LOGIC BUILDING WITH LOOPS

(BEFORE STARTING DSA)

Phase 1 – While Loop
Phase 2 – do while loop
Phase 3 – For Loop
Phase 4 – Nested loop Logic
Phase 5 – Break / Continue logic
Phase 6 – Mathematical Series
Phase 7 – Mixed Logical Loop Problems
Phase 8 – Star Pattern Printing

🎯***Goal:*** Master loops, iteration, and dry-run thinking.
Topics covered: while, do-while, for, break, continue,mathematical series.
Target Questions: 125+

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Phase 1 : While Loop

1. Print all numbers from **1 to 10** using a loop.
2. Print numbers from **10 down to 1** in reverse order.
3. Print **all even numbers** between **1 and 100**.
4. Print **all odd numbers** between **1 and 100**.
5. Print the **multiplication table** of a given number from **n × 1 to n × 10**.
6. Calculate and print the **sum of the first n natural numbers**.
7. Calculate the **sum of all even numbers** from **1 up to n**.
8. Calculate the **sum of all odd numbers** from **1 up to n**.
9. Calculate and print the **factorial of a given number**.
10. Find and print the **product of all digits** of a given number.
11. Count and print the **total number of digits** in a given number.
12. Reverse the given number and print the **reversed value**.
13. Check whether the given number is a **palindrome**.
14. Find and print the **sum of digits** of the given number.
15. Check whether the given number is an **Armstrong number**.
16. Check whether the given number is a **Perfect number**.
17. Print **all prime numbers** between **1 and 100**.
18. Check whether the given number is a **prime number**.
19. Print the **Fibonacci series** up to **n terms**.
20. Find and print the **sum of the Fibonacci series** up to **n terms**.
21. Print the **square of each number** from **1 to n**.
22. Print the **cube of each number** from **1 to n**.
23. Print all numbers between **a and b** that are **divisible by 7**.

24. Print **all factors** of the given number.
25. Find and print the **sum of all factors** of the given number.
26. Find the **HCF (Highest Common Factor)** of two given numbers.
27. Find the **LCM (Least Common Multiple)** of two given numbers.
28. Find the **smallest digit** in the given number.
29. Find the **largest digit** in the given number.

Phase 2 : do - While Loop

1. Print all numbers from **1 to 10**.
2. Print the **multiplication table** of a given number.
3. Keep taking numbers from the user until **0 is entered**, then print the **sum of all entered numbers**.
4. Keep taking numbers from the user until **0 is entered**, then print the **largest number** among all inputs.
5. Count and print the **number of digits** in the given number.
6. Reverse the given number and print the **reversed value**.
7. Check whether the given number is a **palindrome**.
8. Check whether the given number is an **Armstrong number**.
9. Calculate and print the **factorial** of the given number.
10. Print the **Fibonacci series** up to the required number of terms.
11. Find the **HCF (Highest Common Factor)** of the given numbers.
12. Create a **menu-driven program** that allows the user to choose and perform different operations.
13. Keep taking numbers from the user until a **negative number is entered**, then count how many **positive numbers** were entered.
14. Find and print the **sum of digits** of the given number.
15. Calculate and print the **sum of even digits** and the **sum of odd digits** of the given number separately.

Phase 3 : For Loop

1. Print all numbers from **1 to 10**.
2. Print numbers from **10 down to 1** in reverse order.
3. Print **all even numbers** between **1 and 100**.
4. Print **all odd numbers** between **1 and 100**.
5. Print the **multiplication table** of a given number.
6. Calculate and print the **factorial of a given number**.
7. Calculate and print the **factorial of every number** from **1 to n**.
8. Print **all prime numbers** between **1 and 100**.
9. Check whether the given number is a **prime number**.
10. Print the **Fibonacci series** up to the required number of terms.

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11. Find and print the **sum of the Fibonacci series**.
12. Print **all factors** of the given number.
13. Find and print the **sum of all factors** of the given number.
14. Find the **HCF (Highest Common Factor)** of the given numbers.
15. Find the **LCM (Least Common Multiple)** of the given numbers.
16. Print the **square of each number** from **1 to n**.
17. Print the **cube of each number** from **1 to n**.
18. Print all numbers between **a and b** that are **divisible by 7**.
19. Find and print the **sum of the first n natural numbers**.
20. Find and print the **sum of all even numbers** from **1 up to n**.
21. Find and print the **sum of all odd numbers** from **1 up to n**.

Phase 4 : Nested Loop Logic

1. Print the **multiplication tables for all numbers from 1 to 10**.
2. Print **all possible pairs (i, j)** where both `i` and `j` range from **1 to n**.
3. For every number from **1 to n**, count and print the **total number of its factors**.
4. Print **all prime numbers** up to n using **nested loop checking**.
5. Print the **Fibonacci pattern row by row**, where each row prints the next Fibonacci numbers
6. Generate and print a **number triangle pattern** using **nested loops**.
7. Print a **matrix**, then calculate and display the **sum of each row** and the **sum of each column**.
8. Print **all Pythagorean triplets** whose values are **less than or equal to n**.

