GCSE

C500U20-1

S23-C500U20-1

**THURSDAY, 25 MAY 2023 – AFTERNOON**

# COMPUTER SCIENCE – Component 2
## Computational Thinking and Programming

2 hours

### ADDITIONAL MATERIALS

You will require the WJEC supplied prototype Python file: Digitech.py and Payroll.py

Your computer should be pre-installed with a word processing package and a functional copy of Python 3.10.5.

### INSTRUCTIONS TO CANDIDATES

Some questions should be answered in a word-processed document. All other questions will require the use of a functional copy of Python (any version from 3.8 to 3.10.5).
Save your work regularly.

### INFORMATION FOR CANDIDATES

The total number of marks available for this examination is 80.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers. The quality of your written communication, including appropriate use of punctuation and grammar, will be assessed in your answers.

**Create a new word-processed document called ExamAnswers.**

**Open the ParkwoodArts.py file and the Payroll.py file and familiarise yourself with the contents.**

## Investigation

**1.** Using the ParkwoodArts.py file:

(a) Provide a screenshot of the error message displayed following a failed login attempt. State the incorrect username AND incorrect password used. [3]

(b) Provide a screenshot of the message displayed following a successful login attempt. State the username and password used. [3]

**Enter your answers in your ExamAnswers document.**

**2.** Identify **one** example of each of the following from the ParkwoodArts.py file:

(a) selection [1]

(b) user-defined subroutine [1]

(c) A Boolean value. [1]

**Copy your answers into your ExamAnswers document.**

**3.** Describe **one** example of each of the following using annotation in the DigiTech.py file:

(a) code to generate a button on a form [2]

(b) assignment [2]

(c) iteration [2]

(d) writing information to a file. [2]

**Enter your answers as code in the ParkwoodArts.py Python file.**

**Design**

Parkwood Vale Arts Club would like you to design additional features for the system to allow it to store details of its customers.

**4.** Design an algorithm that accepts the input of a course's number of sessions. Your algorithm should output a suitable error message if the data entered contains any string values.

Your algorithm should be written using pseudo-code and self-documenting identifiers. [6]

**5.** Parkwood Vale Arts Club require an additional feature that will calculate how much overtime pay an Art teacher will received based on how many extra hours they have worked.

Assume that an Art teacher's overtime hours are any that are above 15 hours.

Design an algorithm which:

- allows the user to input the amount of hours worked
- calculates how many hours of overtime they have worked
- calculates the overtime pay by multiplying the overtime hours by 1.5 if they are less than 5 otherwise the overtime hours are multiplied by 1.2
- outputs the result of the calculations as currency (£).

Your algorithm should be written using pseudo-code and self-documenting identifiers. [6]

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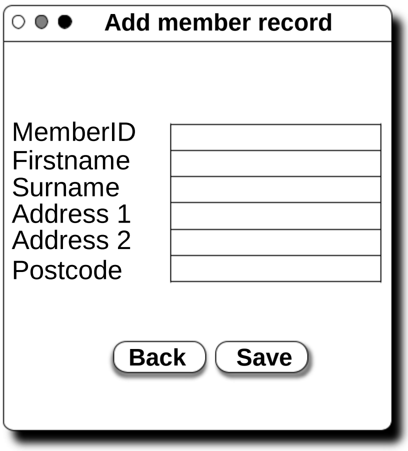
**Enter your answers in your ExamAnswers document.**

## Implementation

**6.** Parkwood Vale arts Club would like to create a new form to input and save new club member details. It has created the outline design shown here:



(a) Create a new form. [1]

(b) Insert a title on the form "Add member record". [2]

(c) Create text boxes to allow a user to input each of the following:

- Member ID
- Firstname
- Surname
- Address 1
- Address 2
- Postcode [6]

(d) Provide an appropriate label for each of the text boxes in question (c). Ensure that the layout is clear. [7]

(e) Create a "Save" button and add code to the Python file to enable the saving of the customer details in a file called "member_details.txt" displaying a successfully saved message. [4]

(f) Create a "back" button to return the user to the main menu. [2]

(g) Explain how your program works by annotating the code you have added within your Python file. [6]

**Enter your answers as code in a new Python file called Members.py**

## Testing

Vale DigiTech Ltd requires you to test the program.

**7.** These Customer details are to be stored using your Python program:

- MemberID: 121
- Firstname: John
- Surname: Dwyer
- Address 1: 3 Parkwood Rise
- Address 2: Parkwood Vale
- Postcode: PV99 2CF

Test the functionality of the Python program by providing screenshots showing:

(a) the form completed with the above details [1]

(b) a message confirming that the customer details have been stored [1]

(c) the member_details.txt file open with the above details stored. [2]

**Enter your answers in your ExamAnswers document.**

## Refinement

Parkwood Vale Arts Club has asked you to carry out refinements to change the function and improve the accuracy of their code.

**8.** Parkwood Vale Arts Club is aware of changes to the tax system that it will have to implement. Refine the code within Payroll.py to take account of the following changes.

(a) (i) Decrease the Tax Rate from 19% to 25%. [2]

(ii) Describe the refinements you have made to your code for the decrease in Tax Rate by annotating your code. [2]

(b) (i) Change the Pension Contribution to 12% of gross pay. [2]

(ii) Describe the refinements you have made to your code for the change in National Insurance Rate by annotating your code. [2]

**Enter your answers as code in Payroll.py**

## Refinement testing

**9.** Provide a screenshot of your Payroll form showing all outputs when a gross pay of £4000.00 is input. [5]

**Enter your answer in your ExamAnswers document.**

## Evaluate

**10.** Discuss how your final program meets Parkwood Vale Art Club's requirements. You should consider:

- Two refinements that your program succeeds in implementing
- How the code achieves those refinements
- Areas for improvement in your final program. [6]

**Enter your answers in your ExamAnswers document.**

**END OF PAPER**

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