



## Cambridge O Level

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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### COMPUTER SCIENCE

2210/02

Paper 2 Algorithms, Programming and Logic

For examination from 2023

SPECIMEN PAPER

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

### INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

### INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **16** pages. Any blank pages are indicated.

1 Four pseudocode descriptions and five pseudocode statements are shown.

(a) Draw a line to link each pseudocode description to the most appropriate pseudocode statement.

Some pseudocode statements will **not** be used.

<b>Pseudocode description</b>	<b>Pseudocode statement</b>
a loop that will always iterate at least once	FOR...TO...NEXT
a conditional statement to deal with many possible outcomes	IF...THEN...ELSE...ENDIF
a loop that will always iterate a set number of times	WHILE...DO...ENDWHILE
a conditional statement with different outcomes for true and false	CASE...OF...OTHERWISE...ENDCASE
	REPEAT...UNTIL

[4]

(b) Using a single loop, write an algorithm in pseudocode to output 50 names that have been stored in the array, Name [ ]

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[3]

2 Describe the purpose of validation and verification checks during data entry.

Include an example for each.

Validation check .....

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Verification check .....

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.....

.....

[4]

3 Tick (✓) **one** box to show the named section of a program that performs a specific task.

A file

B function

C parameter

D process

[1]

4 A satellite navigation system is an example of a computer system that is made up of sub-systems.

Part of a satellite navigation system:

- allows the user to enter details for a new destination or select a previously saved destination
- displays directions in the form of a visual map or as a list.

Draw a structure diagram for this part of the satellite navigation system.

[4]

- 5 An algorithm has been written in pseudocode to input some numbers. It only outputs any numbers that are greater than or equal to 100. The number 999 is not output and stops the algorithm.

```
INPUT Number
WHILE Numbers <> 999 DO
  IF Number > 100
    THEN
      OUTPUT Number
    ENDIF
  ENDWHILE
OUTPUT Number
```

- (a) Identify the **four** errors in the pseudocode and suggest corrections.

Error 1 .....

Correction .....

.....

Error 2 .....

Correction .....

.....

Error 3 .....

Correction .....

.....

Error 4 .....

Correction .....

.....

[4]

- (b) Write a pseudocode statement to change the corrected algorithm to output all numbers between 100 and 200 inclusive.

You do **not** need to rewrite the whole algorithm.

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.....

.....

..... [2]

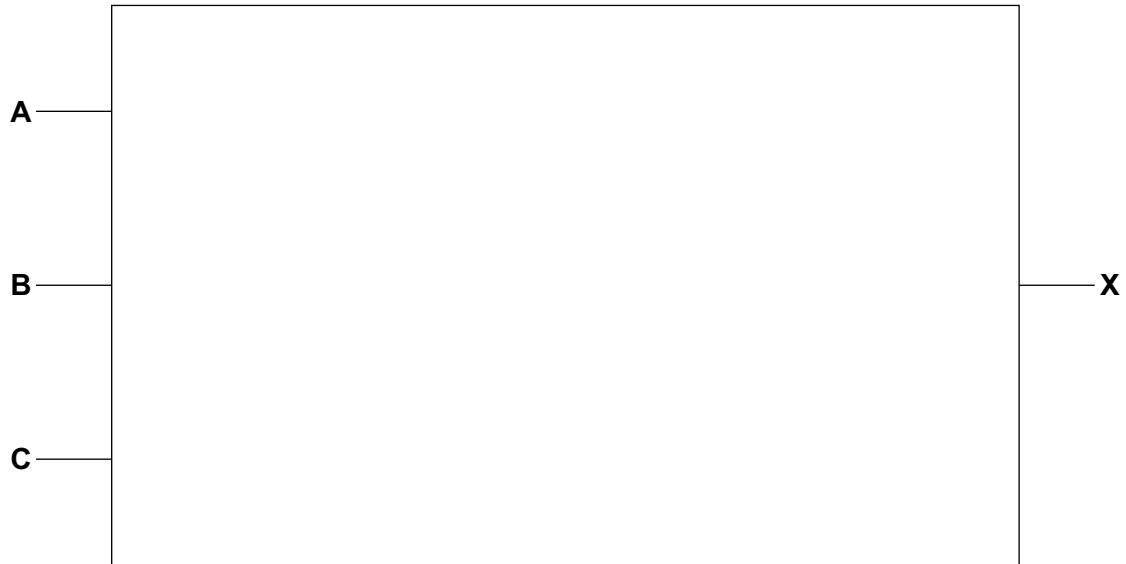
6 Consider this logic expression.

$$X = ( A \text{ AND } B ) \text{ OR } ( B \text{ AND NOT } C )$$

(a) Draw a logic circuit for this logic expression.

