COMPUTER SCIENCE

ALGORITHM IN PSEUDOCODE

LESSON OBJECTIVES

Students will learn about:

- Role of algorithms in programming
- Various statements and structures used in pseudocodes
- Various symbols used in flowcharts

1.

CONTENT

ALGORITHM IN PSEUDOCODE

algorithm | flowchart | pseudocode | Python

algorithm | program

- An_____is generally written using pseudocode or flowcharts.
- _____ is a readable description of what a computer program will do.
- A _____depicts the steps and order to be followed to perform a task.
- Designing a proper _____ plays an important role in the software development process.

ALGORITHM IN PSEUDOCODE

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ALGORITHM IN PSEUDOCODE

flowchart

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Pseudocode

ALGORITHM IN PSEUDOCODE

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Pseudocode

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INPUT AND OUTPUT

- Computer programs require input from users.
- INPUT is used for data entry.
- PRINT is used to display a string or a variable.

Pseudocode	Description
INPUT Name	Value typed by user is stored into variable ‘Name’
INPUT Price	Value typed by user is stored into variable ‘Price’
PRINT Name	Displays the string stored in Name
PRINT Price	Displays the value stored in Price

ASSIGNING A VALUE

- Values are assigned to a variable using the ← operator.
- The value on the right of the ← operator is assigned to the left.
- Mathematical expressions can be used on the right side of the ← operator.

ASSIGNING A VALUE

Pseudocode	Description
Name ← “Mike”	Name has the value Mike
Age ← 32	Age has the value 32
Gender ← “M”	Gender has the value M
Salary ← 6000	Salary has the value 6000
Expense ← 3500	Expense has the value 3500
Saving ← Salary-Expense	Saving has the value 2500

CONDITIONAL STATEMENTS

- Conditional statements are used when different actions need to be performed based on different values of user input.

CONDITIONAL STATEMENTS

If… then… statement

```
IF condition
    THEN PRINT " Yes "
    ELSE PRINT "No "
ENDIF
```

Case statements

```
CASE Choice OF
    1 : PRINT "You entered Choice 1"
    2 : PRINT "You entered Choice 2"
    3 : PRINT "You entered Choice 3"
    OTHERWISE PRINT "Not a valid
choice"
ENDCASE
```

IF... THEN... STATEMENT

Pseudocode	Description
IF Weight < 85 THEN PRINT “You can enter” ELSE PRINT “You are not allowed” ENDIF	• If the value stored in Weight is less than 85, then “you can enter” will be displayed. • If the value stored in Weight is greater than or equal to 85, then “you are not allowed” will be displayed.

OPERATORS FOR COMPARISON

Operator	Comparison
<	Less than
>	Greater than
==	Equal to
<=	Less than or equal to
>=	Greater than or equal to
!=	Not equal to (in Python)
<>	Not equal to (in SQL)
( )	Group
AND	Both
OR	Either
NOT	Complement

IF... THEN... WITH ELSEIF STATEMENT

Pseudocode	Description

IF Weight >= 85 THEN
  PRINT "You are not allowed to enter"
ELSEIF Weight >= 75 THEN
  PRINT "Enter door 1"
ELSEIF Weight >=65 THEN
  PRINT "Enter door 2"
ELSE
  PRINT "Enter door 3"
ENDIF
	• A person is not allowed if weight >= 85
	• Enters door 1 if 75 <= weight < 85
	• Enters door 2 if 65 <= weight < 75
	• Enters door 3 if weight < 65

CASE STATEMENT

Pseudocode	Description
CASE Choice OF 1 : PRINT “You entered Choice 1” 2 : PRINT “You entered Choice 2” 3 : PRINT “You entered Choice 3” OTHERWISE PRINT “Not a valid choice” ENDCASE	• If the value is 1, “You entered Choice 1” will be displayed. • If the value is 2, “You entered Choice 2” will be displayed. • If the value is 3, “You entered Choice 1” will be displayed. • OTHERWISE is the path taken for all other values • ENDCASE denotes end of the statement

LOOP STATEMENTS

- Loop statements are used to perform a part of the algorithm multiple times. The repetition of a set of lines is called iteration.

