T8

Programming

CHAPTER ASSIGNMENT · 93 MARKS

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from *Cambridge IGCSE and O Level Computer Science*, 2nd edition, David Watson and Helen Williams (Hodder Education), for classroom use.

Activities from the chapter

8.1 Write and test the Hello World program in your chosen programming language.

8.2 In pseudocode and the high-level programming language that your school has chosen to use, declare the variables and constants you would use in an algorithm to find the volume of a cylinder.

8.3 In the high-level programming language that your school has chosen to use, write and run your own program that calculates and displays the volume of a cylinder.

8.4 In the high-level programming language that your school has chosen to use, write and run a short program to test if a number input is greater than or equal to 100 or less than 100.

8.5 In the high-level programming language that your school has chosen to use, write and run a short program to input a number and check if that number is equal to 1, 2, 3 or 4 using the **CASE** construct (or alternative where appropriate).

8.6 In the high-level programming language that your school has chosen to use, write and run two short programs, one using a count-controlled loop and the other a condition-controlled loop. They should each repeat ten times, incrementing the loop counter by three and outputting the value for each iteration.

8.7 In the high-level programming language that your school has chosen to use, write and run a short program using a condition-controlled loop to allow the user to input the weight of sacks of rice and to count the number of sacks the user has input. When the user types in '-1' this should stop the process and the program should then output the number of sacks entered and the total weight.

8.8 In the high-level programming language that your school has chosen, write and run a short program to input your full name into a variable, **MyName**, find the length of your name, extract the first three characters of your name and display your name in upper case and in lower case.

8.9 In the high-level programming language that your school has chosen to use, write and test a short program to perform all these mathematical operations and output the results: » Input two numbers, **Number1** and **Number2** » Calculate **Number1 + Number2** » Calculate **Number1 - Number2** » Calculate **Number1 * Number2** » Calculate **Number1 / Number2** » Calculate **Number1 ^ Number2** » Input an integer **Number3** » Calculate **Number3 * (Number1 + Number2)** » Calculate **Number3 * (Number1 - Number2)** » Calculate **(Number1 + Number2) ^ Number3.**

8.10 In the high-level programming language that your school has chosen to use, write and test a short program to perform all these comparisons and output the results. » Input two numbers, **Number1** and **Number2** » Compare **Number1** and **Number2**: – Output with a suitable message if both numbers are not equal – Output with a suitable message identifying which number is largest – Output with a suitable message identifying which number is smallest – Output with a suitable message if both numbers are equal » Input another number **Number3** – Output with a suitable message if all three numbers are not equal – Output with a suitable message identifying which number is largest – Output with a suitable message identifying which number is smallest – Output with a suitable message if all numbers are equal.

8.11 In the high-level programming language that your school has chosen to use, use the pseudocode solution to help you to write and test a short program to calculate and output largest, highest, lowest and average marks for a single subject with five tests taken by a student. Hints: » Look at the other statements and output needed as well as the loop. » For testing purposes, you can reduce the number of tests to two or three.

8.12 When the single subject program is working, extend it to calculate and output largest, highest, lowest, and average marks for a single student with six subjects studied by a student. Hints: » Look at the other statements and outputs needed as well as the loop. » For testing purposes reduce the number of subjects to two or three.

8.13 When the single student program is working, extend your program to complete the task to calculate and output the largest, highest, lowest, and average marks for the whole class of 20 students. Hint: » For testing purposes reduce the class size to two or three.

8.14 Write a short program in your chosen programming language to define and use a procedure to display three lines of stars.

8.15 Extend your short program in your chosen programming language to define and use a procedure that accepts a parameter to write a given number of lines of stars. You will find the following commands useful: »**\n** in Python »**Writeline** in Visual Basic »**Println** in Java.

8.16 Write an algorithm in pseudocode as a function, with a parameter, to convert a temperature from Celsius to Fahrenheit. Test your algorithm by writing a short program in your chosen programming language to define and use this function.

8.17 Write and test a short program for the sample algorithm in your chosen programming language.

8.18 Consider your program for Activity 8.13. State the variables that should be declared and used as local variables if procedures are used for: » The calculation of the highest, lowest, and average marks awarded for each subject » The calculation of the highest, lowest, and average marks awarded for each student.

