What and Why?

Rounds → Iteration

→ Repetition

initialisation   condition
         ↑   ↗   ↗ increment

```cpp
for(int i=1;i<=5;i++){
    cout<<"Good Morning"<<endl;
}
```

i = 1̸ 2̸ 3̸ 4̸ 5̸ 6

5 baar "Good Morning"

- Initialize
- check
- inside loop
- increment
- Repeat

Output
- Good Morning
- Good Morning
- Good Morning
- Good Morning
- Good Morning
-

For Loop

```
for(int i = 1; i<=10; i++){

    // code

}
```

Ques : Print hello world 'n' times. Take 'n' as input from user *in seperate lines*

```
int n;
cin >> n;
```

How for loop works : the various parameters.

initialization , condition , increment/decrement

SKILLS

Ques : Print numbers from 1 to 100

↓

for loop wala variable , → i → iterator

Ques : Print all the even numbers from 1 to 100

```cpp
for(int i=1;i<=10;i++){
    if(i%2==0) cout<<i<<endl;
}
```

i = 1 2 3 4

1) Check

2) Inside loop

3) Increment

Output

• 2

• 4

• 6

• 8

• 10

Ques : Print the table of 19.

```
for ( int i = 19;  i <= 190;  i += 19  ){

        cont << i << endl;

}

i = 19  38  57
```

- 19
- 38
- 57
-

Ques : Display this AP – 1,3,5,7,9.. upto 'n' terms.

$n = \cancel{6}\ 10$

a

1   3   5   7   9   11   13   15   17   19 a_n

```
for ( int i = 1 ; i <= 2*n-1 ; i += 2 ) {

    cout << i << endl ;

}
```

M-I : Mathematics → $a = 1, d = 2$

$a_n = a + (n-1)d$

$\quad = 1 + (n-1) \cdot 2$

$\quad = 1 + 2n - 2 \quad = \boxed{2n - 1}$

$2*n - 1$

Ques : Display this AP – ~~1 3 5 7 9~~.. upto 'n' terms.

$$4, 7, 10, 13, 17$$

$$\downarrow$$

$$a = 4, \quad d = 3$$

$$a_n = a + (n-1)d$$

$$= 4 + (n-1) \cdot 3$$

$$= 4 + 3n - 3$$

$$= \boxed{3n + 1}$$

Ques : Display this GP – 1,2,4,8,16,32,.. upto 'n' terms.

n = 3 4 5 6 7 8

1   2   4   16   32   64   128   256

Practice :   n   to   1

ln → n = 8 →   8
                 7
                 6
                 5
                 4
                 3
                 2
                 1

Ques : Display this AP – 100,97,94,.. upto all terms which are positive.

100   97   94   91   88   4   1   −2   −5 . . .

Dhancha Method → 1 to n   Extra Variable

$a = 100, \quad d = -3, \quad n = ?, \quad a_n = ?$

$a_n > 0$

$\Rightarrow a + (n-1)d > 0$

$\Rightarrow 100 + (n-1)(-3) > 0$

$\Rightarrow 100 > 3(n-1)$

$\Rightarrow 100 > 3n - 3$

$103 > 3n$

$\rightarrow 3n < 103$

$\Rightarrow n < \dfrac{103}{3}$

$\Rightarrow n < 34.33$

$n_{last} \rightarrow 34$

While Loop

$i = 1\ 2\ 3\ 11$

```cpp
int i = 0;
while(i<10){
    // code
    i++;

}
```

```cpp
int i = 1;
while(i<=10){
    i++;
    cout<<i<<endl;
}
```

. 2

. 3

.

.

.

11

Predict the output

```cpp
int main( ) {

    int j ;

    while ( j <= 10 ) {

        cout << j << endl;

        j = j + 1 ;

    }

}
```

Error

Garbage values

Predict the output

```
int main( ) {

    int x = 1 ;

    while ( x == 1 ) {

        x = x - 1 ;

        cout << x << endl;

    }

}
```

$x = \cancel{1} \ 0$

- 0
- .

Do- While Loop   Useless

```
do {

    //code

} while ( another == 'y' ) ;
```

Find the error

```
int main() {
    int x;
    while (x = 0; x <= 255; x++) {
        cout << "Ascii value of Character " << (char)('a' + x) ;
        cout << " is " << x << endl;
    }
}
```

(handwritten annotation: arrow from "while" pointing to the text "for")

Ques: Print all alphabets (uppercase) with their ASCII values.

A 65
B 66
C 67
D 68
.
.
.
Z 90

Thank you!