TYPES OF LOOP STATEMENTS

FOR... TO... NEXT

```
FOR Counter ← 1 TO 10
PRINT "Welcome"
NEXT
```

REPEAT... UNTIL

```
Counter ← 0
REPEAT
PRINT "Welcome"
Counter ← Counter + 1
UNTIL Counter < 10
```

WHILE... DO...

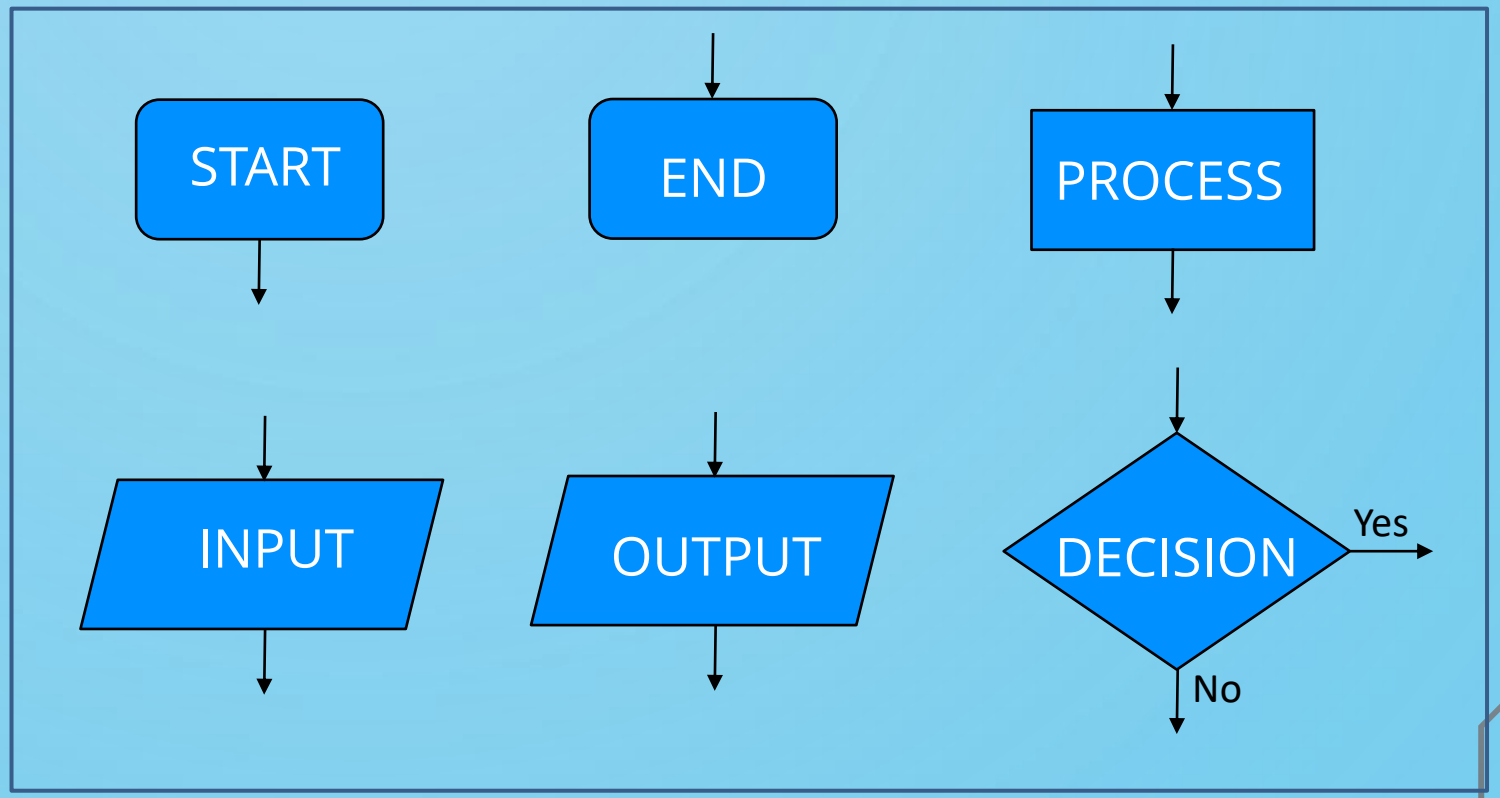
```
Counter ← 0
WHILE Counter < 10
DO
PRINT "Welcome"
Counter ← Counter + 1
ENDWHILE
```

