

## \* For Loop:

```
// for loop  
// for initialization; condition; operation)  
for (let num = 1; num <= 5; num++) {  
    console.log('Level ${num}');  
}
```

\* To enter the for loop condition must be true.

\* operation condition cycle repeats until condition is false.

\*  $num = 1 \neq 5$   $4 \neq 5$   $5 \neq 5$   $num \leq 5$

op: Level 1

Level 2

Level 3

Level 4

Level 5

① Initialization,  
 $let num = 1$

② check condition before entering,

$$num \leq 5 \Rightarrow 1 \leq 5 \Rightarrow \text{true}$$

hence enter loop  $\Rightarrow cl ('Level ${num}')$ ;

op: "Level 1"

③ operation,  $num++ \Rightarrow num = 2$

④  $num \leq 5 \Rightarrow 2 \leq 5 \Rightarrow \text{true}$

op: "Level 2"

⑤ operation,  $num++ \Rightarrow num = 3$

⑥  $num \leq 5 \Rightarrow 3 \leq 5 \Rightarrow \text{true}$

op: "Level 3"

⑦  $num++ \Rightarrow num = 4$

⑧  $num \leq 5 \Rightarrow 4 \leq 5 \Rightarrow \text{true}$

op: "Level 4"

⑨  $num++ \Rightarrow num = 5$

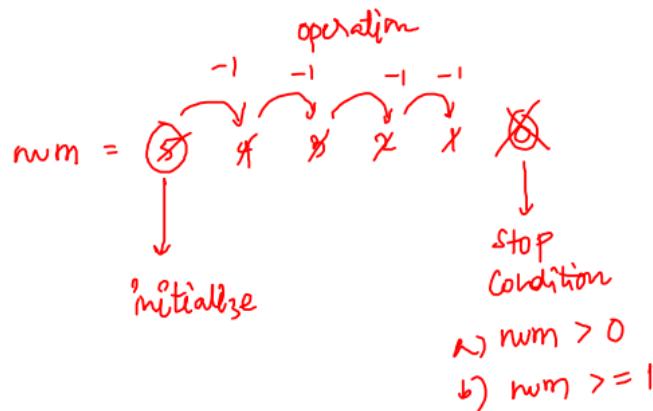
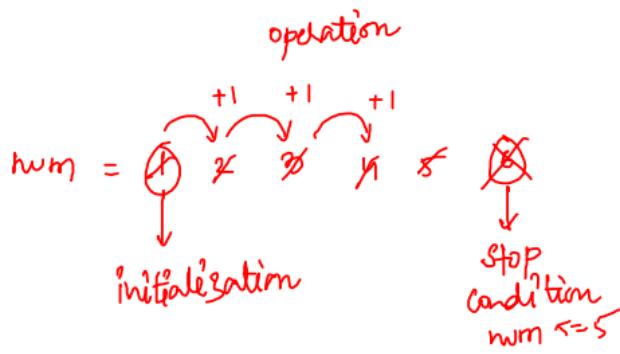
⑩  $num \leq 5 \Rightarrow 5 \leq 5 \Rightarrow \text{true}$

op: "Level 5"

⑪  $num++ \Rightarrow num = 6$

⑫  $num \leq 5 \Rightarrow 6 \leq 5 \Rightarrow \text{false}$

\* — Stop Loop — \*



$\text{num} \leq 6$  same  
( $\leftarrow$ )

```
for (let num = 1; num <= 5; num++) {
```

```
    cl ('Level ' + num);
```

}

~~a)  $\text{num} \leq 5$ , b)  $\text{num} \leq 6$~~   
~~6 <= 5 X~~      ~~6 < 6 X~~

$\text{num} \geq 1$   
( $\leftarrow$ )

```
for (let num = 5; num > 0; num--) {
```

```
    cl ('Level ' + num);
```

}

$5 > 0 \rightarrow \text{level } 5$   
 $4 > 0 \rightarrow \text{level } 4$   
 $3 > 0 \rightarrow \text{level } 3$   
 $2 > 0 \rightarrow \text{level } 2$   
 $1 > 0 \rightarrow \text{level } 1$

$0 > 0$  X

## # break statement :

→ terminate / come out of the current loop in execution

```
444 | for (let num = 1; num <= 5; num++) {  
445 |   if (num == 3) {  
446 |     console.log("Sorry you cannot proceed");  
447 |     break;  
448 |   }  
449 |  
450 |   console.log(`Level ${num}`);  
451 }
```



num = X ≠ 3

- a) if X      ↗ if X      ↗ if ✓
- b) "Level 1"    b) "Level 2"    → "Sorry"  
                                        → break

① num = 1, num <= 5  
(1 <= 5)

- a) num == 3, 1 == 3 X
- b) "Level 1"

② num++, num = 2, num <= 5  
(2 <= 5)

- a) num == 3, 2 == 3 X
- b) "Level 2"

③ num++, num = 3, num <= 5  
(3 <= 5)

- a) num == 3, 3 == 3 ✓,  
→ "Sorry", ...

