



CANDIDATE
NAME

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CENTRE
NUMBER

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2210/22

May/June 2024

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

- 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.

- 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.

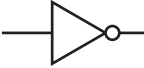
- 1 Tick (✓) **one** box to identify a method used to design and construct a solution to a computing problem.

A analysis	☐
B coding	☐
C flowchart	☐
D testing	☐

[1]

- 2 **Four** logic functions and **five** standard symbols for logic gates are shown.

Draw **one** line to link each logic function to its standard symbol. **Not** all standard symbols will be used.

Logic function	Standard symbol
AND	
XOR	
NAND	
OR	
	

[4]

- 3 Identify **three** different tasks in the analysis stage of the program development life cycle.

1

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2

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3

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[3]

4 A program needs to make sure the characters input for a product code meet these rules:

- The product code is six characters in length.
- The first two characters must be "PD".
- The last four characters must be a number in the range 1000 to 9999 inclusive.

(a) Identify **three** validation checks and state how each check would make sure the product code met one of these rules.

Check 1

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Check 2

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Check 3

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[6]

(b) The program design will include a pseudocode algorithm. Assume that the product code is stored in the variable `Product`

(i) Write the pseudocode to make sure that the product code is six characters in length.

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..... [2]

(ii) Write the pseudocode to make sure that the first two characters of the product code are "PD".

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..... [2]

- 5 A high-level programming language makes use of arithmetic, Boolean and logical operators.

State how each type of operator is used.

Give an example statement, in pseudocode, for each one.

Arithmetic

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Example

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Boolean

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Example

.....

Logical

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Example

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[6]

- 6 Totalling and counting are standard methods of solution.

Numbers are input. The number 9999.9 is the last number to be input and is ignored.

- (a) Write an algorithm in pseudocode to total the numbers input and to output the total. You do **not** need to validate the input.

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..... [4]

- (b) Write an algorithm in pseudocode to count and output the number of input values that are greater than 100. You do **not** need to validate the input.

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..... [4]

- 7 An algorithm has been written in pseudocode to find and display the maximum and minimum values in an array of 1000 positive numbers. The array `List[]` starts at index 1

```

01 Max ← List[1]
02 Min ← List[1]
03 FOR Counter ← 2 TO 1000
04     IF List[Counter] < Max
05         THEN
06             Max ← List[Counter]
07     ENDIF
08     IF List[Count] < Min
09         THEN
10             Min ← List[Counter]
11     ENDWHILE
12 NEXT Counter
13 OUTPUT "Maximum value is ", Max
14 OUTPUT "Minimum value is ", Min

```

- (a) Give a line number for each of these types of statement:

Assignment statement
 Selection statement
 Iteration statement
 [3]

- (b) Identify the line numbers of the **three** errors in the pseudocode and suggest a correction for each error.

Error 1 line number
 Correction

 Error 2 line number
 Correction

 Error 3 line number
 Correction

 [3]

- 8 A logic circuit is to be built to control the opening of a safe used to store money. There are two keys, **A** and **B**, and a time switch **C**. The safe can only open if both keys are used and the time switch is off.

key A	not used	0
	used	1
key B	not used	0
	used	1
time switch C	switch off	0
	switch on	1
safe X	safe cannot open	0
	safe can open	1

- (a) Write the logic expression for this problem.

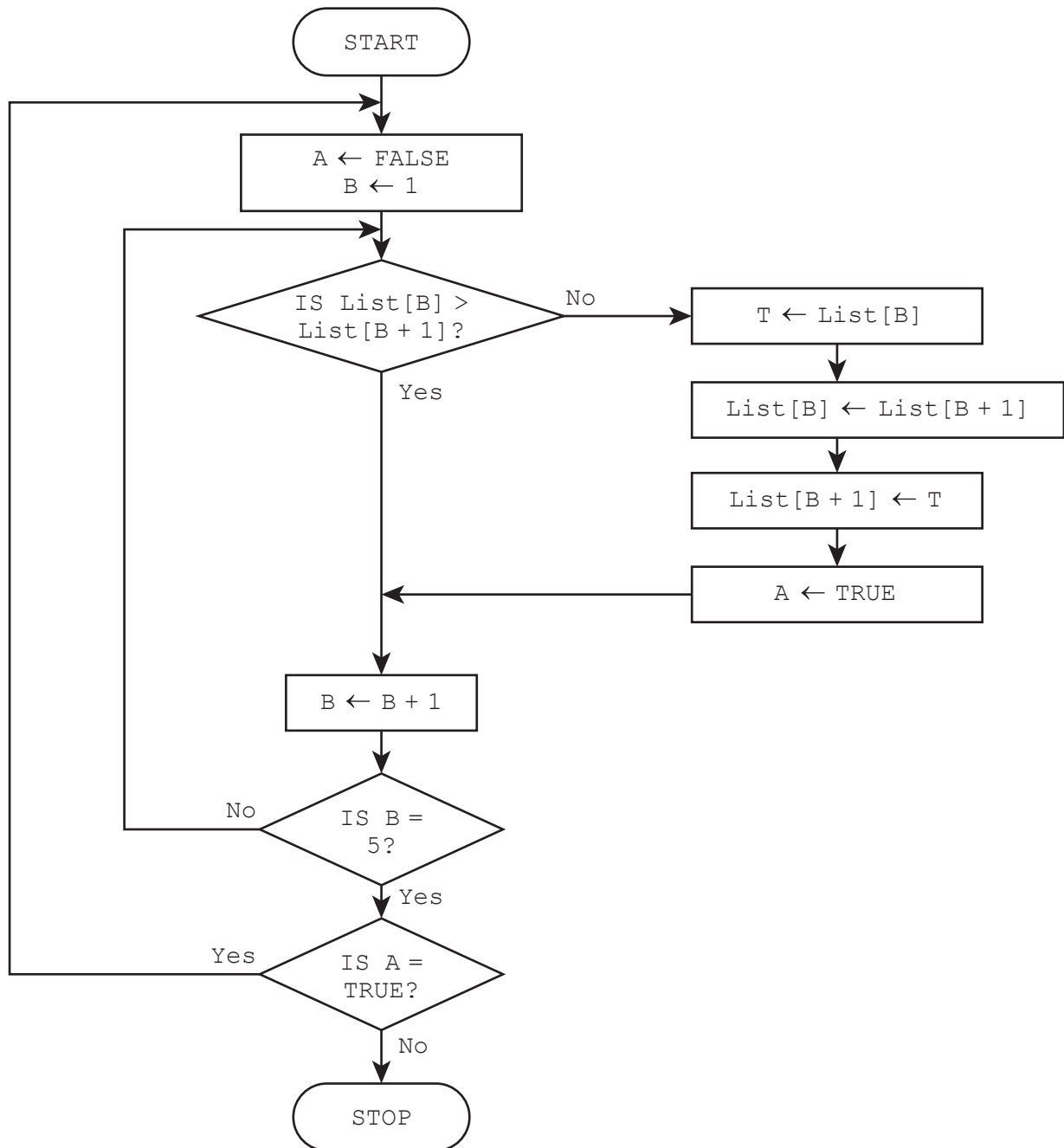
..... [3]

