

Loop Logic Mastery

1. Right-Angled Triangle

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main.cpp

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the right-angled triangle: ";
9     cin >> rows;
10
11     // Loop to print the triangle
12     for (int i = 1; i <= rows; i++) {
13         for (int j = 1; j <= i; j++) {
14             cout << "** "; // Print an asterisk followed by a space
15         }
16         cout << endl; // Move to the next line
17     }
18
19     return 0;
20 }
21
```

Run

Output

Clear

Enter the number of rows for the right-angled triangle: 5
*
**

=== Code Execution Successful ===

2. Inverted Right-Angled Triangle

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main.cpp

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the inverted right-angled triangle: ";
9     cin >> rows;
10
11     // Loop to print the inverted triangle
12     for (int i = rows; i >= 1; i--) {
13         for (int j = 1; j <= i; j++) {
14             cout << "** "; // Print an asterisk followed by a space
15         }
16         cout << endl; // Move to the next line
17     }
18
19     return 0;
20 }
21
```

Run

Output

Clear

Enter the number of rows for the inverted right-angled triangle: 5

**
*

=== Code Execution Successful ===

3. Full Pyramid

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the full pyramid: ";
9     cin >> rows;
10
11     // Loop to print the full pyramid
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print asterisks for the current row
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             cout << "* ";
21         }
22
23         cout << endl; // Move to the next line
24     }
25
26     return 0;
27 }
28
```

Output

Clear

Enter the number of rows for the full pyramid: 5
*
* * *
* * * * *
* * * * * *
* * * * * * *

=== Code Execution Successful ===

4. Inverted Pyramid

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the inverted pyramid: ";
9     cin >> rows;
10
11     // Loop to print the inverted pyramid
12     for (int i = rows; i >= 1; i--) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print asterisks for the current row
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             cout << "* ";
21         }
22
23         cout << endl; // Move to the next line
24     }
25
26     return 0;
27 }
28
```

Output

Clear

Enter the number of rows for the inverted pyramid: 5
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *

=== Code Execution Successful ===

5. Hollow Pyramid

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the hollow pyramid: ";
9     cin >> rows;
10
11     // Loop to print the hollow pyramid
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print the hollow pyramid pattern
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             if (j == 1 || j == (2 * i - 1) || i == rows) {
21                 cout << "* "; // Print a star at the edges or the bottom row
22             } else {
23                 cout << " "; // Print a space inside the pyramid
24             }
25         }
26
27         cout << endl; // Move to the next line
28     }
29
30     return 0;
31 }
32

```

Output

Clear

```

- Enter the number of rows for the hollow pyramid: 5
      *
     * *
    * * *
   * * * *
  * * * * *

=== Code Execution Successful ===

```

6. Diamond

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Run

```

2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows for the diamond (half of the diamond)
8     cout << "Enter the number of rows for the diamond: ";
9     cin >> rows;
10
11     // Upper half of the diamond
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print stars for the current row
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             cout << "* ";
21         }
22
23         cout << endl; // Move to the next line
24     }
25
26     // Lower half of the diamond
27     for (int i = rows - 1; i >= 1; i--) {
28         // Print spaces for alignment
29         for (int j = 1; j <= rows - i; j++) {
30             cout << " ";
31         }
32
33         // Print stars for the current row
34         for (int j = 1; j <= (2 * i - 1); j++) {
35             cout << "* ";
36         }
37
38         cout << endl; // Move to the next line
39     }
40
41     return 0;

```

Output

Clear

```

- Enter the number of rows for the diamond: 5
      *
     * *
    * * *
   * * * *
  * * * * *
 * * * * *
* * * * *
 * * * * *
  * * * *
   * * *
    * *
     *

=== Code Execution Successful ===

```

7. Square

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the square
8     cout << "Enter the size of the square: ";
9     cin >> size;
10
11     // Loop to print the square
12     for (int i = 1; i <= size; i++) {
13         for (int j = 1; j <= size; j++) {
14             cout << "** "; // Print asterisks
15         }
16         cout << endl; // Move to the next line
17     }
18
19     return 0;
20 }
21