Output →

```
Welcome
Welcome
Welcome
Welcome
Welcome
Welcome
Welcome
Welcome
Welcome
Welcome
```

FLOWCHART SYMBOLS

Flowchart symbols are used to represent the start and end of a programme, process, output and decision.



LET'S REVIEW SOME CONCEPTS

INPUT statement

INPUT statement is used for data entry.

PRINT statement

PRINT statement is used to display a string or a variable.

← Symbol

Values are assigned to a variable using the ← operator.

Conditional statements

Conditional statements are used when different actions need to be performed based on different values of user input.

Types: If… then… and case statements.

Loop statements

Loop statements are used to perform a part of the algorithm multiple times.

Types of loop statements

FOR… TO… NEXT

REPEAT… UNTIL

WHILE… DO…

Flowchart symbols

Flowchart symbols are used to represent the start and end of a program, process, output and decision.

2.

ACTIVITY

Activity-1

Duration: 20 minutes

1. Software is designed to calculate grades of students according to the marks scored. The grades for marks scored are given in the table.

   Create the pseudocode and flowchart of the algorithm.

Marks (%)	Grade
90-100	A*
80-89	A
70-79	B
60-69	C
50-59	D
Below 50	Fail

ACTIVITY 1 ANSWER

1. Software is designed to calculate grades of students according to the marks scored. The grades for marks scored are given in the table.
2. Create the pseudocode and flowchart of the algorithm.

Marks (%)	Grade
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50-59	D
Below 50	Fail

Pseudocode:

```
Input Mark/Grade(%)
IF Grade >= 90 THEN
   Grade ← A*
   ELSEIF Grade >= 80 THEN
   Grade ← A
   ELSEIF Grade >= 70 THEN
   Grade ← B
   ELSEIF Grade >= 60 THEN
   Grade ← C
   ELSEIF Grade >= 50 THEN
   Grade ← D
   ELSE
   Grade ← Fail
ENDIF
Print Grade
```

ACTIVITY-2

DURATION: 15 MINUTES

1. Create a flowchart and pseudocode for an algorithm to calculate factorial of a number.

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Factorial

$$n! = n * (n-1) * (n-2) * (n-3) * \cdots * 3 * 2 * 1$$

$0! = 1$

$1! = 1$

$2! = 2 \times 1 = 2$

$3! = 3 \times 2 \times 1 = 6$

$4! = 4 \times 3 \times 2 \times 1 = 24$

3.

