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|  | |  |  | | --- | --- | |  |  | | **1(a).** | The following table contains several definitions of terms that are used in Computer Science.     |  |  | | --- | --- | | **Letter** | **Definition** | | **A** | Cleaning up data entered by removing non-standard characters | | **B** | Hiding or removing irrelevant details from a problem to reduce complexity | | **C** | Checking that the user is allowed to access the program | | **D** | Breaking a complex problem down into smaller problems | | **E** | Repeating elements of a program | | **F** | Converting one data type to another, for example converting an integer to a real number |   Write the letter of the definition that matches each keyword in each space.     |  |  |  | | --- | --- | --- | |  | Decomposition | ........D......... | |  | Abstraction | ..........B....... | |  | Input sanitisation | ...........A...... | |  | Casting | .............F.... | | **[4]** | | | | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | 1. Write a pseudocode statement to assign the value 7.3 to a variable with the identifier timer   **Timer=7.3**  **[1]**   1. State the most appropriate data type for the variable timer.   **float**  **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **2(a).** | Dru writes the following program using a high-level language.     |  |  |  | | --- | --- | --- | |  | 01 | function newscore(a,b) | |  | 02 | temp = a\*b | |  | 03 | temp = temp + 1 | |  | 04 | return temp | |  | 05 | endfunction | |  | 06 | score = 18 | |  | 07 | name = "Dru" | |  | 08 | print (score) | |  | 09 | print ("name") | |  | 10 | print (newscore(score,2)) | |  | 11 | print (score) |   The following table contains the program code for each line where this program outputs values.  State the values output by the program on each of the lines.     |  |  |  | | --- | --- | --- | | **Line** | **Program code** | **Value output** | | 08 | print (score) | 18 | | 09 | print ("name") | Dru | | 10 | print (newscore(score,2)) | 37 | | 11 | print (score) | 18 |      |  | | --- | | **[4]** | | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | Describe the advantages of writing the program in a high-level language instead of in assembly language.  **It is easier for a human to understand high level  and is easier**      **[2]** | |

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|  | |  |  | | --- | --- | |  |  | | **(c).** | Describe how a character set is used to represent the string value stored in the variable name  **Each Character has a unique binary number and each character in a string is assigned a unique number**      **[2]** | |

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|  | |  |  | | --- | --- | |  |  | | **3(a).** | A vending machine has the following options available.     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  | | --- | --- | --- | | **Item code** | **Item name** | **Price** | | A1 | Crisps, bacon flavour | £0.75 | | A2 | Crisps, salted | £0.75 | | B1 | Chocolate bar | £0.90 | | C1 | Apple pieces | £0.50 | | C2 | Raisins | £0.85 | |  |   Users insert coins into the vending machine and then enter the two character item code of their selection. If the user has inserted enough money, the vending machine will release the chosen item and output any change required. If the user enters an invalid item code then a suitable error message is displayed.  The vending machine is tested before it is released.   1. Explain the purpose of testing the vending machine.   **To make sure it functions correctly and you can identify any errors in the code before putting it in to production**      **[2]**   1. Describe the difference between iterative testing and final testing.         **[2]**   1. Complete the following test plan for the vending machine.      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  | | --- | --- | --- | | **Code entered** | **Money inserted** | **Expected result** | | B1 | £1 | Chocolate bar served, £0.10 change given | |  | £0.85 | Raisins served, no change given | | C1 |  | Error – not enough money inserted | | C3 | £0.75 |  | | | **[3]** | | | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | The algorithm for one section of a vending machine program is shown in pseudocode.  if money >= price then       venditem()       giveChange(money – price)   else       print("Error – not enough money inserted")   endif   1. Give the identifier of **one** variable used in the algorithm.   **[1]**   1. State how many parameters are passed into the giveChange() subroutine.   **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **(c).** | Draw the vending machine algorithm in the part above as a flowchart.     |  | | --- | |  |      |  | | --- | | **[5]** | | |