```

Output

Clear

Enter the size of the square: 5

=== Code Execution Successful ===

8. Hollow Square

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the square
8     cout << "Enter the size of the square: ";
9     cin >> size;
10
11     // Loop to print the hollow square
12     for (int i = 1; i <= size; i++) {
13         for (int j = 1; j <= size; j++) {
14             // Print stars for the boundary, spaces for the inside
15             if (i == 1 || i == size || j == 1 || j == size) {
16                 cout << "** ";
17             } else {
18                 cout << "  ";
19             }
20         }
21         cout << endl; // Move to the next line
22     }
23
24     return 0;
25 }
26

```

Output

Clear

Enter the size of the square: 5

* *
* *
* *

=== Code Execution Successful ===

9. Diagonal Line

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the diagonal line
8     cout << "Enter the size of the diagonal line: ";
9     cin >> size;
10
11     // Loop to print the diagonal line
12     for (int i = 1; i <= size; i++) {
13         for (int j = 1; j <= size; j++) {
14             // Print a star only where row index equals column index
15             if (i == j) {
16                 cout << " * ";
17             } else {
18                 cout << "   "; // Print spaces for alignment
19             }
20         }
21         cout << endl; // Move to the next line
22     }
23     return 0;
24 }
25
26

```

Output

Clear

Enter the size of the diagonal line: 5

```

 *
 *
 *
 *
 *

```

=== Code Execution Successful ===

10. Opposite Diagonal

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the opposite diagonal line
8     cout << "Enter the size of the opposite diagonal line: ";
9     cin >> size;
10
11     // Loop to print the opposite diagonal line
12     for (int i = 1; i <= size; i++) {
13         for (int j = 1; j <= size; j++) {
14             // Print a star only where row index + column index equals size + 1
15             if (i + j == size + 1) {
16                 cout << " * ";
17             } else {
18                 cout << "   "; // Print spaces for alignment
19             }
20         }
21         cout << endl; // Move to the next line
22     }
23     return 0;
24 }
25
26

```

Output

Clear

Enter the size of the opposite diagonal line: 5

```

      *
     *
  *
 *

```

=== Code Execution Successful ===

11. X Shape

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```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the X shape
8     cout << "Enter the size of the X shape: ";
9     cin >> size;
10
11     // Loop to print the X shape
12     for (int i = 1; i <= size; i++) {
13         for (int j = 1; j <= size; j++) {
14             // Print stars where the row index equals the column index (left
15             // diagonal)
16             // or the column index equals (size - row index + 1) (right diagonal)
17             if (i == j || j == size - i + 1) {
18                 cout << "*" << " ";
19             } else {
20                 cout << " "; // Print spaces for alignment
21             }
22             cout << endl; // Move to the next line
23         }
24     }
25     return 0;
26 }
27

```

Output

Enter the size of the X shape: 9

```

*
 *
  *
   *
    *
     *
      *
       *
        *

```

=== Code Execution Successful ===

12. Plus Sign

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```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the plus sign (must be an odd number for
8     // symmetry)
9     cout << "Enter the size of the plus sign (odd number): ";
10    cin >> size;
11
12    // Check if the input is odd
13    if (size % 2 == 0) {
14        cout << "Please enter an odd number for symmetry." << endl;
15        return 0;
16    }
17
18    // Loop to print the plus sign
19    for (int i = 1; i <= size; i++) {
20        for (int j = 1; j <= size; j++) {
21            // Print the vertical and horizontal parts of the plus sign
22            if (i == size / 2 + 1 || j == size / 2 + 1) {
23                cout << "*" << " ";
24            } else {
25                cout << " "; // Print spaces elsewhere
26            }
27            cout << endl; // Move to the next line
28        }
29    }
30    return 0;
31 }

```

Output

Enter the size of the plus sign (odd number): 5

```

*
 *
* * *
 *
*

```

=== Code Execution Successful ===

13. Triangle with Borders

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the triangle with borders: ";
9     cin >> rows;
10
11     // Loop to print the triangle with borders
12     for (int i = 1; i <= rows; i++) {
13         for (int j = 1; j <= i; j++) {
14             // Print stars for the border (first and last elements of each row)
15             if (j == 1 || j == i || i == rows) {
16                 cout << " * ";
17             } else {
18                 cout << "  "; // Print spaces for the inside part
19             }
20         }
21         cout << endl; // Move to the next line
22     }
23
24     return 0;
25 }
26

