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Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMPUTER SCIENCE **0478/21**

Paper 2 Problem-solving and Programming **May/June 2019**

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.

Any businesses described in this paper are entirely fictitious.

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

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

The local high school uses buses to transport students to school. There are six bus routes labelled A to F. You have conducted a survey to analyse the punctuality statistics of these buses over a four-week period. The data from the survey are shown in the table:

	Punctuality table					
Day	**Bus A**	**Bus B**	**Bus C**	**Bus D**	**Bus E**	**Bus F**
Mon1	0	0	2	1	–1	0
Tue1	0	1	0	0	–1	–5
Wed1	0	0	–1	0	–1	–5
Thu1	2	0	–1	0	–2	–5
Fri1	2	1	–2	0	–4	–4
Mon2	4	2	–2	0	–10	–3
Tue2	0	0	–3	0	–2	–5
Wed2	3	0	–1	0	0	0
Thu2	4	0	0	0	0	0
Fri2	–2	0	0	0	0	0
Mon3	–5	1	–2	2	0	0
Tue3	0	0	0	0	1	–2
Wed3	0	0	1	0	2	–3
Thu3	3	0	1	0	–3	1
Fri3	4	2	1	0	1	1
Mon4	–1	0	1	0	1	1
Tue4	8	0	–1	0	3	0
Wed4	1	1	–1	0	–1	0
Thu4	1	0	2	0	0	–2
Fri4	–2	0	–2	0	0	–5

Positive numbers represent minutes early, negative numbers represent minutes late and 0 represents the bus having been on time.

Write and test a program or programs for the local high school.

- Your program or programs must include appropriate prompts for the entry of data; data must be validated on entry.
- 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 – Setting up the data storage.
Using arrays set up a system to enable data for each bus route to be entered covering each day of a four-week period. It must be possible to enter the data supplied or your own set of data, using suitable prompts as necessary.

Task 2 – Working out the statistics.
Extend your program so that the following statistics for the four-week period may be calculated and output:
- the number of late arrivals for each bus route
- the average number of minutes late for each bus route
- the bus route with the highest number of days on which it was late
- the average number of minutes late for each bus route, using only data from days on which it was late

All the results should be displayed with appropriate annotation.

Task 3 – Checking specific days.
Extend the program as follows:
- Allow the user to input a specific day, for example Fri3, to be used for analysis of data.
- Find and display how many buses were late on this particular day.
- For each late bus, display the route label and how late the bus was on this particular day.

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