Phase 5 : Break / Continue Logic

1. Print numbers from **1 to 100**, and **stop the loop** as soon as a number **divisible by 17** is encountered.
2. Print numbers from **1 to 100**, but **skip** all numbers that are **divisible by 5** and continue printing the rest.
3. Take **5 numbers** as input, **skip any number that is 0** using `continue`, and calculate the **sum of the remaining numbers**.
4. Search for a specific number in a list of inputs, and **terminate the loop** immediately when the number is **found**.
5. Keep taking numbers from the user and **print them until a negative number appears**, then stop the loop.
6. Skip all **odd numbers** and print **only the even numbers**.
7. Continuously add numbers in a loop and **stop the loop** when the **sum becomes greater than 100**

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Phase 6 : Mathematical Series

1. Find and print the **sum of the first n natural numbers**.
2. Find and print the **sum of the first n even numbers**.
3. Find and print the **sum of the first n odd numbers**.
4. Print the **first n terms** of an **arithmetic progression** for the given first term and common difference.
5. Print the **first n terms** of a **geometric progression** for the given first term and common ratio.
6. Print the **Fibonacci series** up to the required number of terms.
7. Find and print the **sum of the Fibonacci series** up to the required number of terms.
8. Calculate and print the value of the series
   $1^2 + 2^2 + 3^2 + \ldots + n^2$.
9. Calculate and print the value of the series
   $1^3 + 2^3 + 3^3 + \ldots + n^3$.
10. Calculate and print the value of the series
    $1 + 1/2 + 1/3 + \ldots + 1/n$.
11. Print the series of powers of two:
    $1 + 2 + 4 + 8 + \ldots + 2^n$.
12. Calculate and print the value of the series
    $1! + 2! + 3! + \ldots + n!$.
13. Calculate and print the value of the series
    $1 + x + x^2 + x^3 + \ldots + x^n$.
14. Calculate and print the value of the series
    $x - x^2/2! + x^3/3! - x^4/4! + \ldots$.
15. Check whether the given number is a **Strong number**, where the number equals the **sum of factorials of its digits**.

Phase 7 : Mixed Logical Loop Problems

1. Print all numbers between **1 and 100** whose **sum of digits is even**.
2. Count Total numbers between **1 & 500** are **divisible by 7** but **not divisible by 5**.
3. Print **all palindrome numbers** between **1 and 500**.
4. Print all numbers from **1 to 100** whose **sum of digits is a multiple of 3**.
5. Print all numbers from **1 to n** whose **binary representation contains an even number of 1s**.
6. Print a pattern where the **i-th row prints the value `i × i`**.
7. Find & print the **sum of odd digits** & the **sum of even digits** of the given number.
8. Print **all Armstrong numbers** between **1 and 1000**.
9. Print **all Perfect numbers** between **1 and 1000**.
10. Find the number between **1 and n** that has the **maximum digit sum**, and print that number along with its digit sum.

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Phase 7 : Star Pattern Printing

1. Print a Single Star (*)

2. Print Four Stars (****)

3. Print n Stars on Same Line

4. Print Square of Stars (n x n Stars)

5. Print an Increasing Triangle of Stars

6. Print a Right-Aligned Triangle of Stars

7. Print Stars in Even Numbers (2, 4, 6, 8, 10)

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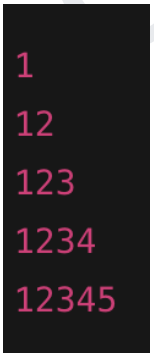
8. Print Stars in Odd Numbers (1, 3, 5, 7, 9)

9. Print a Centered Pyramid of Stars

10. Print Stars and Spaces Alternating (Stars and Blank Spaces) (b = blank space here)

11. Print Numbers in an Increasing Sequence (1, 12, 123, 1234, 12345)



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12. Print Repeated Numbers per Row (Same Number Repeated)

```
1
22
333
4444
55555
```

13.

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

14.

```
1
2 3
4 5 6
7 8 9 0
1 2 3 4 5
5 7 8 9 0 1
2 3 4 5 6 7 8
```

15.

```
1
0 1
0 1 0
1 0 1 0
1 0 1 0 1
```

16

```
A
B C
D E F
G H I J
K L M N O
```

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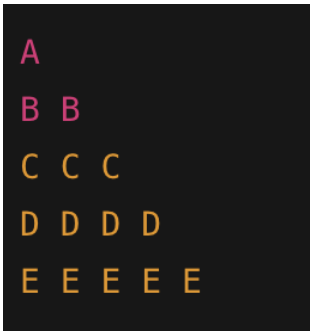

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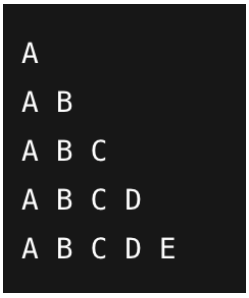
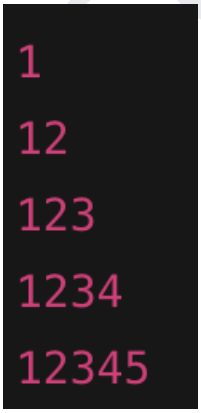


19.

20.



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21.

```
    1
   121
  12321
 1234321
123454321
```

22.

```
*
**
****
*****
****
***
**
*
```

23.

```
*
**
***
****
*****
*****
****
***
**
*
```

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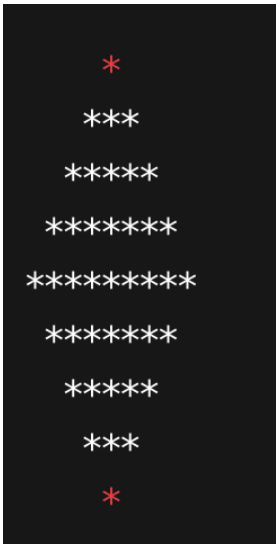
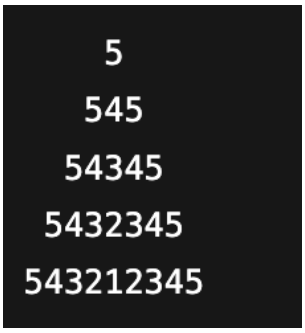


25.



Find Star pattern Solutions here: STRONG YOUR LOGIC BUILDING .pdf

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