

# **02 - Finding Time Complexity of Algorithms**

**Ex. No. : 2.1**

**Date: 20.08.24**

**Register No.: 230701393**

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## AIM:

Convert the following algorithm into a program and find its time complexity using the counter method.

```
void function (int n)
```

```
{
    int i= 1;
    int s =1;
    while(s <= n)
    {
        i++;
        s += i;
    }
}
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

**For example:**

Input	RESULT
9	12

## ALGORITHM:

Step 1: Start



Step 2: Read the value of n from the user.

Step 3: Call the function func(n), initializing count, i to 1, and s to 1. Increment count (1st increment).

Step 4: While  $s \leq n$ , increment count (2nd increment), then increment i and update s by adding i. Increment count again (3rd increment).

Step 5: After exiting the loop, increment count (4th increment).

Step 6: Print the value of count.

Step 7: End

PROGRAM:

```
#include<stdio.h>
```

```
void function(int n)
```

```
{
```

```
    int count=0;
```

```
    int i=1;
```

```
    count++;
```

```
    int s=1;
```

```
    count++;
```

```
    while(s<=n)
```

```
    {
```

```
        i++;
```



```
        count++;

        s+=i;

        count++;

        count++;

    }

    count++;

    printf("%d",count);

}

int main()

{

    int n;

    scanf("%d",&n);

    function(n);

}
```

OUTPUT:



	Input	Expected	Got	
✓	9	12	12	✓
✓	4	9	9	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

## RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.2

Date: 20.08.24

Register No.: 230701393

Name: THARUN KUMAR S

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AIM:

Convert the following algorithm into a program and find its time complexity using the counter method.

```
void func(int n){  
    if(n==1){  
        printf("*");}  
    else{  
        for(int i=1; i<=n; i++){  
            for(int j=1; j<=n; j++){  
                printf("*");  
                printf("*");  
                break;  
            }  
        }  
    }  
}
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

ALGORITHM:

Step 1: Start



Step 2: Read the value of n from the user.

Step 3: Call the function func(n).

Step 4: In func, if n == 1, increment count (1st increment).

Step 5: If n > 1, increment count (2nd increment) and loop i from 1 to n, increment count (3rd increment) for each iteration, and loop j from 1 to n, incrementing count (4th increment) three times, then break. Increment count (5th increment) after the inner loop, and once more after the outer loop (6th increment).

Step 6: Print the value of count.

Step 7: End

PROGRAM:

```
#include<stdio.h>
```

```
void func(int n)
```



```
{  
    int count=0;  
    if(n==1)  
    {  
        count++;  
    }  
    else  
    {  
        count++;  
        for(int i=1;i<=n;i++)  
        {  
            count++;  
            for(int j=1;j<=n;j++)  
            {  
                count++;  
                count++;  
                count++;  
                break;  
            }  
            count++;  
        }  
    }  
}
```





```
    }  
    count++;  
}  
printf("%d",count);  
}
```

```
int main()  
{  
    int n;  
    scanf("%d",&n);  
    func(n);  
}
```

OUTPUT:



	Input	Expected	Got	
✓	2	12	12	✓
✓	1000	5002	5002	✓
✓	143	717	717	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

## RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.3

Date: 20.08.24

Register No.: 230701393

Name: THARUN KUMAR S

AIM:

Convert the following algorithm into a program and find its time complexity using counter method.

```
Factor(num) {  
    {  
        for (i = 1; i <= num;++i)  
        {  
            if (num % i== 0)  
            {  
                printf("%d ", i);  
            }  
        }  
    }  
}
```

Note: No need of counter increment for declarations and scanf() and counter variable printf() statement.

Input:

A positive Integer n

Output:

Print the value of the counter variable

ALGORITHM:

Step 1: Start



Step 2: Read the value of n from the user.

Step 3: Call the function Factor(n).

Step 4: In Factor, loop i from 1 to num, increment count (1st increment).

Step 5: For each i, check if  $\text{num} \% i == 0$ . If true, increment count (2nd increment). Increment count again (3rd increment) for the end of the loop.

Step 6: After the loop, increment count (4th increment).

