

1. Counter-Controlled Loops

Ex. 1: Print first 5 odd numbers.

```
#include <iostream>

using namespace std;

int main() {

    int i = 1, count = 0;

    while (count < 5) {

        cout << i << " ";

        i += 2;

        count++;

    }

    return 0;

}

// Output: 1 3 5 7 9
```

Ex. 2: Calculate sum of squares of 1 to 4.

```
#include <iostream>

using namespace std;

int main() {

    int i = 1, sum = 0;

    while (i <= 4) {

        sum += i * i;

        i++;

    }

}
```

```
    cout << "Sum of squares: " << sum << endl;

    return 0;

}

// Output: Sum of squares: 30
```

Ex. 3: Multiply even numbers from 2 to 6.

```
#include <iostream>

using namespace std;

int main() {

    int product = 1, i = 2;

    while (i <= 6) {

        product *= i;

        i += 2;

    }

    cout << "Product: " << product << endl;

    return 0;

}

// Output: Product: 48
```

Ex. 4: Print countdown from 5 to -5.

```
#include <iostream>

using namespace std;

int main() {

    int i = 5;

    while (i >= -5) {
```

```
        cout << i << " ";

        i--;

    }

    return 0;

}

// Output: 5 4 3 2 1 0 -1 -2 -3 -4 -5
```

Ex. 5: Print cubes of first 4 numbers.

```
#include <iostream>

using namespace std;

int main() {

    int i = 1;

    while (i <= 4) {

        cout << i * i * i << " ";

        i++;

    }

    return 0;

}

// Output: 1 8 27 64
```

2. Sentinel-Controlled Loops

Ex. 1: Keep adding until user enters -5.

```
#include <iostream>

using namespace std;

int main() {

    int num, sum = 0;

    cout << "Enter numbers (-5 to stop): ";

    cin >> num;

    while (num != -5) {

        sum += num;

        cin >> num;

    }

    cout << "Final sum: " << sum << endl;

    return 0;

}
```

Ex. 2: Count negatives until 100 entered.

```
#include <iostream>

using namespace std;

int main() {

    int num, count = 0;

    cin >> num;

    while (num != 100) {

        if (num < 0) count++;

        cin >> num;

    }

    cout << "Negative numbers: " << count << endl;
```

```
    return 0;
}
```

Ex. 3: Find minimum until user enters stop.

```
#include <iostream>

#include <string>

#include <climits>

using namespace std;

int main() {

    string input;

    int minVal = INT_MAX;

    while (true) {

        cin >> input;

        if (input == "stop") break;

        int num = stoi(input);

        if (num < minVal) minVal = num;

    }

    cout << "Minimum: " << minVal << endl;

    return 0;

}
```

Ex. 4: Average of positives until -1.

```
#include <iostream>

using namespace std;

int main() {
```

```

int num, count = 0;

double sum = 0;

cin >> num;

while (num != -1) {

    if (num > 0) {

        sum += num;

        count++;

    }

    cin >> num;

}

cout << "Average of positives: " << (count ? sum / count : 0) << endl;

return 0;

}

```

Ex. 5: Add odd numbers until 50.

```

#include <iostream>

using namespace std;

int main() {

    int num, sum = 0;

    cin >> num;

    while (num != 50) {

        if (num % 2 != 0) sum += num;

        cin >> num;

    }

    cout << "Odd sum: " << sum << endl;

    return 0;
}

```

```
}
```

```
---
```

3. For Loops

Ex. 1: Print first 6 even numbers.

```
#include <iostream>

using namespace std;

int main() {

    for (int i = 2; i <= 12; i += 2) {

        cout << i << " ";

    }

    return 0;

}

// Output: 2 4 6 8 10 12
```

Ex. 2: Sum of first 5 odd numbers.

```
#include <iostream>

using namespace std;

int main() {

    int sum = 0;

    for (int i = 1; i <= 9; i += 2) {

        sum += i;
```

```
}  
  
cout << "Sum: " << sum << endl;  
  
return 0;  
  
}  
  
// Output: Sum: 25
```

