.	Ex 6B p126-127	1
	Locate the optimal point in a feasible region using the objective function line (ruler) method, and use the vertex testing method to locate the optimal point.	Ex 6C p137-140	2
Integer solutions	Determine solutions which need integer values	Ex 6D p143-144	1-2
	Solve a variety of linear programming problems	Mixed Ex 6E p145-147	1-2
Assessment – D1 LP [2] – Solving LP problems			

ALGORITHMS (6-7 lessons)

Topic	**Syllabus**	**Text book -** Discrete Mathematics 1	**Lessons**
Algorithms and flow diagrams.	Candidates should be able to: (a) understand the definition of an algorithm; (b) appreciate why an algorithmic approach to problem-solving is generally preferable to ad hoc methods, and understand the limitations of algorithmic methods; (c)) interpret and apply simple algorithms defined by flow diagrams or given as a listing in words.	Ex 1A p5 Ex 1B, p8-9	1-2
Bubble sort, Quick sort and binary search algorithms	Be able to carry out a bubble sort and quick sort algorithm, and implement the binary search algorithm.	Bubble - Ex 1C p13-14; Q1, Q3a, Q4a, Q5a Quick – Ex 1C p13-14; Q2, Q3b, Q4b, Q5b. Binary – Ex1D p16-17;	3
Bin - Packing algorithms	Candidates should be able to show familiarity with simple algorithms concerning packing including first-fit methods (first-fit and first-fit decreasing) and full bin packing algorithm.	Ex 1E p21-22	2
	Solve problems using involving all of the above algorithms	Review Ex 1F p22-23	HWK
Assessment – d1 Algorithms			

GRAPHS & NETWORS (3-4 lessons)

Topic	**Syllabus**	**Text book -** Discrete Mathematics 1	**Lessons**
Graph theory	Candidates should be able to: (a) Know that graphs and networks can be used to create mathematical models (eg: London underground) Understand the meaning of the terms ‘arc’ (or ‘edge’), ‘node’ (or ‘vertex’), ‘path’, ‘tree’ ‘trail’, ‘closed trail’ and ‘cycle’; Degree/order (valency), simple graph and digraph (b) Understand meaning of and recognise a tree, a spanning tree, a complete graph, isomorphic graphs and bipartite graphs . (c) Understand how graphs and networks can be represented using matrices.	Ex 2A p30-32 Ex 2B p35-36 Q1 to Q5 Ex 2B p35-36 Q6 to Q10 Mixed Exercises 2C p37-38	3-4
Assessment – d1 Graphs & Networks			

ALGORITHMS ON NETWORK (5-6 Lessons)

Topic	Syllabus	Text book Discrete Mathematics 1 -	Lessons
Minimum connector problems	Apply Kruskal's algorithm in solving the minimum connector problem to find a minimum spanning tree (including the use of a matrix representation for Prim's algorithm).	Ex 3A p44	**1**
	Apply Prim's algorithm in solving the minimum connector problem to find a minimum spanning tree (including the use of a matrix representation for Prim's algorithm).	Ex 3B p46	**1**
	Apply Prim's algorithm to a distance matrix	Ex 3C p50-51	**1**
	Use Dijksta's algorithm to find the shortest path between two vertices in a network including networks with directed arcs	Ex 3D p56-58	**2**
	Solve problems involving all three algorithms (Could be HWK)	Mixed Ex3E p58-61	**1**
Assessment – Networks - Prim's, Kruskal's and Dijkstra's			

ROUTE INSPRECTION (CHINESE POSTMAN PROBLEM) (3-4 lessons)

Topic	Syllabus	Text book Discrete Mathematics 1	Lessons
Eulerian grpahs	Use the orders of the nodes in a graph to determine whether the graph is Eulerian or semi-Eulerian or neither; ***Students could discover Euler's relationship for the number of regions, nodes and arcs for themselves. Likewise they could try to discover conditions for a graph to be Eulerian or semi-Eulerian.***	Ex 4A p65-66	1
Route inspection (Chinese postman)	Use route inspection algorithm to find the shortest route in a network, and name that route.	Ex 4B p71-72 Mixed Exercise 4C p73--75	2-3
Assessment –Route inspection			

CRITICAL PATH ANALYSIS (8 lessons)

Topic	Syllabus	Text book Discrete Mathematics 1	Lessons
Precedence tables	Model a project by an activity network, from a precedence table.	Ex 5A p91-92	1
	Understand the use of dummies in an activity network	Ex 5B p94-95	1
Activity network adaption	Carry out a forward and backward pass using early and late event times in an activity network	Ex 5C p98	1
	Identify critical activities in an activity network	Ex 5D p100	1
Total float	Determine the total float of activities in an activity network	Ex 5E p102	1
Gannt charts	Be able to construct a Gannt (cascade) chart and use a Gannt chart.	Ex 5F p103 Ex 5G p104-105	1
	Be able to construct a scheduling diagram	Ex 5H p108-109	1
	Solve mixed exam style quesitons	Ex 5I p110-111	1
Assessment –Route inspection			

PAST PAPERS

Past papers should be completed once the D1 syllabus has been completed. Copies of past papers are available in the maths area. Students need as much practise at past exam papers as possible – they usually run out of time in the exam so getting up to 'speed' is essential for success.

ASSESSMENTS

Students should complete an assessment test at the end of each unit of work. Marks for these assessments should be recorded on G4S as soon as they are complete.