Step 7: Print the value of count.

Step 8: End

PROGRAM:

```
#include<stdio.h>
```



```
void Factor(int num)
{
    int i,count=0;
    for(i=1;i<=num;i++)
    {
        count++;
        if(num%i==0)
        {
            count++;
        }
        count++;
    }
    count++;
    printf("%d",count);
}

int main()
{
    int num;
    scanf("%d",&num);
    Factor(num);
}
```

OUTPUT:



	Input	Expected	Got	
✓	12	31	31	✓
✓	25	54	54	✓
✓	4	12	12	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

## RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.4

Date: 20.08.24

Register No.: 230701393

Name: THARUN KUMAR S

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AIM:

Convert the following algorithm into a program and find its time

complexity using counter method.

```
void function(int n)
{
    int c= 0;
    for(int i=n/2; i<n; i++)
        for(int j=1; j<n; j = 2 * j)
            for(int k=1; k<n; k = k * 2)
                c++;
}
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

ALGORITHM:

Step 1: Start



Step 2: Read the value of n from the user.

Step 3: Call the function function(n).

Step 4: In function, initialize c to 0 and increment count (1st increment).

Step 5: Loop i from n/2 to n, incrementing count (2nd increment), and for each i, loop j from 1 to n, doubling j each time, incrementing count (3rd increment).

Step 6: Inside the j loop, loop k from 1 to n, doubling k each time, incrementing count (4th increment), increment c, and increment count (5th increment). Increment count again after the k loop (6th increment) and after the j loop (7th increment).

Step 7: Increment count after the i loop (8th increment).

Step 8: Print the value of count.

Step 9: End

PROGRAM:

```
#include<stdio.h>

void function(int n)
{
    int count=0;

    int c=0;

    count++;

    for(int i=n/2;i<n;i++)
```





```

{
    count++;
    for(int j=1;j<n;j=2*j)
    {
        count++;
        for(int k=1;k<n;k=k*2)
        {
            c++;
            count++;
            count++;
        }
        count++;
    }
    count++;
    printf("%d",count);
}

int main()
{

```



```
int n;  
  
scanf("%d",&n);  
  
function(n);  
}
```

OUTPUT:

	Input	Expected	Got	
✓	4	30	30	✓
✓	10	212	212	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

RESULT:

Hence the above program has been executed successfully.

Ex. No. : 2.5

Date: 20.08.24

Register No.: 230701393

Name: THARUN KUMAR S

## AIM:

Convert the following algorithm into a program and find its time complexity using counter method.

```
void reverse(int n)

{

    int rev = 0, remainder;

    while (n != 0)

    {

        remainder = n % 10;

        rev = rev * 10 + remainder;

        n/= 10;

    }

    print(rev);

}
```

Note: No need of counter increment for declarations and scanf() and count variable printf() statements.

Input:

A positive Integer n

Output:

Print the value of the counter variable

## ALGORITHM:

Step 1: Start

Step 2: Read the value of n from the user.



Step 3: Call the function reverse(n).

Step 4: In reverse, initialize rev to 0 and increment count (1st increment).

Step 5: While n is not 0, increment count (2nd increment), calculate remainder as  $n \% 10$ , and increment count (3rd increment). Update rev by multiplying it by 10 and adding remainder, then increment count (4th increment). Divide n by 10 and increment count (5th increment).

Step 6: After exiting the loop, increment count (6th increment) and again for the commented print statement (7th increment).

Step 7: Print the value of count.

Step 8: End

PROGRAM:

```
#include<stdio.h>

void reverse(int n)
{
    int count=0;

    int rev=0;

    count++;

    int remainder;

    count++;

    while(n!=0)
```



```
{  
    count++;  
    remainder=n%10;  
    count++;  
    rev=rev*10+remainder;  
    count++;  
    n/=10;  
    count++;  
}count++;  
printf("%d",count);  
}  
  
int main()  
{  
    int n;  
    scanf("%d",&n);  
    reverse(n);  
}
```

OUTPUT:



	Input	Expected	Got	
✓	12	11	11	✓
✓	1234	19	19	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

## RESULT:

Hence the above program has been executed successfully.