



GCSE

C500U20-1B



SEPTEMBER 2024

COMPUTER SCIENCE – Component 2
Computer Programming

PRE-RELEASED MATERIAL

INSTRUCTIONS TO CANDIDATES

You must **not** take this material or any associated research material into the examination with you.

INFORMATION FOR CANDIDATES

The information overleaf is provided to assist your preparation for the Computer Programming examination.

All programs should be developed using Python version 3.10.2

Original Requirements

Parkwood Vale Museum is a reputable institution dedicated to preserving and showcasing art and cultural heritage. In addition to its extensive collection of artwork, it also provides visitors with a variety of educational programmes, workshops, and resources related to art appreciation.

Parkwood Vale Museum recognises the need to streamline its operations and enhance the visitor experience. To achieve this, the museum wishes to implement a comprehensive computerised system to manage its exhibits and educational programmes. Instead of opting for an off-the-shelf software package, the museum has chosen to commission a bespoke solution.

Authentication

Data security is very important to the museum. It has insisted that the system has a login screen that requires a username and a password for authentication. The system must display a message stating whether login was successful or unsuccessful. It must also allow for new usernames and passwords to be added.

Main Menu and Navigation

Parkwood Vale Museum understands that its staff, while highly skilled in art practices and education, may not possess specialised computer skills. In order to ensure a user-friendly experience, the system will need to incorporate a Graphical User Interface (GUI) for intuitive navigation. A main menu is required to navigate between different sections of the program.

Exhibits and Programmes

Parkwood Vale Museum actively encourages its staff to organise and promote new exhibits and educational programmes throughout the year. Each exhibit or programme will be assigned a unique reference code, facilitating easy identification and management of the events available to visitors.

Add Exhibition

Parkwood Vale Museum has decided that it would like a form to input the following details for each art exhibition:

- Exhibition ID
- Exhibition name
- Start date
- Description
- Weeks on display

The form should also include buttons that:

- save the details to a file on disk called Museum.txt
- return to the main menu.

Parkwood Vale Museum has provided a partial design of the user interface it would like to use:

The image shows a window titled "Exhibition Details" with a standard macOS-style title bar (three buttons: red, yellow, green). Inside the window, there are five text input fields arranged vertically, each preceded by a label: "Exhibition ID", "Exhibition name", "Start date", "Description", and "Weeks on display". Below these fields, there are two buttons: "Back" and "Save", both with rounded rectangular shapes and a slight shadow effect.

Payroll

Parkwood Vale Museum must pay its staff for the hours worked and needs to calculate the correct amount of pay for each staff member.

Users will enter the monthly salary (Gross Pay) and the system will calculate and display deductions (Tax, National Insurance and Pension Contribution), and the correct amount of take-home pay (Net Pay).

The following calculations should be used for the prototype software:

- Tax = 19% of Gross Pay
- National Insurance = 12.5% of Gross Pay
- Pension Contribution = 10% of Gross Pay
- Deductions = Tax + National Insurance + Pension Contribution
- Net Pay = Gross Pay – Deductions.

The museum has decided that there is no need to store the results of these calculations.

A partial design for the user interface has been provided

The image shows a software window titled "Payroll". Inside the window, there is a form with the following elements:

- A label "Gross Pay" followed by a text input field containing the number "0".
- A rounded button labeled "Calculate" positioned below the "Gross Pay" field.
- A label "Tax:" followed by a text input field containing "0.0".
- A label "National Insurance:" followed by a text input field containing "0.0".
- A label "Pension Contribution:" followed by a text input field containing "0.0".
- A label "Deductions:" followed by a text input field containing "0.0".
- A label "Net Pay:" followed by a text input field containing "0.0".
- A rounded button labeled "Back" at the bottom center of the window.

Parkwood Vale Museum would like their new system to be developed using the Python programming language. This will enable it to make any necessary, future, additions and changes to the program.