Cambridge
O Level

**Cambridge International Examinations**
Cambridge Ordinary Level

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|---|---|---|---|---|---|---|---|---|---|
| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | |

*4357963448*

**COMPUTER SCIENCE** **2210/21**

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 data logger records the temperature on the roof of a school twice a day, at midday and midnight. Input and store the temperatures recorded for a month. You must store the temperatures in two one-dimensional arrays, one for the midday temperatures and one for the midnight temperatures. All the temperatures must be validated on entry and any invalid temperatures rejected. You must decide your own validation rules. You may assume that there are 30 days in a month.

**TASK 2**

Calculate the average temperature for midday and the average temperature for midnight. Output these averages with a suitable message for each one.

**TASK 3**

Select the day with the highest midday temperature and the day with the lowest midnight temperature. Then output each of these temperatures, the corresponding day and a suitable message.

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)** In **Task 1**, you had to store the midday temperatures and midnight temperatures in arrays.

Write suitable declarations for these **two** arrays.

.....

.....[2]

**(ii)** It has been decided to record the temperatures for one week rather than one month.

Write the new array declarations that you would use.

.....

.....[1]

**(iii)** Declare **two** other variables that you have used and state what you used each one for.

Variable 1 .....

Use .....

Variable 2 .....

Use .....[4]

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

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.....[5]

**(c)** Give a set of midday temperature data, for a week, that could be used to check your validation rules for **Task 1**. Explain why you chose this data set.

Data set .....

.....

Reason for choice .....

.....

.....[2]

**(d)** Explain how you select the day with the highest midday temperature (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 10 positive numbers and then output the smallest number input.

```
1   Small = 0
2   Counter = 0
3   REPEAT
4     INPUT Num
5     IF Num < Small THEN Num = Small
6     Counter = Counter + 1
7     PRINT Small
8   UNTIL Counter < 10
```

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

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

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

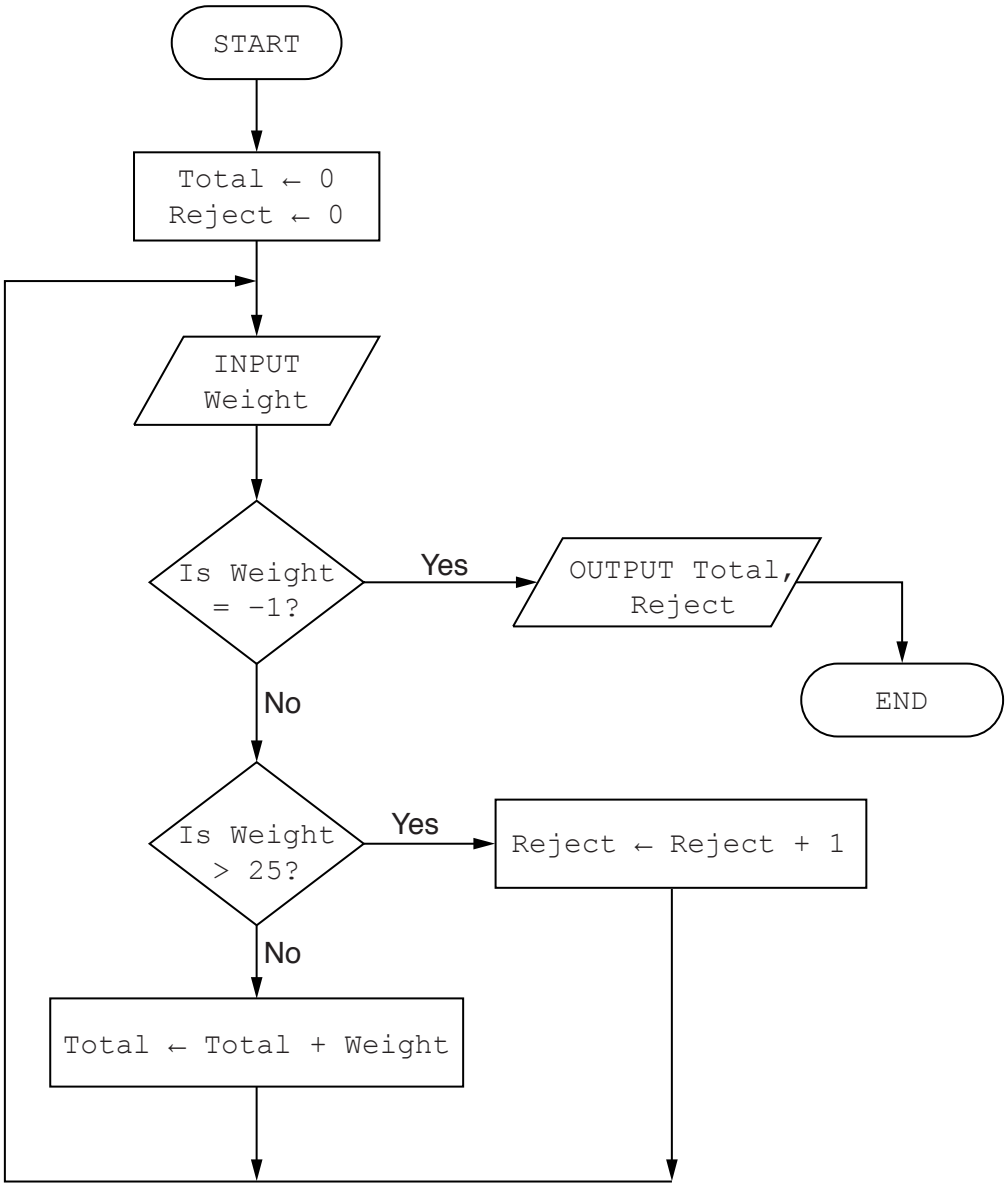
.....[4]

