



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**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.**

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**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.



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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.

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.

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