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|  | |  |  | | --- | --- | |  |  | | **(d).** | When writing the program for the vending machine, maintainability was considered.   1. Identify **two** ways that the program in the part above has been made more maintainable.      |  |  |  | | --- | --- | --- | |  | 1 |  | |  |  | | |  | 2 |  | |  |  | | | **[2]** | | |  1. Give **one** additional way that the maintainability of the program can be improved.     **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **(e).** | The vending machine stores the quantity of items available in a database table called ITEMS. The current contents of ITEMS is shown:     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  | | --- | --- | --- | | **ItemCode** | **ItemName** | **Stock** | | A1 | Crisps, bacon flavour | 6 | | A2 | Crisps, salted | 2 | | B1 | Chocolate bar | 12 | | C1 | Apple pieces | 18 | | C2 | Raisins | 7 | |  |   Complete the following SQL statement to display the item code for all items that have fewer than 10 in stock.     |  |  | | --- | --- | | **SELECT** |  |      |  |  | | --- | --- | | **FROM** |  | |  | | | **[4]** | | | |

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|  | |  |  | | --- | --- | |  |  | | **(f).** | The vending machine can be in one of three states: on, off or suspended. A user can change the state of the vending machine by using the following algorithm.      newstate = input("Enter the new state : ")       switch newstate:          case "on":             statevalue = 1          case "off":             statevalue = 2          case "suspended":             statevalue = 3          default:             print("Invalid state")       endswitch   Rewrite the algorithm to perform the same actions using IF statements in place of the switch statement.                **[5]** | |

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|  | |  |  | | --- | --- | |  |  | | **4(a).** | Convert the binary value **1110 0011** into hexadecimal.        **[2]** | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | Convert the denary value **105** into an 8 bit binary number.        **[2]** | |

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|  | |  |  | | --- | --- | |  |  | | **(c).** | Give **two** reasons why computer scientists use hexadecimal to represent numbers instead of binary.     |  |  | | --- | --- | | 1 |  | |  | | | 2 |  | |  | | | **[2]** | | | |

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|  | |  |  | | --- | --- | |  |  | | **(d).** | DIV and MOD are both operators used in computing-related mathematics.   1. State the value of 13 DIV 4     **[1]**   1. State the value of 13 MOD 4     **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **(e).** | Show the outcome of a right shift of three places on the binary value 0111 1000    **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **(f).** | 1. Draw the logic diagram for the logic system **P = A OR (B AND C)**      |  | | --- | |  |      |  | | --- | | **[3]** |  1. Complete the truth table for the logic system **P = NOT (A OR B)**      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  | | --- | --- | --- | | **A** | **B** | **P** | | 0 | 0 | 1 | | 0 | 1 |  | | 1 | 0 |  | |  |  |  | |  | | **[4]** | | | | |

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|  | |  |  | | --- | --- | |  |  | | **5(a).** | The following logo is stored as a bitmap image. Each box represents one pixel, with three different colours being used in the image.     |  | | --- | |  |   State what is meant by the term image resolution.    **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | Calculate the fewest number of bits that could be used to store the logo as a bitmap image. You must show your working.              **[4]** | |

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|  | |  |  | | --- | --- | |  |  | | **(c).** | Give **two** ways that the file size of the image could be reduced.     |  |  | | --- | --- | | 1 |  | |  | | | 2 |  | |  | | | **[2]** | | | |

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|  | |  |  | | --- | --- | |  |  | | **(d).** | Metadata is sometimes stored alongside images.   1. State what is meant by the term metadata.     **[1]**   1. Give **one** example of metadata that could be stored alongside the logo.     **[1]** | |

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|  | |  |  | | --- | --- | |  |  | | **6(a).** | The following names of students are stored in an array with the identifier studentnames.  studentnames = ["Rob", "Anna", "Huw", "Emma", "Patrice", "Iqbal"]  Describe the steps that a linear search would take to find Anna in studentnames                **[4]** | |

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|  | |  |  | | --- | --- | |  |  | | **(b).** | The names of students are sorted into ascending alphabetical order using an insertion sort.  Complete the following diagram to show the stages an insertion sort would take to complete this task.  Each row represents one pass of the insertion sort algorithm. You may not need to use all empty rows.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Rob** | **Anna** | **Huw** | **Emma** | **Patrice** | **Iqbal** |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |      |  | | --- | | **[5]** | | |

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|  | |  |  | | --- | --- | |  |  | | **(c).** | A school uses the array to call an attendance register every morning.  Write an algorithm using iteration to:     |  |  | | --- | --- | | • | display the name of each student one at a time from studentnames | | • | take as input whether that student is present or absent | | • | display the total number of present students and number of absent students in a suitable message, after all student names have been displayed. |                             **[6]** | |

**END OF QUESTION PAPER**