END OF TOPIC QUESTIONS

ACTIVITY 1 ANSWER

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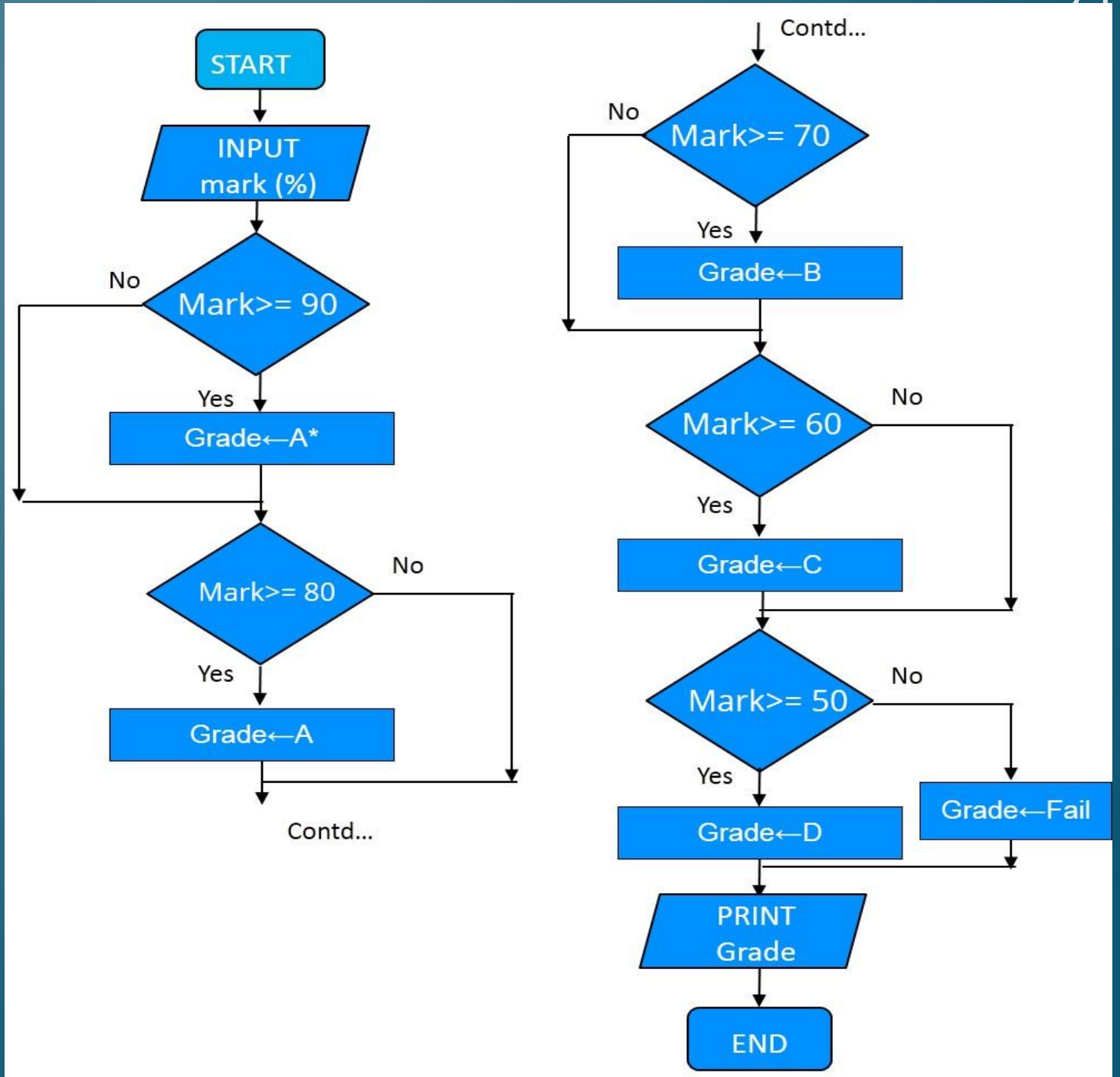

ACTIVITY 2 ANSWER

Create a flowchart and pseudocode for an algorithm to calculate factorial of a number.

Pseudocode:

```
Input num
count←1
fact←1
    While (count<num) Do
        fact=fact×count
        count=count+1
    endwhile
Print fact
```