```

Output

Clear

```

Enter the number of rows for the triangle with borders: 5
 *
 * *
 * * *
 * * * *
 * * * * *

=== Code Execution Successful ===

```

14. Zigzag Pattern

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows, cols;
6
7     // Ask the user for the number of rows and columns
8     cout << "Enter the number of rows for the zigzag pattern: ";
9     cin >> rows;
10    cout << "Enter the number of columns for the zigzag pattern: ";
11    cin >> cols;
12
13    // Loop to print the zigzag pattern
14    for (int i = 1; i <= rows; i++) {
15        for (int j = 1; j <= cols; j++) {
16            // Print stars at appropriate positions for the zigzag
17            if ((i + j) % 2 == 0) {
18                cout << " * ";
19            } else {
20                cout << "  "; // Print spaces for other positions
21            }
22        }
23        cout << endl; // Move to the next line
24    }
25
26    return 0;
27 }
28

```

Output

Clear

```

Enter the number of rows for the zigzag pattern: 5
Enter the number of columns for the zigzag pattern: 5
 * * *
 * * *
 * * *
 * * *
 * * *

=== Code Execution Successful ===

```

15. Sand Clock

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the triangle: ";
9     cin >> rows;
10
11     // Loop to print the triangle
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print stars for the current row
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             cout << "* ";
21         }
22
23         cout << endl; // Move to the next line
24     }
25
26     return 0;
27 }
28

```

Output

Clear

Enter the number of rows for the triangle: 5

```

      *
     ***
    *****
   *       *
  *       *
 *       *

```


=== Code Execution Successful ===

18. Number Triangle

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the number triangle: ";
9     cin >> rows;
10
11     // Loop to print the number triangle
12     for (int i = 1; i <= rows; i++) {
13         for (int j = 1; j <= i; j++) {
14             // Print numbers for the current row
15             cout << j << " ";
16         }
17         cout << endl; // Move to the next line
18     }
19
20     return 0;
21 }
22

```

Output

Clear

Enter the number of rows for the number triangle: 5

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```


=== Code Execution Successful ===

19. Inverted Number Triangle

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the inverted number triangle: ";
9     cin >> rows;
10
11     // Loop to print the inverted number triangle
12     for (int i = rows; i >= 1; i--) {
13         for (int j = 1; j <= i; j++) {
14             // Print numbers for the current row
15             cout << j << " ";
16         }
17         cout << endl; // Move to the next line
18     }
19
20     return 0;
21 }
22
```

Output

Clear

Enter the number of rows for the inverted number triangle: 5
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1

=== Code Execution Successful ===

20. Number Pyramid

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the number pyramid: ";
9     cin >> rows;
10
11     // Loop to print the number pyramid
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print numbers for the current row
19         for (int j = 1; j <= i; j++) {
20             cout << j << " ";
21         }
22
23         // Print numbers in reverse for the current row
24         for (int j = i - 1; j >= 1; j--) {
25             cout << j << " ";
26         }
27
28         cout << endl; // Move to the next line
29     }
30
31     return 0;
32 }
```

Output

Clear

Enter the number of rows for the number pyramid: 5
1
1 2 1
1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1

=== Code Execution Successful ===

21. Number Inverted Pyramid

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the number inverted pyramid: ";
9     cin >> rows;
10
11     // Loop to print the inverted pyramid
12     for (int i = rows; i >= 1; i--) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Print numbers for the current row
19         for (int j = 1; j <= i; j++) {
20             cout << j << " ";
21         }
22
23         // Print numbers in reverse for the current row
24         for (int j = i - 1; j >= 1; j--) {
25             cout << j << " ";
26         }
27
28         cout << endl; // Move to the next line
29     }
30
31     return 0;
32 }
```

Output

Clear

Enter the number of rows for the number inverted pyramid: 5
1 2 3 4 5 4 3 2 1
1 2 3 4 3 2 1
1 2 3 2 1
1 2 1
1
=== Code Execution Successful ===