→ **break** → terminate current loop and come out

# Continue :

→ move to the next iteration of current loop by ignoring all the code below it.

```
459 for (let num = 1; num <= 5; num++) {  
460   if (num == 3) {  
461     console.log("Sorry you cannot proceed");  
462     continue;  
463   }  
464   console.log(`Level ${num}`);  
465 }  
466 }
```

①  $\text{num} = 1, 1 \leq 5$

a)  $\text{num} == 3, 1 == 3 \times$

b) "Level 1"

②  $\text{num}++, \text{num} = 2, 2 \leq 5$

a)  $\text{num} == 3, 2 == 3 \times$

b) "Level 2"

③  $\text{num}++, \text{num} = 3, 3 \leq 5$

a)  $\text{num} == 3, 3 == 3 \checkmark$

→ "Sorry"  
→ Continue,

~~b)~~ ignored due to continue

④  $\text{num}++, \text{num} = 4$

~~4~~  $\leq 5$

a)  $\text{num} == 3, 4 == 3 \times$

b) "Level 4"

⑤  $\text{num}++, \text{num} = 5$

~~5~~  $\leq 5$

a)  $\text{num} == 3, 5 == 3 \times$

b) "Level 5"

⑥  $\text{num} = 6$

~~6~~  $\leq 5 \times$

## \* sum of natural numbers :

$$\text{if } \circ 5 = N$$

$$\text{op: } 1+2+3+4+5 \\ = 15$$

$$\text{if: } 10 = N$$

$$\text{op: } 1+2+3+4+5+6+7+8+9+10 \\ = 55$$

$$N=5, \quad \textcircled{1} \quad \text{nwm} = 1 \Rightarrow \text{sum} = 0 + \frac{1}{1}$$

$$\textcircled{2} \quad \text{nwm} = 2 \Rightarrow \text{sum} = 1 + 2 \\ = 3$$

$$\textcircled{3} \quad \text{nwm} = 3 \Rightarrow \text{sum} = 3 + 3 \\ = 6$$

$$\textcircled{4} \quad \text{nwm} = 4 \Rightarrow \text{sum} = 6 + 4 \\ = 10$$

$$\textcircled{5} \quad \text{nwm} = 5 \Rightarrow \text{sum} = 10 + 5 \\ = 15$$

$$a = 1 \quad a = 1 \\ b = 2 \quad b = 2 \\ c = 3 \quad c = 3 \\ \boxed{a+b} \quad \boxed{a+b+c}$$

$$\text{let sum} = 0$$

for (let nwm = 1; nwm <= N; nwm++) {  
 sum += nwm;

$$\sum = \emptyset \xrightarrow{+1} \emptyset \xrightarrow{+2} \emptyset \xrightarrow{+3} \emptyset \xrightarrow{+4} \emptyset \xrightarrow{+5} \emptyset \xrightarrow{+6} 15$$

# Efficient approach:

formula, sum of 1<sup>st</sup> N natural numbers

$$= \frac{N(N+1)}{2}$$

Ex:  $N = 5$

$$\Rightarrow \frac{5(5+1)}{2}$$

$$\Rightarrow \frac{5 \times 6}{2} = 15$$

Ex:  $N = 10$

$$\Rightarrow \frac{10(10+1)}{2}$$

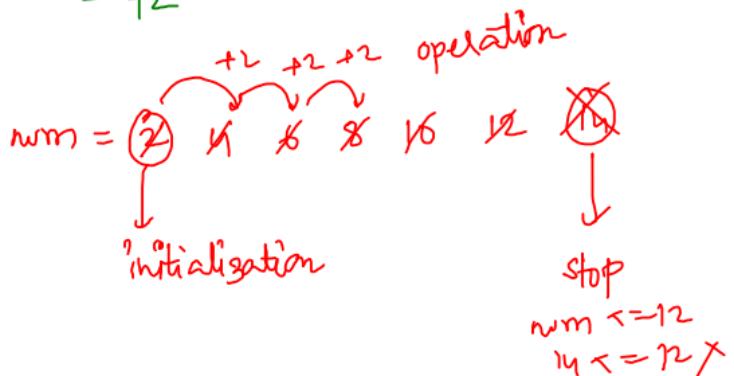
$$\Rightarrow \frac{10 \times 11}{2} = 55$$

## \* Even Sum :

ip : 12

op :  $2 + 4 + 6 + 8 + 10 + 12$  ~~(+14)~~

$$= 42$$



let sum = 0;

$$\begin{aligned}nwm &= nwm + 2 \\&= 2 + 2 = 4\end{aligned}$$

for( let nwm = 2 ; nwm <= N ; num += 2 ) {

sum += nwm;

}

①  $nwm = 2 \Rightarrow sum = 0 + 2 = 2$

②  $nwm = 4 \Rightarrow sum = 2 + 4 = 6$

③  $nwm = 6 \Rightarrow sum = 6 + 6 = 12$

:

:

:

:

# efficient :

$$\frac{N(N+2)}{4}$$

↓  
only works  
for even  
numbers  
(N = even)

\* \* \*  
⇒ when N is odd

$$\Rightarrow N = N - 1$$

$$\Rightarrow \frac{N(N+2)}{4}$$

$$\text{eg: } N = 13 \Rightarrow N = 13 - 1 = 12 \\ \Rightarrow \frac{12 \times 14}{2} = 42$$

eg:  $N = 12, \frac{12 + 14}{4} = 42$   $(2+4+6+8+10+12)$

eg:  $N = 24, \frac{24 + 26}{4} = 156$   $(2+4+6+8+10+12+14+16+18+20+22+24)$

eg:  $N = 13, \frac{13 + 15}{4} = \underline{\underline{43,75}}$  { wrong }

eg:  $N = 25, \frac{25 + 27}{4} = \underline{\underline{157,0000}}$  { same }

even number until 12, 13 will be same

" " " " 26, 25 will be same

odd numbers X (leave this) — out of module

Print 1 to 10

Factorial with loop

Print sum 10

N stars  
prime  
HCF

} mandatory

→ Contest Mandatory

→ Scores are tracked

→ give honest attempt, do not copy,  
score doesn't matter, effort / attempt matters

3 Qs, 1½ hrs