ACTIVITY 2 ANSWER

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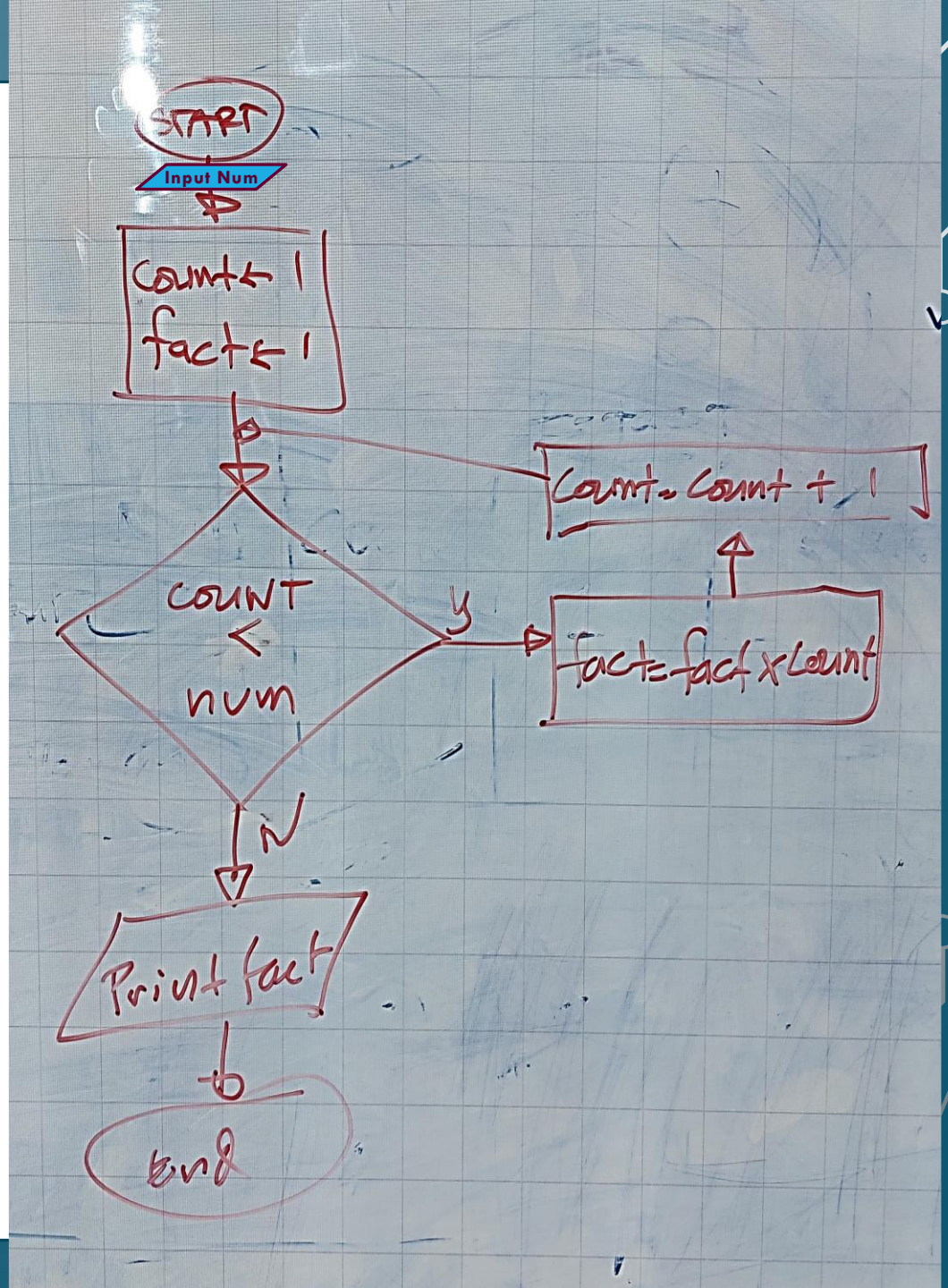