22. Repeated Numbers

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Run

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the repeated numbers triangle: ";
9     cin >> rows;
10
11     // Loop to print the repeated numbers triangle
12     for (int i = 1; i <= rows; i++) {
13         for (int j = 1; j <= i; j++) {
14             // Print the row number repeatedly
15             cout << i << " ";
16         }
17         cout << endl; // Move to the next line
18     }
19
20     return 0;
21 }
22
```

Output

Clear

Enter the number of rows for the repeated numbers triangle: 5
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
=== Code Execution Successful ===

23. Numbers in Columns

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Run

Output

Clear

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows, cols;
6
7     // Ask the user for the number of rows and columns
8     cout << "Enter the number of rows: ";
9     cin >> rows;
10    cout << "Enter the number of columns: ";
11    cin >> cols;
12
13    // Loop to print numbers in columns
14    for (int i = 1; i <= rows; i++) {
15        for (int j = 1; j <= cols; j++) {
16            // Print the column number
17            cout << j << " ";
18        }
19        cout << endl; // Move to the next line
20    }
21
22    return 0;
23 }
24
```

```
Enter the number of rows: 5
Enter the number of columns: 5
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5

=== Code Execution Successful ===
```

24. Floyd's Triangle

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main.cpp

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Run

Output

Clear

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows, num = 1;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for Floyd's Triangle: ";
9     cin >> rows;
10
11    // Loop to print Floyd's Triangle
12    for (int i = 1; i <= rows; i++) { // Outer loop to iterate through each row
13        for (int j = 1; j <= i; j++) { // Inner loop to print numbers in each row
14            cout << num << " "; // Print the current number
15            num++; // Increment the number
16        }
17        cout << endl; // Move to the next line after each row
18    }
19
20    return 0;
21 }
22
```

```
Enter the number of rows for Floyd's Triangle: 5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15

=== Code Execution Successful ===
```

25. Pascal's Triangle

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main.cpp

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for Pascal's Triangle: ";
9     cin >> rows;
10
11     // Loop to print Pascal's Triangle
12     for (int i = 0; i < rows; i++) {
13         int number = 1; // Start each row with the value 1
14
15         // Print spaces for alignment
16         for (int j = 1; j < rows - i; j++) {
17             cout << " ";
18         }
19
20         // Print the numbers in each row
21         for (int j = 0; j <= i; j++) {
22             cout << number << " "; // Print the current number
23
24             // Update the number for the next value in the row
25             number = number * (i - j) / (j + 1);
26         }
27
28         cout << endl; // Move to the next line after each row
29     }
30
31     return 0;
32 }
```

