Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMPUTER SCIENCE **0478/23**

Paper 2 Problem-solving and Programming **May/June 2018**

PRE-RELEASE MATERIAL

No Additional Materials are required.

This material should be given to the relevant teachers and candidates as soon as it has been received at the Centre.

READ THESE INSTRUCTIONS FIRST

Candidates should use this material in preparation for the examination. Candidates should attempt the practical programming tasks using their chosen high-level, procedural programming language.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **2** printed pages.

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CAMBRIDGE International Examinations

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In preparation for the examination candidates should attempt the following practical tasks by **writing and testing a program or programs**.

A car park has space for 100 cars and a barrier entrance and exit system. There is a display at the entrance to show how many spaces are empty. Cars are issued a ticket with a unique number on entry and the time of issue is stored. The car park charges $1.50 per hour and the fee is paid at a machine before leaving the car park. At the machine, the ticket number and departure time are entered; the fee is calculated by the machine and the amount due is paid by the ticket holder. Cars cannot stay overnight; the system is reset at midnight.

Write and test a program or programs for the car park manager.

- Your program or programs must include appropriate prompts for the entry of data.
- Error messages and other output 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 – Operating the car park.

The system is reset at midnight every day.
Set up a system using arrays and with suitable prompts that will carry out the following as cars enter or leave the car park:

On Entry:
- display the number of empty car park spaces
- issue the next available ticket number
- store the current time and the ticket number
- display the updated number of empty car park spaces.

On Exit:
- input a ticket number and departure time
- output the amount of time the car stayed at the car park
- delete the ticket number from the array
- display the updated number of empty car park spaces.

TASK 2 – Working out the cost and daily takings.

Amend the program so that it will calculate the amount to be paid using a charge of $1.50 per hour, or part of an hour (i.e. any amount of time into the next hour is charged for a whole hour). The amount to be paid is displayed and is added to a running total for the day, before the ticket number is deleted from the array. At the end of the day, the following information is displayed:
- total daily takings
- number of cars that have used the car park
- average charge per car
- average length of stay per car.

TASK 3 – Introducing parking restrictions.

The car park manager decides to restrict the length of stay to a maximum of eight hours, and will charge an extra $100 if a car overstays. Modify your program to implement this change and ensure the driver is aware of this extra charge. Output the number of cars that have overstayed in a day.