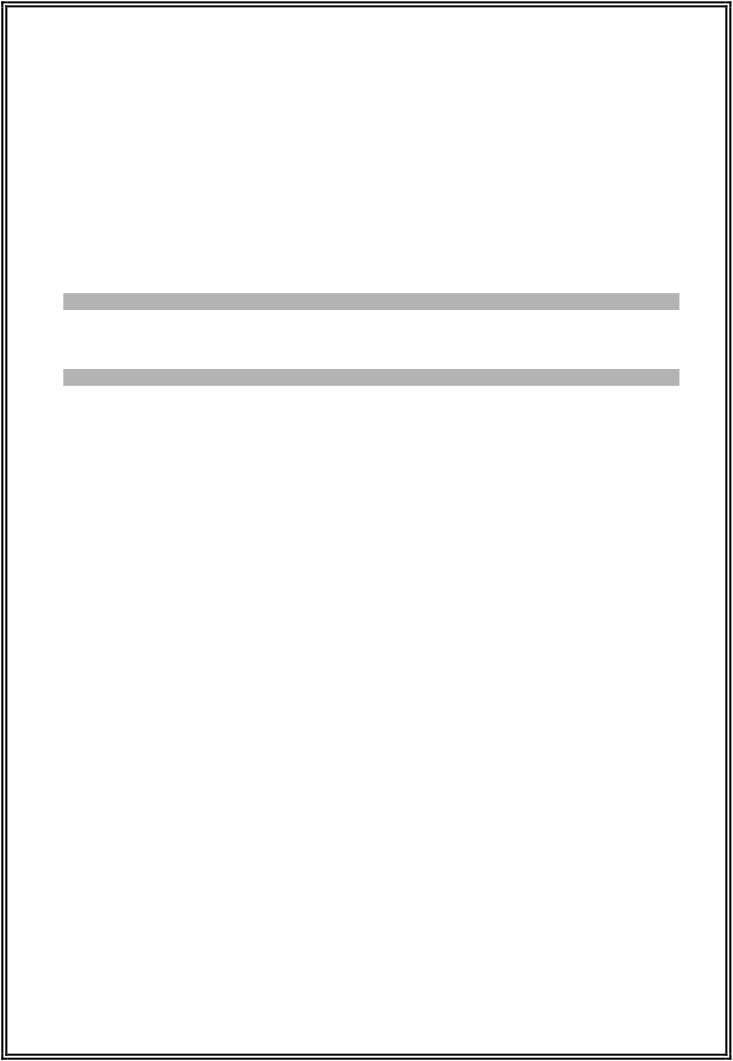
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**GCE A LEVEL MARKING SCHEME**



**SUMMER 2018**

**A LEVEL (NEW)**

**COMUTER SCIENCE - UNIT 4 1500U40-1**

**INTRODUCTION**

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

**WJEC A Level Computer Science - Unit 4 Mark Scheme Summer 2018**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Mark | AO1 | AO2 | AO3 | Total |
| 1(a) | 1 mark for naming and 1 mark for describing the function of any two buses, up to a maximum of **4 marks**.   * ***Address bus***, used to transmit the address in RAM of the next line of program code to be fetched. Used to transmit the address of a RAM location or input/output port where data is to be stored or loaded. * ***Data bus***, used to transfer program code between RAM memory and the processor. Used to transfer data between the processor and RAM memory or input/output ports. * ***Control bus***, used to send control signals from the processor to the RAM memory or input/output ports to initiate data transfer. Carries interrupt signals to the processor to indicate that hardware/software requires attention. | 4 | 1.1b |  |  | 4 |
| 1(b) | The program command is accessed from the ***current instruction register***. The processor then carries out actions which depend on the command:  On completion of the execute phase, the ***program counter*** is updated, ready to fetch the next program command.  **1 mark** for stating that the program instruction is held in the **current instruction register.**  **1 mark** for correctly describing a load or save operation, including reference to the **memory address register** and **memory data register.**  **1 mark** for correctly describing one other processing operation, i.e. **Calculation**, **Logic** or **Jump** operation  **1 mark** for stating that the **program counter** is incremented at the end of the execute phase. | 4 | 1.1b |  |  | 4 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Mark | AO1 | AO2 | AO3 | Total |
| 1(c) | LOD S, 0 {initialise the count variable} LOD T, 0 {initialise the total variable} LOOP: IN R {start loop,  input a value and store in R} JLZ R, END {jump out of loop if value is  negative, but continue if the value input is positive}  INC S {add 1 to the count}  ADD T, R {add current data value to the total}  JMP LOOP {repeat the loop}  END: OUT T {loop ends, output total}  OUT S {output count}  **1 mark** for initialising count or total to zero **1 marks** for label marking start of the loop  **2 marks** for correct operation of the loop  (Award 1 mark for checking for negative rogue value, 1 mark for jump(s) which correctly continue or end the loop. Other possible combinations of jump commands allowed, provided the rogue value is not added to the total or count)  **1 mark** for updating total or count **1 mark** for output of total or count | 1 1  2  1 1 |  |  | 3.1b  3.1b 3.1b  3.1b 3.1b | 6 |
| 2(a) | **1 mark** for the overflow area is a separate file.  **1 mark** for the overflow area uses serial storage.   1. Award one mark for each correct point up to a maximum of **2 marks**:   Advantage any one of:   * Records are likely to be stored at or close to the calculated location, so access will be fast. * If a record is not in the file, this will be known as soon as the first empty location is reached. * Less total storage space needed   Disadvantage:   * The main file has a fixed maximum capacity, so storage of further records may be prevented. | 2 2 | 1.1b | 2.1b |  | 4 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | Mark | | AO1 | | AO2 | | AO3 | | Total | |
| 2(b) | 1. *NOV3099* (14+15+22+30+99) = 180, 180 MOD 1000 = **180**  * The records would be grouped near the start of the file, * so collisions would be frequent.  1. A variety of answers are possible.   **Up to 2 marks** **for a suitable hash method** which:   * incorporates the month, day and year figures and can generate hash values over most of the range 0-1000 **1 mark** * will avoid collisions between records for similar dates in successive years (e.g MAR0218 and MAR0119). **1 mark** * produce a number in excess of 1000 by using powers or multiples (**1 mark**) of the day, month and year values, then apply the hash function: total MOD 1000 | | | | 1  1 1  2 | |  | | 2.1b  2.1b  2.1b | |  | | 5 | |
| 3(a) | costs of links:  A – C: 10 A – D: 5 B – D: 4  C – E: 20 D – E: 2  **Award 2 marks for all correct, 1 mark for 3 or more correct** | | | | 2 | |  | | 2.1b | |  | | 2 | |
| 3(b) | **1 mark for each table row showing a correct cost from node A:** | | | | 4 | |  | | 2.1b | |  | | 4 | |
| Destination | Route | Cost |  | |  | |  | |  | |  | |
| B | D, B | 9 |
| C | C | 10 |
| D | D | 5 |
| E | D, E | 7 |
|  | | | |  | |  | |  | |  | |  | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Mark | AO1 | AO2 | AO3 | Total |
| 4(a) | 1. Up to a **maximum of 2 marks**  * No key field**,** so confusion between customers with the same name**: 1 mark** * Name field is not atomic. Names should be stored in separate Surname and Forename fields, to allow easy searching/sorting by surname: **1 mark** |

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