Output

Enter the number of rows for Pascal's Triangle: 5

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

=== Code Execution Successful ===

26. Alphabet Triangle

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main.cpp

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the alphabet triangle: ";
9     cin >> rows;
10
11     // Loop to print the alphabet triangle
12     for (int i = 1; i <= rows; i++) {
13         char ch = 'A'; // Start each row with the letter 'A'
14
15         // Loop to print letters in each row
16         for (int j = 1; j <= i; j++) {
17             cout << ch << " ";
18             ch++; // Move to the next letter
19         }
20
21         cout << endl; // Move to the next line after each row
22     }
23
24     return 0;
25 }
```

Output

Enter the number of rows for the alphabet triangle: 5

A
A B
A B C
A B C D
A B C D E

=== Code Execution Successful ===

27. Alphabet Pyramid

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main.cpp

2 using namespace std;

3

4- int main() {

5 int rows;

6

7 // Ask the user for the number of rows

8 cout << "Enter the number of rows for the alphabet pyramid: ";

9 cin >> rows;

10

11 // Loop to print the alphabet pyramid

12- for (int i = 1; i <= rows; i++) {

13 char ch = 'A'; // Start each row with the letter 'A'

14

15 // Print spaces for alignment

16- for (int j = 1; j <= rows - i; j++) {

17 cout << " "; // Print spaces to center align

18 }

19

20 // Print alphabet letters in increasing order

21- for (int j = 1; j <= i; j++) {

22 cout << ch << " ";

23 ch++; // Move to the next letter

24 }

25

26 // Print alphabet letters in decreasing order

27 ch--; // Move back to the last printed letter

28- for (int j = 1; j < i; j++) {

29 cout << ch << " ";

30 }

31 }

32

33 cout << endl; // Move to the next line after each row

34 }

35

36 return 0;

37 }

38

Output

Enter the number of rows for the alphabet pyramid: 5

A

A B A

A B C B A

A B C D C B A

A B C D E D C B A

=== Code Execution Successful ===

Clear

28. Alternating Triangle

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main.cpp

1 #include <iostream>

2 using namespace std;

3

4- int main() {

5 int rows;

6

7 // Ask the user for the number of rows

8 cout << "Enter the number of rows for the alternating triangle: ";

9 cin >> rows;

10

11 // Loop to print the alternating triangle

12- for (int i = 1; i <= rows; i++) {

13 // Loop to print numbers in each row

14- for (int j = 1; j <= i; j++) {

15 // Alternate between 1 and 0

16 if ((i + j) % 2 == 0)

17 cout << "1 ";

18 else

19 cout << "0 ";

20 }

21 cout << endl; // Move to the next line after each row

22 }

23

24 return 0;

25 }

26

Output

Enter the number of rows for the alternating triangle: 5

1

0 1

1 0 1

0 1 0 1

1 0 1 0 1

=== Code Execution Successful ===

Clear

29. Binary Pyramid

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main.cpp

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the binary full pyramid: ";
9     cin >> rows;
10
11     // Loop to print the binary full pyramid
12     for (int i = 1; i <= rows; i++) {
13         // Print spaces for alignment
14         for (int j = 1; j <= rows - i; j++) {
15             cout << " ";
16         }
17
18         // Loop to print binary numbers in each row
19         for (int j = 1; j <= (2 * i - 1); j++) {
20             // Alternate between 1 and 0 based on the position
21             if (j % 2 == 0)
22                 cout << "0 ";
23             else
24                 cout << "1 ";
25         }
26
27         cout << endl; // Move to the next line after each row
28     }
29
30     return 0;
31 }
32

```

Output

Clear

```

Enter the number of rows for the binary full pyramid: 5
      1
     1 0 1
    1 0 1 0 1
   1 0 1 0 1 0 1
  1 0 1 0 1 0 1 0 1

=== Code Execution Successful ===

```

30. Zigzag with Numbers

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main.cpp

Share

Run

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the zigzag V shape: ";
9     cin >> rows;
10
11     // Loop to print the zigzag V shape pattern
12     for (int i = 1; i <= rows; i++) {
13         // Print the leading spaces
14         for (int j = 1; j <= i; j++) {
15             cout << " "; // Space to form the left part of V
16         }
17
18         // Print the left number in each row
19         cout << i;
20
21         // Print the middle spaces (for rows that are not the last row)
22         if (i != rows) {
23             for (int j = 1; j <= (2 * (rows - i) - 1); j++) {
24                 cout << " "; // Space in the middle
25             }
26
27             // Print the right number in each row (only for rows before the last one)
28             cout << i;
29         }
30
31         cout << endl; // Move to the next line after each row
32     }
33
34     return 0;
35 }
36

```

Output

Clear