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**Question 3 begins on page 8.**

**3** The flowchart below inputs the weight of a number of parcels in kilograms. Parcels weighing more than 25 kilograms are rejected. A value of –1 stops the input.

The following information is output: the total weight of the parcels accepted and number of parcels rejected.



Complete the trace table for the input data:

1.8, 26.0, 7.0, 11.3, 10.0, 2.5, 25.2, 5.0, 19.8, 29.3, –1

| Total | Reject | Weight | OUTPUT |
|---|---|---|---|
| | | | |
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[5]

**4** Five data types and five data samples are shown below.

Draw a line to link each data type to the correct data sample.

| Data type | Data sample |
|---|---|
| Integer | 'a' |
| Real | 2 |
| Char | 2.0 |
| String | True |
| Boolean | "Twelve" |

[4]

**5** Explain the difference between a variable and a constant in a program.

.....

.....

.....

.....[2]

**6** Identify **three** different loop structures that you can use when writing pseudocode.

1 .....

.....

2 .....

.....

3 .....

.....[3]

**7** A database, PROPERTY, was set up to show the prices of properties for sale and the features of each property. Part of the database is shown below.

| Property Type | Brochure No | Number of Bedrooms | Number of Bathrooms | Garden | Garage | Price in $ |
|---|---|---|---|---|---|---|
| Bungalow | B17 | 7 | 4 | Yes | Yes | 750,000 |
| Apartment | A09 | 2 | 1 | No | No | 100,000 |
| House | H10 | 4 | 2 | Yes | No | 450,000 |
| House | H13 | 3 | 2 | Yes | No | 399,000 |
| Apartment | A01 | 2 | 2 | No | Yes | 95,000 |
| Apartment | A16 | 1 | 1 | No | No | 150,000 |
| House | H23 | 3 | 1 | No | Yes | 250,000 |
| House | H46 | 2 | 1 | Yes | Yes | 175,000 |

**(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)** State the data type you would choose for each of the following fields.

**Garage** .....

**Number of Bedrooms** .....

**Price in $** .....[3]

**(d)** The query-by-example grid below selects all houses with more than 1 bathroom and more than 2 bedrooms.

| Field: | Property Type | Number of Bedrooms | Number of Bathrooms | Price in $ | Brochure No |
|---|---|---|---|---|---|
| Table: | PROPERTY | PROPERTY | PROPERTY | PROPERTY | PROPERTY |
| Sort: | | | | Ascending | |
| Show: | ☐ | ☐ | ☐ | ☑ | ☑ |
| Criteria: | = 'House' | >2 | >1 | | |
| or: | | | | | |

Show what would be output.

.....

.....[2]

**(e)** Complete the query-by-example grid below to select and show the brochure number, property type and price of all properties with a garage below $200,000.

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

[4]

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