Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7065705124

COMPUTER SCIENCE **2210/22**

Paper 2 Problem-solving and Programming **May/June 2015**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

DO NOT ATTEMPT TASKS 1, 2 AND 3 in the pre-release material; these are for information only.

You are advised to spend no more than **40 minutes** on **Section A** (Question 1).

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 50.

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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 tasks before the examination to answer Question 1.

Pre-release Material

Write and test a program to complete the **three** tasks.

TASK 1

A school keeps records of the weights of each pupil. The weight, in kilograms, of each pupil is recorded on the first day of term. Input and store the weights and names recorded for a class of 30 pupils. You must store the weights in a one-dimensional array and the names in another one-dimensional array. All the weights must be validated on entry and any invalid weights rejected. You must decide your own validation rules. You may assume that the pupils' names are unique. Output the names and weights of the pupils in the class.

TASK 2

The weight, in kilograms, of each pupil is recorded again on the last day of term. Calculate and store the difference in weight for each pupil.

TASK 3

For those pupils who have a difference in weight of more than 2.5 kilograms, output, with a suitable message, the pupil's name, the difference in weight and whether this is a rise or a fall.

Your program must include appropriate prompts for the entry of data. Error messages and other outputs need to be set out clearly and understandably. All variables, constants and other identifiers must have meaningful names. Each task must be fully tested.

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1 **(a)** All variables, constants and other identifiers should have meaningful names.

(i) Declare the array to store the pupils' names.

.....[1]

(ii) Declare the array to store the pupils' weights.

.....[1]

(iii) It has been decided to record the weights for the whole school of 600 pupils rather than one class.

Write suitable new declarations for these two arrays.

.....

.....[1]

(b) Write an algorithm to complete **Task 2**, using **either** pseudocode, programming statements **or** a flowchart. Use weights for **the whole school**. You should assume that Task 1 has already been completed.

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.....[5]

(c) (i) Describe suitable validation rules for **Task 1**.

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.....[2]

(ii) Give **two** pupil weights that you could use to check the validation used in **Task 1**. Explain why you chose each weight.

Weight 1 .....

Reason for choice .....

.....

Weight 2 .....

Reason for choice .....

.....[4]

(d) Explain how you select the pupils with a fall in weight of more than 2.5 kilograms (part of **Task 3**). You may include pseudocode or programming statements as part of your explanation.

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.....[6]

Section B

2 Read this section of program code that should input 30 positive numbers and then output the largest number input.

```
1   Large = 9999
2   Counter = 0
3   WHILE Counter > 30
4   DO
5     INPUT Num
6     IF Num < Large THEN Large = Num
7     Counter = Counter - 1
8   ENDWHILE
9   PRINT Large
```

There are **four** errors in this code.

Locate these errors and suggest a corrected piece of code for each error.

1 .....

.....

2 .....

.....