```

Enter the number of rows for the zigzag V shape: 5
      1
     2 2
    3 3
   4 4
  5

```

31. Number X Shape

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main.cpp

1 #include <iostream>

2 using namespace std;

3

4 int main() {

5 int size;

6

7 // Ask the user for the size of the X

8 cout << "Enter the size for the number X shape: ";

9 cin >> size;

10

11 // Loop to print the number X shape pattern

12 for (int i = 1; i <= size; i++) {

13 // Loop to print numbers in each row

14 for (int j = 1; j <= size; j++) {

15 // Print the number at the crossing points

16 if (i == j || i + j == size + 1) {

17 cout << i << " "; // Print the current row number

18 } else {

19 cout << " "; // Print spaces for the other positions

20 }

21 }

22 cout << endl; // Move to the next line after each row

23 }

24

25 return 0;

26 }

27

Output

Enter the size for the number X shape: 5

1 1

2 2

3 3

4 4 4

5 5

=== Code Execution Successful ===

Clear

32. Reversed Triangle

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main.cpp

1 #include <iostream>

2 using namespace std;

3

4 int main() {

5 int rows;

6

7 // Ask the user for the number of rows

8 cout << "Enter the number of rows for the reversed triangle: ";

9 cin >> rows;

10

11 // Loop to print the reversed triangle

12 for (int i = rows; i >= 1; i--) {

13 // Loop to print the numbers in each row

14 for (int j = rows; j >= rows - i + 1; j--) {

15 cout << j; // Print the current number

16 }

17 cout << endl; // Move to the next line after each row

18 }

19

20 return 0;

21 }

22

Output

Enter the number of rows for the reversed triangle: 5

54321

5432

543

54

5

=== Code Execution Successful ===

Clear

33. Staggered Numbers

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main.cpp

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Run

Output

Clear

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int rows;
6
7     // Ask the user for the number of rows
8     cout << "Enter the number of rows for the triangle with stars and numbers: ";
9     cin >> rows;
10
11     // Loop to print the triangle with stars and numbers
12     for (int i = 1; i <= rows; i++) {
13         // Loop to print numbers in each row
14         for (int j = 1; j <= i; j++) {
15             cout << j; // Print the number
16             if (j != i) // Print star only if it's not the last number
17                 cout << "*"; // Print the star
18         }
19         cout << endl; // Move to the next line after each row
20     }
21
22     return 0;
23 }
24

```

Enter the number of rows for the triangle with stars and numbers: 5
1
1*2
1*2*3
1*2*3*4
1*2*3*4*5

=== Code Execution Successful ===

36. Number Borders

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main.cpp

Share

Run

Output

Clear

```

1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int size;
6
7     // Ask the user for the size of the square
8     cout << "Enter the size for the number border: ";
9     cin >> size;
10
11     // Loop to print the square with borders
12     for (int i = 1; i <= size; i++) {
13         // Loop to print each column in the row
14         for (int j = 1; j <= size; j++) {
15             // Print 1 for the border (first or last row/column)
16             if (i == 1 || i == size || j == 1 || j == size)
17                 cout << "1";
18             else
19                 cout << "0"; // Print 0 for the inner part
20         }
21         cout << endl; // Move to the next line after each row
22     }
23
24     return 0;
25 }
26

```

Enter the size for the number border: 5
11111
10001
10001
10001
11111

=== Code Execution Successful ===

37. Nested Loops

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main.cpp

1#include <iostream>

2using namespace std;

3

4int main() {

5 int rows;

6

7 // Ask the user for the number of rows

8 cout << "Enter the number of rows for the number triangle: ";

9 cin >> rows;

10

11 // Outer loop for rows

12 for (int i = 1; i <= rows; i++) {

13 // Inner loop for printing numbers in each row

14 for (int j = 1; j <= i; j++) {

15 cout << j << " "; // Print the current number

16 }

17 cout << endl; // Move to the next line after each row

18 }

19

20 return 0;

21 }

22

Output

Clear

Enter the number of rows for the number triangle: 5

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

=== Code Execution Successful ===

38. Pyramid of Digits

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main.cpp

1#include <iostream>

2using namespace std;

3

4int main() {

5 int rows;

6

7 // Ask the user for the number of rows in the pyramid

8 cout << "Enter the number of rows for the pyramid: ";

9 cin >> rows;

10

11 // Outer loop for each row

12 for (int i = 1; i <= rows; i++) {

13 // Print leading spaces for alignment

14 for (int j = 1; j <= rows - i; j++) {

15 cout << " "; // Space to center the pyramid

16 }

17

18 // Inner loop to print the digits in each row

19 for (int j = 1; j <= i; j++) {

20 cout << i << " "; // Print the current row number repeatedly

21 }

22

23 // Move to the next line after each row

24 cout << endl;

25 }

26

27 return 0;

28 }

29

Output

Clear

Enter the number of rows for the pyramid: 5

1

2 2

3 3 3

4 4 4 4

5 5 5 5 5

=== Code Execution Successful ===

39. Inverted Triangle Numbers

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main.cpp

Share

Run

1

#include <iostream>

2

using namespace std;

