**NEA Programming Project – Mark Scheme**

**Programming Techniques (0-12 available)**

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| **Marks** | | | |
| **Marking criteria** | **1-4** | **5-8** | **9-12** |
| AO3-12 | * There is an attempt to program a solution to solve component parts of the task using few of the techniques identified. * Code may be minimal, disorganised or hard to follow. * Component parts of the task may be trivial, incomplete, or not attempted. | * There is an attempt to program a solution to most component parts of the task using several techniques. * The code is mostly correct. * The task is clearly broken into its component parts and there are links to the design. * A good range of techniques are used appropriately, giving a working solution to most component parts of the task. * Some sections of the solution may be inefficiently coded, although basic functionality is mostly successful. * The task is mostly complete, but it may be limited in its scope. | * There is an attempt to program solution to solve all of the task using most of the techniques listed. * The task is clearly broken down into its component parts, with reasons given, and there is a clear correspondence of the design with the final code. * The techniques are used appropriately in all cases giving an efficient, working solution to all parts of the problems. * There may be additional programming techniques used to produce an efficient and elegant solution to the task. * The solution is sufficiently challenging and makes good use of a range of techniques. |

**Analysis (0 -6 marks available)**

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| **Marks** | | | |
| **Marking criteria** | **1-2** | **3-4** | **5-6** |
| AO2-2  AO3-4 | * There is limited analysis, with some comments on what the task involves. * There may be little decomposition of the task into its component parts. * There are brief comments on how testing might take place, but with no mention of success criteria. | * There is some analysis indicating what is required for each of the component parts. * The problems have been decomposed into clearly defined component parts. * There is some discussion of how testing will take place. * The link between testing and success criteria is evident. * In the solution to the task, the objectives are clear. * The solution to the task shows awareness of real-world utility value but may be limited in scope. | * There is a detailed analysis of what is required for solving the problems. * There is clear and logical decomposition of larger tasks into component parts. * There is a clear requirements specification which covers all the functionality of the task. * Approaches are justified. * There is detailed discussion of testing and success criteria. * The importance of validation in order to produce a robust program is taken into account. * In the solution to the task, objectives are clear and show awareness of the need for real-world utility and robustness. |

**Design (0 -8 marks available)**

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| **Marks** | | | |
| **Marking criteria** | **1-2** | **3-5** | **6-8** |
| AO1-1  AO2-2  AO3-5 | * There are basic plans to solve some of the component parts of the task. * There may be a limited outline describing the intended approach to some parts of the task. * Testing is not planned or only briefly mentioned. * The solution may be outlined but not in sufficient detail to produce a workable solution. | * Most component parts of the task are planned. * The user interface is described. * There is a set of basic algorithms outlining a solution to most parts of the problems. * There is some discussion of how testing will take place. * The link between testing and success criteria is evident. * There is some discussion of the variables to be used. * There is awareness of the need for validation. * The solution to the task shows awareness of real-world utility value, but may be limited in scope. | * All the component parts of the task are clearly planned. * There is discussion and planning of the user interface. * There is a full set of detailed algorithms representing a solution to each part of the problem. * The design is complete enough for it to be used as the basis for coding. * There is detailed discussion of testing and success criteria. * There is awareness of why testing should be destructive. * Variables and data structures are identified. * The solution to the task shows consideration about how to build in robustness. * The solution to the task is clearly designed in a modular way. |

**Development (0 -8 marks available)**

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| **Marks** | | | |
| **Marking criteria** | **1-2** | **3-5** | **6-8** |
| AO1-1  AO2-2  AO3-5 | * There is limited evidence to show a solution to component parts of the task. * There is some evidence to show that the solution works. * Code is presented with little or no annotation. * Variable names may not reflect their purpose. * The code shows little organisation or structure. * There is a limited record of resources used. * Quality of extended response – The report is presented in an unstructured format. Information may be supported by limited evidence and the relationship to the evidence may not be clear. | * There is evidence to show how the solutions was developed. * There is some evidence of testing during development. * Testing shows that many parts of the solution work. * The code is organised with sensible variable names and with some annotation indicating the purpose of each part of the code. * There is a record of resources used. * Quality of extended response – The report, for the most part, is presented in a structured format. The information presented is, in the most part, relevant and supported by some evidence. | * There is detailed evidence showing development of the solution. * There is detailed evidence of systematic testing and refinement during development to show that all parts work as required. * The code is well organised with meaningful variable names and detailed annotation indicating the function of each section. * There is a detailed record of resources used. * Quality of extended response – The report is presented in a coherent and structured format. The information presented is relevant   and substantiated. |

**Testing and evaluation and conclusions (0 -6 marks available)**

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| **Marks** | | | |
| **Marking criteria** | **1-2** | **3-4** | **5-6** |
| AO2-2  AO3-4 | * There is evidence to show that the system has been tested for basic functionality but the test plan is limited in scope with little structure. * There is limited evidence to show how the result matches the original criteria. * Quality of extended response – The report may be ambiguous or disorganised, with little or no use of specialist terms. | * There is a test plan covering many parts of the problem with some suggested test data. * There is evidence that the system has been tested using this data. * There is some evidence to show how the results of testing have been compared to the original criteria. * There is a brief evaluation of how successful or otherwise the solution is. * Quality of extended response – The report, for the most part, is resented in a structured format with use of some specialist terms. | * The detailed test plan covers all major success criteria for the original problem. * The testing demonstrates how the solution relates to the success criteria. * Unresolved issues are highlighted together with comments on how the issues might be resolved. * Testing is clearly more than just a demonstration of success – it is used destructively to uncover errors. * There is a full evaluation of the final solution against the success criteria. * Quality of extended response – The report is presented in a coherent and structured format, and specialist terms are used accurately and confidently. |