Ex. 3: Print multiples of 4 up to 20.

```
#include <iostream>  
  
using namespace std;  
  
int main() {  
  
    for (int i = 4; i <= 20; i += 4) {  
  
        cout << i << " ";  
  
    }  
  
    return 0;  
  
}  
  
// Output: 4 8 12 16 20
```

Ex. 4: Factorial of 6.

```
#include <iostream>  
  
using namespace std;  
  
int main() {  
  
    int fact = 1;  
  
    for (int i = 1; i <= 6; i++) {  
  
        fact *= i;  
  
    }  
  
}
```



```
    cout << "Factorial: " << fact << endl;

    return 0;

}

// Output: Factorial: 720
```

Ex. 5: Reverse print from 20 to 10.

```
#include <iostream>

using namespace std;

int main() {

    for (int i = 20; i >= 10; i--) {

        cout << i << " ";

    }

    return 0;

}

// Output: 20 19 18 17 16 15 14 13 12 11 10
```

4. While Loops

Ex. 1: Print numbers 2 to 12.

```
#include <iostream>

using namespace std;

int main() {
```

```
int i = 2;

while (i <= 12) {

    cout << i << " ";

    i++;

}

return 0;

}
```

// Output: 2 3 4 5 6 7 8 9 10 11 12

Ex. 2: Keep reading names until "exit".

```
#include <iostream>

#include <string>

using namespace std;

int main() {

    string name;

    while (cin >> name && name != "exit") {

        cout << "Hello, " << name << endl;

    }

    return 0;

}
```

Ex. 3: Countdown from 12.

```
#include <iostream>

using namespace std;

int main() {
```

```
int i = 12;

while (i > 0) {

    cout << i << " ";

    i--;

}

return 0;

}
```

// Output: 12 11 10 ... 1

Ex. 4: Sum of even numbers until 10.

```
#include <iostream>

using namespace std;

int main() {

    int i = 2, sum = 0;

    while (i <= 10) {

        sum += i;

        i += 2;

    }

    cout << "Sum of evens: " << sum << endl;

    return 0;

}
```

// Output: Sum of evens: 30

Ex. 5: Keep asking until user enters a number < 100.

```
#include <iostream>
```

```
using namespace std;

int main() {

    int num;

    cout << "Enter number (<100): ";

    cin >> num;

    while (num >= 100) {

        cout << "Too big, try again: ";

        cin >> num;

    }

    cout << "Accepted: " << num << endl;

    return 0;

}
```

5. Do-While Loops

Ex. 1: Simple calculator menu until 0.

```
#include <iostream>

using namespace std;

int main() {

    int choice;

    do {

        cout << "1. Add, 2. Subtract, 0. Quit: ";

        cin >> choice;
```

```
    } while (choice != 0);  
  
    return 0;  
  
}
```

Ex. 2: Multiply numbers until user enters 1.

```
#include <iostream>  
  
using namespace std;  
  
int main() {  
  
    int num, product = 1;  
  
    do {  
  
        cin >> num;  
  
        if (num != 1) product *= num;  
  
    } while (num != 1);  
  
    cout << "Product: " << product << endl;  
  
    return 0;  
  
}
```

Ex. 3: Guess password until correct.

```
#include <iostream>  
  
#include <string>  
  
using namespace std;  
  
int main() {  
  
    string pwd;  
  
    do {  
  
        cout << "Enter password: ";
```

```
    cin >> pwd;

    } while (pwd != "open123");

    cout << "Access granted!" << endl;

    return 0;

}
```

Ex. 4: Print 5 to 8.

```
#include <iostream>

using namespace std;

int main() {

    int i = 5;

    do {

        cout << i << " ";

        i++;

    } while (i <= 8);

    return 0;

}

// Output: 5 6 7 8
```

Ex. 5: Keep asking for number ≥ 50 .

```
#include <iostream>

using namespace std;

int main() {

    int num;

    do {
```

```
    cout << "Enter number >= 50: ";  
  
    cin >> num;  
  
} while (num < 50);  
  
cout << "Valid: " << num << endl;  
  
return 0;  
  
}
```