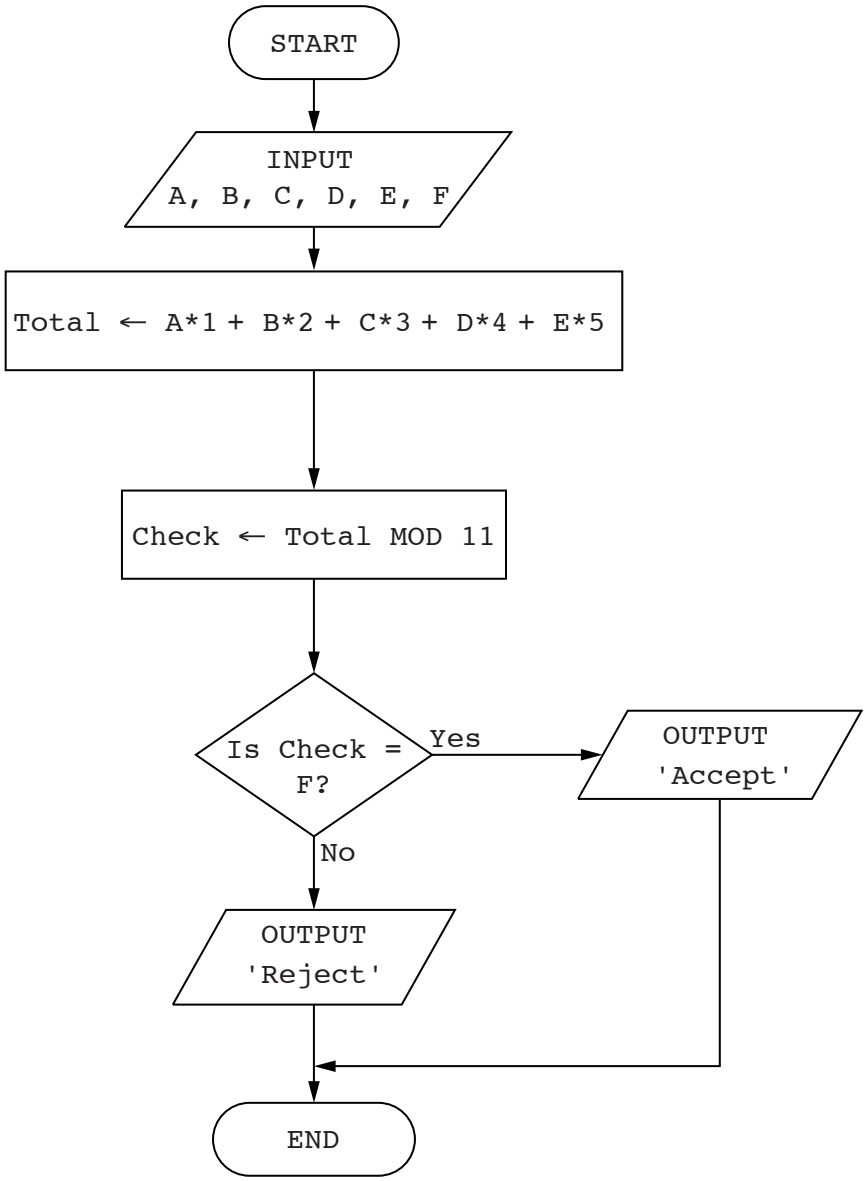
3 .....

.....

4 .....

.....[4]

3 **(a)** The flowchart below inputs six single digit numbers. The predefined function `MOD` gives the value of the remainder, for example, `Y ← 10 MOD 3` gives the value `Y = 1`



Complete a trace table for each of the two sets of input data.

Set 1 5, 2, 4, 3, 1, 5

Set 2 3, 2, 1, 0, 7, 3

Trace table set 1 5, 2, 4, 3, 1, 5

A	B	C	D	E	F	Total	Check	Output

Trace table set 2 3, 2, 1, 0, 7, 3

A	B	C	D	E	F	Total	Check	Output

[4]

(b) State the purpose of the flowchart in **part (a)**.

.....

.....[1]

(c) Identify a problem with this flowchart and explain how to correct it.

Problem .....

.....

Solution .....

.....

.....

.....[3]

4 Four programming concepts and four examples of programming code are shown below.

Draw a line to link each programming concept to the correct example of programming code.

Programming concept	Example of programming code
Counting	`Sum = Sum + Value[n]`
Repetition	`IF Value = 10 THEN PRINT 'X'`
Selection	`FOR Counter = 1 TO 10`
Totalling	`Amount = Amount + 1`
	`Sum = Num1 + Num2`

[4]

5 **(a)** Write an algorithm, using pseudocode and a `FOR … TO … NEXT` loop structure, to input 1000 numbers into an array.

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.....[2]

(b) Rewrite your algorithm using another loop structure.

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.....[4]

Question 6 begins on page 10.

6 A database, MARKS, was set up to record the test results for a class of students. Part of the database is shown below.

Student Name	Class ID	Maths	English	Science	History	Geography
Paul Smith	0017	70	55	65	62	59
Ravi Gupta	0009	29	34	38	41	44
Chin Hwee	0010	43	47	50	45	52
John Jones	0013	37	67	21	28	35
Diana Abur	0001	92	88	95	89	78
Rosanna King	0016	21	13	11	27	15

(a) Give the number of fields that are in each record.

.....[1]

(b) State which field you would choose for the primary key.

.....

Give a reason for choosing this field.

.....

.....[2]

(c) The query-by-example grid below selects all students with more than 60 marks in History or more than 60 marks in Geography.

Field:	Student Name	History	Geography
Table:	MARKS	MARKS	MARKS
Sort:	Ascending		
Show:	☑	☐	☐
Criteria:		>60	
or:			>60

Show what would be output.

.....

.....[2]

(d) Complete the query-by-example grid below to select and show the student names only of all students with less than 40 marks in both Maths and English.

Field:			
Table:			
Sort:			
Show:	☐	☐	☐
Criteria:			
or:			

[3]

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