**Little Heath Sixth Form**

**Mathematics** Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:****Mathematics (Decision 2)** | **Unit Code:****MD02** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| --- | --- | --- | --- |
| **D1 Re-Cap (Skills and Knowledge)** | **Red** | **Amber** | **Green** |
| * Understand the concept of an algorithm
 |  |  |  |
| * Understand and be familiar with Linear Programming
 |  |  |  |
| * Draw a bipartite graph
 |  |  |  |

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| **Allocation-The Hungarian Algorithm** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Understand how to formulate an allocation problem in matrix form
 |  |  |  |  |
| * Formulate a square cost matrix
 |  |  |  |  |
| * Work out an opportunity cost matrix by row and column reduction
 |  |  |  |  |
| * Be able to apply the line test successfully
 |  |  |  |  |
| * Be able to augment an opportunity cost matrix
 |  |  |  |  |
| * Successfully establish a minimal matching
 |  |  |  |  |
| * Be able to adapt the algorithm to find a maximal matching
 |  |  |  |  |
| * Be able to adapt the algorithm to use on a non-square matrix
 |  |  |  |  |
| **Dynamic Programming** |  |  |  |  |
| * Understand and use Bellman’s principle
 |  |  |  |  |
| Understand and use stages and states |  |  |  |  |
| * Work from right to left through a network
 |  |  |  |  |
| * Use the table method to find the stage, state, action, destination and value
 |  |  |  |  |
| * Maximise the minimum and minimise the maximum

Trace back to find and state the route |  |  |  |  |
| * Re-draw diagrams so that any vertical lines go left to right
 |  |  |  |  |
| * Draw the decision network where edges represent actions
 |  |  |  |  |

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|  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| **Critical Path Analysis** |  |  |  |  |
| * Able to model a project using an activity network from a precedence table
 |  |  |  |  |
| * Able to identify where dummies are needed because of precedence
 |  |  |  |  |
| * Able to identify where dummies are needed to show unique task
 |  |  |  |  |
| * Able to carry out a forward pass to find the early event times
 |  |  |  |  |
| * Able to carry out a backward pass to find the latest event times
 |  |  |  |  |
| * Able to identify the critical events
 |  |  |  |  |
| * Able to identify the critical activities and the critical path
 |  |  |  |  |
| * Able to construct a cascade (Gantt) chart
 |  |  |  |  |
| * Able to use a cascade (Gantt) chart
 |  |  |  |  |
| * Able to calculate the minimum number of workers needed from the critical path time
 |  |  |  |  |
| * Able to calculate the minimum number of workers needed from the cascade (Gantt) chart
 |  |  |  |  |
| * Use and construct a resource diagram
 |  |  |  |  |
| * Use and construct a levelling diagram
 |  |  |  |  |
| **Network Flows** |  |  |  |  |
| Understand and use source and sinks |  |  |  |  |
| * Understand flow is less than or equal to edge capacity
 |  |  |  |  |
| * Understand the principle of the vertex condition, inflow = outflow
 |  |  |  |  |
| * Be able to augment flow paths
 |  |  |  |  |
| * Understand the concept of saturated edges
 |  |  |  |  |
| * Evaluate a cut; add the capacities
 |  |  |  |  |
| * Use the Max flow/Min cut theorem
 |  |  |  |  |
| * Understand and use the correct labelling procedure: excess flow or forward capacity, back flow or reverse capacity
 |  |  |  |  |
| * Super-sources and super-sinks
 |  |  |  |  |
| * Resolving bottlenecks
 |  |  |  |  |
| **Linear Programming: The Simplex Algorithm** |  |  |  |  |
| * Be able to formulate a linear programming problem into a tableau
 |  |  |  |  |
| * Introduce slack variables
 |  |  |  |  |
| * Use the ratio test to select the pivot
 |  |  |  |  |
| * Perform the simplex algorithm to solve the problem
 |  |  |  |  |
| * Interpret the tableau solution
 |  |  |  |  |
| **Game Theory for Zero Sum Games** |  |  |  |  |
| * Understand what is meant by zero sum games
 |  |  |  |  |
| * Set up a pay off matrix
 |  |  |  |  |
| * Use Row minimum and column maximum to find saddle points
 |  |  |  |  |
| * Find the value of a game
 |  |  |  |  |
| * Understand play safe strategies
 |  |  |  |  |
| * Understand stable solutions and saddle points
 |  |  |  |  |
| * Reduce a matrix due to row or column dominance
 |  |  |  |  |
| * Find solutions to mixed strategy games
 |  |  |  |  |
| * Find the feasible region
 |  |  |  |  |

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| **REVISION****Use the information on this checklist to make revision cards and notes** |

**Grade tracking:**

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| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
|  |  |  |  |  |  |
| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
|  |  |  |  |  |  |

*Note: You should discuss this checklist regularly with your subject teacher/mentor*