Each logic gate must have a maximum of **two** inputs.

Do **not** simplify this logic expression.



[4]

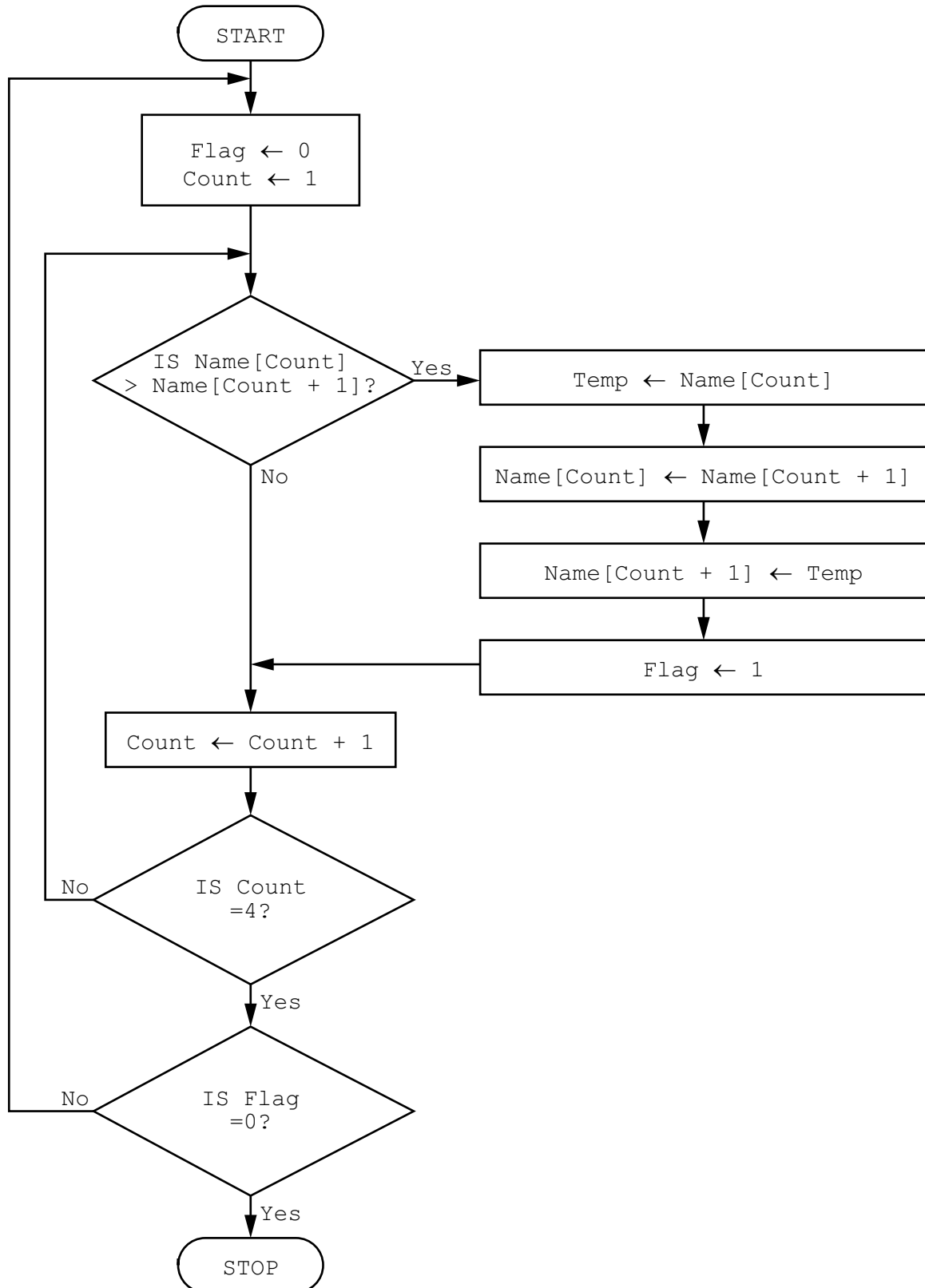
(b) Complete the truth table from the given logic expression.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]



7 This flowchart represents an algorithm.





(a) The array Name [1 : 4] used in the flowchart contains the following data:

Name [1]	Name [2]	Name [3]	Name [4]
Jamal	Amir	Eve	Tara

Complete the trace table using the data given in the array.