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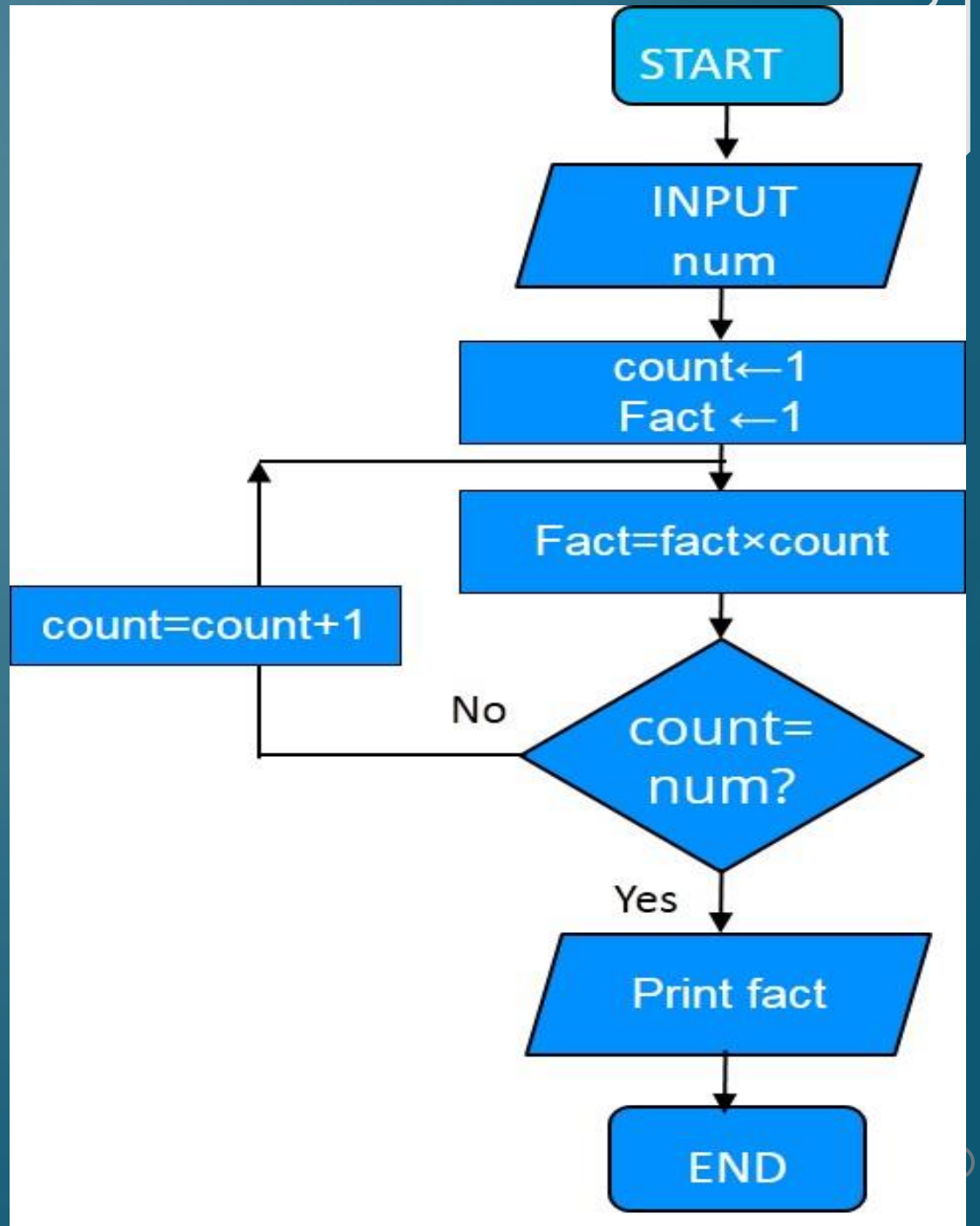

TAKE NOTE OF CONDITIONAL CASE STATEMENT FORMAT

Case statements

CASE Choice **OF**
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    2 : PRINT “You entered Choice 2”
    3 : PRINT “You entered Choice 3”
    OTHERWISE PRINT “Not a valid choice”
ENDCASE

PLENARY
END OF TOPIC QUESTIONS

1. What are input and output statements? Give examples.
2. What operator is used to assign values to variables?
3. How are mathematical expressions used in statements assigning values?
4. What are the different conditional statements?
5. What is iteration? What are the different iteration statements?
6. How is a repeat…until… loop different from while…do… loop?

COMPUTER SCIENCE

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Adaptation from

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