3

4

int main() {

5

int rows;

6

7

// Ask the user for the number of rows for the inverted triangle

8

cout << "Enter the number of rows for the inverted triangle: ";

9

cin >> rows;

10

11

// Loop to print the inverted triangle

12

for (int i = 1; i <= rows; i++) {

13

// Loop to print numbers in each row (decreasing from i to 1)

14

for (int j = i; j >= 1; j--) {

15

cout << j; // Print the current number

16

}

17

cout << endl; // Move to the next line after each row

18

}

19

return 0;

20

}

21

22

Output

Clear

Enter the number of rows for the inverted triangle: 5

1

21

321

4321

54321

=== Code Execution Successful ===

40. Spiral Matrix

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main.cpp

Share

Run

1

#include <iostream>

2

#include <vector>

3

using namespace std;

4

5

void generateSpiralMatrix(int n) {

6

// Create an empty n x n matrix

7

vector<vector<int>> matrix(n, vector<int>(n, 0));

8

9

int left = 0, right = n - 1, top = 0, bottom = n - 1;

10

int num = 1;

11

12

// Start filling the matrix from the center

13

while (left <= right && top <= bottom) {

14

// Traverse from left to right

15

for (int i = left; i <= right; ++i) {

16

matrix[top][i] = num++;

17

}

18

top++;

19

20

// Traverse downwards

21

for (int i = top; i <= bottom; ++i) {

22

matrix[i][right] = num++;

23

}

24

right--;

25

26

// Traverse from right to left

27

for (int i = right; i >= left; --i) {

28

matrix[bottom][i] = num++;

29

}

30

bottom--;

31

32

// Traverse upwards

Output

Clear

Enter the size of the matrix (n x n): 4

1 2 3 4

12 13 14 5

11 16 15 6

10 9 8 7

=== Code Execution Successful ===

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main.cpp

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Run

Output

Clear

```

27-   for (int i = right; i >= left; --i) {
28-       matrix[bottom][i] = num++;
29-   }
30-   bottom--;
31-
32-   // Traverse upwards
33-   for (int i = bottom; i >= top; --i) {
34-       matrix[i][left] = num++;
35-   }
36-   left++;
37- }
38-
39- // Print the matrix
40- for (int i = 0; i < n; ++i) {
41-     for (int j = 0; j < n; ++j) {
42-         cout << matrix[i][j] << " ";
43-     }
44-     cout << endl;
45- }
46- }
47-
48- int main() {
49-     int n;
50-     cout << "Enter the size of the matrix (n x n): ";
51-     cin >> n;
52-
53-     generateSpiralMatrix(n); // Generate and print the spiral matrix
54-
55-     return 0;
56- }
57-

```

Enter the size of the matrix (n x n): 4
1 2 3 4
12 13 14 5
11 16 15 6
10 9 8 7

=== Code Execution Successful ===

41. Number Pyramid with Gaps

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main.cpp

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Output

Clear

```

1 #include <iostream>
2 using namespace std;
3
4 void printNumberTriangleWithGaps(int rows) {
5     int num = 1; // Start with 1 for the number triangle
6
7     for (int i = 1; i <= rows; i++) {
8         // Print the numbers and gaps for each row
9         for (int j = 1; j <= i; j++) {
10-            if (j == 1 || j == i) { // Print numbers at the beginning and end of
the row
11-                cout << num++ << " ";
12-            } else { // Print spaces for the gaps
13-                cout << " "; // Two spaces for better alignment
14-            }
15-        }
16-        cout << endl;
17-    }
18- }
19-
20- int main() {
21-     int rows;
22-     cout << "Enter the number of rows: ";
23-     cin >> rows;
24-
25-     printNumberTriangleWithGaps(rows);
26-
27-     return 0;
28- }
29-

