Cambridge IGCSE™

CANDIDATE
NAME

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NUMBER

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COMPUTER SCIENCE   **0478/21**

Paper 2 Problem-solving and Programming   **May/June 2022**

                                                                                                  1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS
- Answer **all** questions.
- **Do not attempt Tasks 1, 2 and 3** in the copy of the pre-release material on page 2; these are for information only.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION
- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **12** pages.

Section A

You are advised to spend no longer than 40 minutes answering this section.

Here is a copy of the pre-release material.

DO NOT attempt Tasks 1, 2 and 3 now.

Use the pre-release material and your experience from attempting the following tasks before the examination to answer Question 1.

Pre-release material

Friends of Seaview Pier is an organisation devoted to the restoration and upkeep of a pier in the town. A pier is a wooden structure that provides a walkway over the sea. The pier requires regular maintenance and the friends of the pier need to raise money for this purpose.

Members of Friends of Seaview Pier each pay $75 per year, as a contribution to the pier's running costs. This entitles them to free admission to the pier throughout the year. They can also volunteer to help run the pier, by working at the pier entrance gate, working in the gift shop, or painting and decorating.

To provide additional income, the pier's wooden planks can be sponsored. A brass plaque, which contains a short message of the sponsor's choice, is fitted to a plank on the pier, for a donation of $200.

Write and test a program or programs for the Friends of Seaview Pier:
- Your program or programs must include appropriate prompts for the entry of data. Data must be validated on entry.
- All outputs, including error messages, need to be set out clearly and understandably.
- All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

Task 1 – becoming a member of Friends of Seaview Pier

Set up a system to enable people to become members of Friends of Seaview Pier and for each new member enter:
- their first name and last name
- whether or **not** they wish to work as a volunteer
   - if they choose to volunteer, identify the area from:
      - the pier entrance gate
      - the gift shop
      - painting and decorating
- the date of joining
- whether or **not** they have paid the $75 fee.

All of this information needs to be stored using suitable data structures.

Task 2 – using the membership data

Extend the program in **Task 1** so that a list of the first and last names of members can be output in any of the following categories:
- Members who have chosen to work as volunteers.
- Volunteers who would like to work at the pier entrance gate.
- Volunteers who would like to work in the gift shop.
- Volunteers who would like to help with painting and decorating tasks.
- Members whose membership has expired (they have **not** re-joined this year).
- Members who have **not** yet paid their $75 fee.

Task 3 – sponsoring a wooden plank

Add an additional option to the program in **Task 1** to enable the pier's wooden planks to be sponsored. Separate data structures should be used to store the names of the individuals and the short messages they would like to have written on their brass plaque. An output would display everything that was input for the sponsor to confirm. If errors are found, the program should allow data to be re-entered. Once complete, the data is stored and the sponsor is charged $200.