8.19 Identify the values of the variables **Value1**, **Value2** and **Value3**.

8.20 Write and test a short program in your chosen programming language to: » input two integers a and b and then find **a MOD b** and **a DIV b** » create a random integer between 100 and 300.

8.21 Check your last two programs and make sure they could be maintained by another programmer. Swap your program listing with another student and check that they can understand it.

8.22 In your chosen programming language write a short program to declare and populate the array **MyList**, as shown in Figure 8.10, using a **FOR** loop.

8.23 In your chosen programming language, write a program to declare and populate the array **MyTable**, as shown in Figure 8.11, using a nested **FOR** loop.

8.24 Use the program written in your chosen programming language to write a line of text to a file and read it back from the file. Use the comments in the pseudocode to help you write comments to explain how the file handling works.

8.25 Using pseudocode write an algorithm to copy a line of text from one text file to another text file.

Exam-style questions

1 Variables and constants are used for data storage in computer programs. Discuss the similarities and differences between these data stores. [4]

2 A programmer is writing a program that stores data about items stored in a warehouse. Suggest suitable meaningful names and data types for: » Item name » Manufacturer » Description » Number in stock » Reorder level » Whether the item is on order or not. [6]

3 Programming concepts include: » sequence » selection » iteration » totalling » counting. Describe each concept and provide an example of program code to show how it is used. [10]

4 Write a short pseudocode algorithm to input a password, check that it has exactly 8 characters in it, check that all the letters are upper case, and output the message "Password meets the rules" if both these conditions are true. [6]

5 Programs can use both local and global variables. Describe, using examples, the difference between local and global variables. [6]

6 Explain why programmers find library routines useful when writing programs. Include in your answer with **two** examples of library routines that programmers frequently use. [4]

7 A two-dimensional array stores the first name and family name of ten people.

(a) Write a program in pseudocode to display the first name and family name of the ten people. [3]

(b) Extend your program to sort the ten names in order of family name before displaying the names. [5]

8 A computer file, **"Message.txt"**, stores a line of text. Write an algorithm in pseudocode to display this line of text. [3]

9

(a) Describe the purpose of each statement in this algorithm. [2]

```
FOR I ← 1 TO 300
  INPUT Name[I]
NEXT I
```

(b) Identify, using pseudocode, another loop structure that the algorithm in **part a** could have used. [1]

(c) Write an algorithm, using pseudocode, to input a number between 0 and 100 inclusive. The algorithm should prompt for the input and output an error message if the number is outside this range. **For IGCSE Computer Science, you should be able to write an understandable algorithm to solve a problem. Your algorithm should be easy to read and understand and may use any of the concepts in this chapter and Chapter 7. Here are some further problems for you to solve:** [3]

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10 The one-dimensional array **StaffName[]** contains the names of the staff in a department. Another one-dimensional array **StaffPhone[]** contains the phone numbers for the members of staff. A final one-dimensional array **StaffOffice[]** contains the office location for the members of staff. The position of each member of staff's data in the three arrays is the same, for example, the member of staff in position 5 in **StaffPhone[]** and **StaffOffice[]** is the same. Write a program that meets the following requirements: » uses procedures to display these lists: – staff phone numbers and names in alphabetic order of staff name – members of staff grouped by office number » uses a procedure to display all the details for a member of staff, with the name used as a parameter » uses a procedure to update the details for a member of staff, with the name used as a parameter. You must use program code with local and global variables and add comments to explain how your code works. [15]

11 Use a trace table to test the program you have written in question **10**. [If you have used a real programming language to write your program then it is also good practice to run the program to test and help find errors.] [5]

12 You can become a member of the town guild if you meet all the following requirements: » aged between 18 and 65 » you have lived in the town for 20 years or you have lived in the town for 5 years and both your parents still live in the town or one parent has died and the other parent still lives in the town or you and a brother or a sister have lived in the town for 10 years » you have half a million dollars in your bank account » you have never been to prison » at least two guild members support your application » if five guild members support your application then you could be excused one of the above requirements, apart from age Write a program that allows you to input answers to questions to ensure that you meet the requirements, issues a unique membership number if you do or explains all the reasons for failure if you don't meet the requirements. [15]

13 Use a trace table to test the program you have written in question 12. [If you have used a real programming language to write your program then it is also good practice to run the program to test and help find errors.] [5]

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/computer-science/o-level/programming/