- (b) Complete the truth table for this problem.

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]

9 This flowchart represents an algorithm.



(a) The array `List[1:5]` used in the flowchart contains this data:

<code>List[1]</code>	<code>List[2]</code>	<code>List[3]</code>	<code>List[4]</code>	<code>List[5]</code>
15	17	20	5	9

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

[illegible]

[5]

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

..... [2]

10 A television subscription service has a new database table named `Contract` to store details of their subscribers' contracts. The table contains these fields:

- `ContractNumber` – the contract number, for example CT567
- `Months` – the length of the contract in months, for example 6
- `EndDate` – the date the contract finishes, for example 30 November 2024
- `News` – the news service, yes or no
- `Movie` – the movie service, yes or no
- `Sport` – the sports service, yes or no
- `Junior` – the children's service, yes or no.

(a) Identify the field that will be the most appropriate primary key for this table.

..... [1]

(b) Complete the table to identify the most appropriate data type for these fields in `Contract`

Field	Data type
<code>ContractNumber</code>	
<code>Months</code>	
<code>EndDate</code>	
<code>Sport</code>	

[2]

(c) Explain the purpose of these structured query language (SQL) statements.

Statement 1: `SELECT SUM (Months) FROM Contract;`

Statement 2: `SELECT COUNT (News) FROM Contract WHERE News;`

Statement 1

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.....

Statement 2

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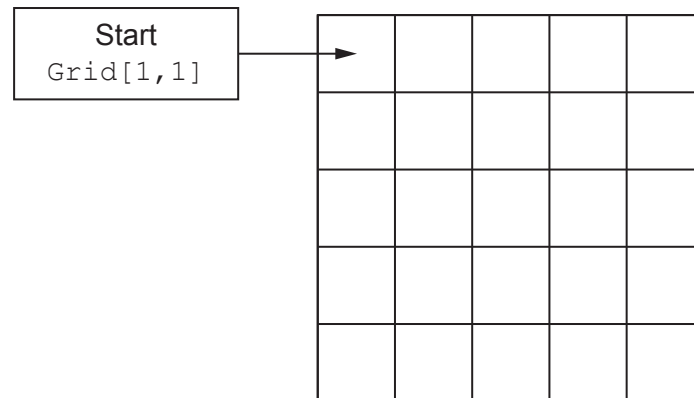
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[3]

- (d) Complete this SQL statement to find the contract numbers of the subscribers that take both the news and sports services.

```
SELECT .....  
  
FROM Contract  
  
WHERE ..... AND ..... ;  
[2]
```

- 11 A one-player game uses the two-dimensional (2D) array `Grid[]` to store the location of a secret cell to be found by the player in 10 moves. Each row and column has 5 cells.



At the start of the game:

- The program places an 'X' in a random cell (**not** in `Grid[1,1]`) and empties all the other cells in the grid.
- The player starts at the top left of the grid.
- The player has 10 moves.

During the game:

- The player can move left, right, up or down by one cell and the move must be within the grid.
- "You Win" is displayed if the player moves to the cell with 'X' and has played 10 moves or less.
- "You Lose" is displayed if the player has made 10 moves without finding the 'X'.

Write a program that meets these requirements.

You must use pseudocode or program code **and** add comments to explain how your code works.

You do **not** need to declare any arrays or variables; you may assume that this has already been done.

All inputs and outputs must contain suitable messages.

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