Flag	Count	Name [1]	Name [2]	Name [3]	Name [4]	Temp
		Jamal	Amir	Eve	Tara	

[5]

(b) Describe what the algorithm represented by the flowchart is doing.

.....

.....

.....

..... [2]

8 A programmer has written an algorithm to check that prices are less than \$10.00

These values are used as test data:

10.00                      9.99                      ten

State why each value was chosen as test data.

10.00 .....

9.99 .....

ten .....

[3]

9 Explain why a program might need to store data in a file.

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.....  
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.....  
.....  
..... [3]

10 A function is declared using pseudocode.

```
FUNCTION ConvertToCm(Inches: REAL) RETURNS REAL  
    RETURN Inches * 2.4  
ENDFUNCTION
```

Tick (✓) **one** box which accurately describes the use of the variable Inches

- A answer
- B call
- C parameter
- D response

[1]

11 A database table, 2018MOV, is used to keep a record of movie details.

CatNo	Title	Genre1	Genre2	Blu-ray	DVD	Streaming
18m01	Power Rangers	Adventure	Fantasy	Yes	No	Yes
18m02	Baywatch	Comedy	Drama	Yes	No	Yes
18m03	Table 19	Comedy	Drama	Yes	Yes	No
18m04	Wonder Woman	Action	Fantasy	Yes	No	Yes
18m05	Justice League	Action	Fantasy	Yes	Yes	Yes
18m06	Twilight	Thriller	Action	Yes	Yes	No
18m07	Ant Man	Action	Fantasy	No	Yes	No
18m08	Venice Beach	Action	History	No	Yes	No
18m12	Fast Five	Action	Thriller	No	Yes	No
18m15	King Kong	Adventure	Fantasy	No	Yes	No
18m16	Transformers: The Last Knight	Action	Sci-Fi	Yes	Yes	Yes
18m17	The Dark Tower	Fantasy	Sci-Fi	Yes	Yes	No
18m19	Beauty and the Beast	Fantasy	Romance	Yes	Yes	Yes
18m21	The Mummy	Action	Fantasy	No	No	Yes
18m22	Star Wars: Episode VIII	Sci-Fi	Action	Yes	No	Yes
18m23	Guardians of the Galaxy	Action	Sci-Fi	Yes	Yes	Yes
18m26	Thor	Action	Sci-Fi	No	Yes	Yes
18m27	Twilight	Fantasy	Sci-Fi	No	No	Yes
18m30	Beneath	Action	Fantasy	Yes	No	No
18m31	Despicable Me	Animation	Action	Yes	Yes	No

(a) State the number of records in the database table.

..... [1]

(b) (i) Give the name of the field that would be used for the primary key.

..... [1]

(ii) State the reason for choosing this field for the primary key.

.....  
 ..... [1]

- (c) Complete the table to identify the most appropriate data type for each field based on the data shown in the database table, 2018MOV.

Field	Data type
CatNo	
Title	
Genre1	
Streaming	

[2]

- (d) Complete the structured query language (SQL) to return the category number and title for all Comedy movies.

```
SELECT CatNo, Title
```

```
..... 2018MOV
```

```
WHERE Genre1 = .....
```

[2]

12 The variables  $X$ ,  $Y$  and  $Z$  are used to store data in a program:

- $X$  stores a string
- $Y$  stores a position in the string (e.g. 2)
- $Z$  stores the number of characters in the string.

(a) Write pseudocode statements to declare the variables  $X$ ,  $Y$  and  $Z$ .

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..... [3]

(b) The function `LENGTH(X)` finds the length of a string  $X$ .

The function `SUBSTRING(X, Y, Z)` finds a substring of  $X$  starting at position  $Y$  and  $Z$  characters long. The first character in  $X$  is in position 1.

Write pseudocode statements to:

- store the string "Programming is fun" in  $X$
- find the length of the string and output it
- extract the word `fun` from the string and output it.

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