```

Enter the number of rows: 5
1
2 3
4 5
6 7
8 9

=== Code Execution Successful ===

42. Diamond Spiral

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main.cpp

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Run

```

1 #include <iostream>
2 using namespace std;
3
4 void printHollowDiamond(int n) {
5     int num = 1; // Starting number for the upper half
6
7     // Upper half of the diamond
8     for (int i = 1; i <= n; i++) {
9         // Print leading spaces
10        for (int j = 1; j <= n - i; j++) {
11            cout << " ";
12        }
13
14        // Print numbers and hollow spaces in between
15        for (int j = 1; j <= 2 * i - 1; j++) {
16            if (j == 1 || j == 2 * i - 1) { // Boundary numbers
17                cout << num;
18                num++; // Increment the number
19                if (num > 9) num = 1; // Reset to 1 after 9
20            } else {
21                cout << " "; // Hollow space
22            }
23        }
24        cout << endl;
25    }
26
27    // Lower half of the diamond (mirror of the upper half)
28    int startNum = 1; // Restart number from 1 after the upper half is done
29
30    for (int i = n - 1; i >= 1; i--) {
31        // Print leading spaces
32        for (int j = 1; j <= n - i; j++) {

```

Output

Clear

```

Enter the size of the diamond (number of rows in the upper half): 5
 1
 2 3
 4 5
 6 7
 8 9
1 2
3 4
5 6
7

=== Code Execution Successful ===

```

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main.cpp

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Run

```

29
30 for (int i = n - 1; i >= 1; i--) {
31     // Print leading spaces
32     for (int j = 1; j <= n - i; j++) {
33         cout << " ";
34     }
35
36     // Print numbers and hollow spaces in between
37     for (int j = 1; j <= 2 * i - 1; j++) {
38         if (j == 1 || j == 2 * i - 1) { // Boundary numbers
39             cout << startNum;
40             startNum++; // Increment the number
41             if (startNum > 9) startNum = 1; // Reset to 1 after 9
42         } else {
43             cout << " "; // Hollow space
44         }
45     }
46     cout << endl;
47 }
48
49
50 int main() {
51     int n;
52     cout << "Enter the size of the diamond (number of rows in the upper half): ";
53     cin >> n;
54
55     printHollowDiamond(n);
56
57     return 0;
58 }
59

```

Output

Clear

```

Enter the size of the diamond (number of rows in the upper half): 5
 1
 2 3
 4 5
 6 7
 8 9
1 2
3 4
5 6
7

=== Code Execution Successful ===

```

43. Checkerboard Numbers with Conditions

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main.cpp

Share

Run

Output

Clear

```
1 #include <iostream>
2 using namespace std;
3
4 void printCheckerboard(int rows, int cols) {
5     // Loop through each row
6     for (int i = 0; i < rows; i++) {
7         // Loop through each column in the current row
8         for (int j = 0; j < cols; j++) {
9             // Check if the sum of the row index and column index is even or odd
10            if ((i + j) % 2 == 0) {
11                cout << "1 "; // Print 1 for even sum of indices
12            } else {
13                cout << "0 "; // Print 0 for odd sum of indices
14            }
15        }
16        cout << endl; // Move to the next line after printing the row
17    }
18 }
19
20 int main() {
21     int rows = 5, cols = 5; // You can adjust rows and columns here
22
23     printCheckerboard(rows, cols);
24
25     return 0;
26 }
27
```

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

=== Code Execution Successful ===
```

44. Snake Pattern

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main.cpp

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Output

Clear

```
1 #include <iostream>
2 using namespace std;
3
4 void printSnakePattern(int rows, int cols) {
5     int num = 1; // Starting number
6
7     for (int i = 0; i < rows; i++) {
8         if (i % 2 == 0) { // For even rows, print left to right
9             for (int j = 0; j < cols; j++) {
10                 cout << num++ << " ";
11             }
12         } else { // For odd rows, print right to left
13             int temp = num + cols - 1;
14             for (int j = 0; j < cols; j++) {
15                 cout << temp-- << " ";
16             }
17             num += cols; // Update num to the next starting number
18         }
19         cout << endl; // Move to the next row
20     }
21 }
22
23 int main() {
24     int rows = 4, cols = 5; // Adjust dimensions as needed
25     printSnakePattern(rows, cols);
26     return 0;
27 }
28
```

```
1 2 3 4 5
10 9 8 7 6
11 12 13 14 15
20 19 18 17 16

=== Code Execution Successful ===
```