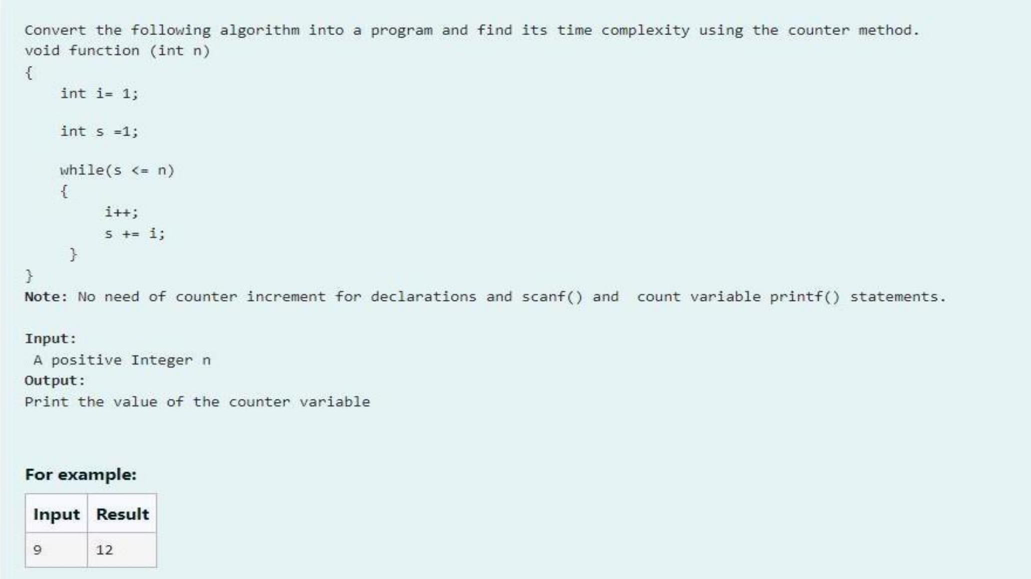
230701521
JABARAJ E
BE COMPUTER SCIENCE ENGINEERING
‘A’

TIME COMPLEXITY

QUESTION 2.A

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

AIM:

Step 1: Start

Step 2: Input the integer n

Step 3: Initialize c to 0 to count

operations Step 4: Initialize i to 1

Step 5: Increment c by 1

Step 6: Initialize s to 1

Step 7: Increment c by 1

Step 8: While s is less than or equal to n, do Steps 8.1 to

8.5 Step 8.1: Increment c by 1

Step 8.2: Increment i by 1

Step 8.3: Increment c by 1 Step
8.4: Add i to s (s += i)

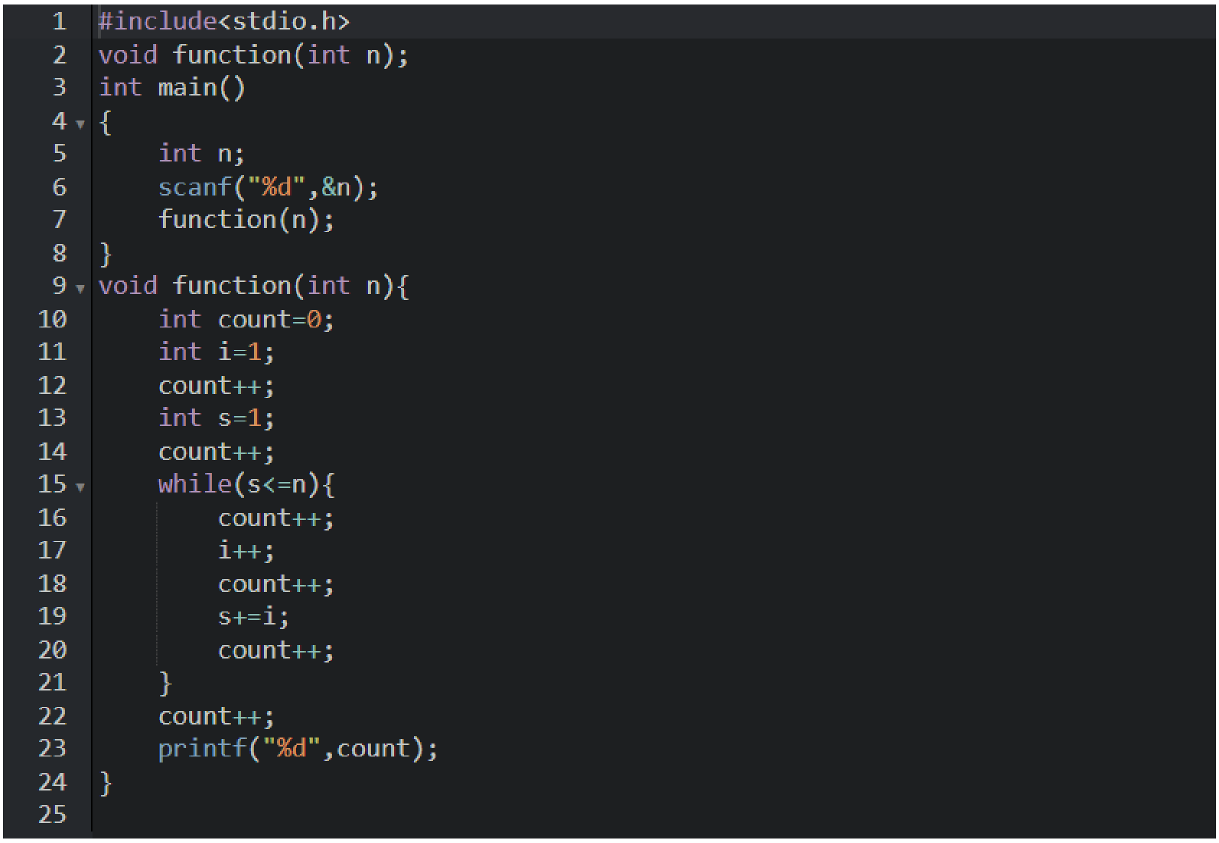
Step 8.5: Increment c by 1

Step 9: Increment c by 1

Step 10: Print the value of
c

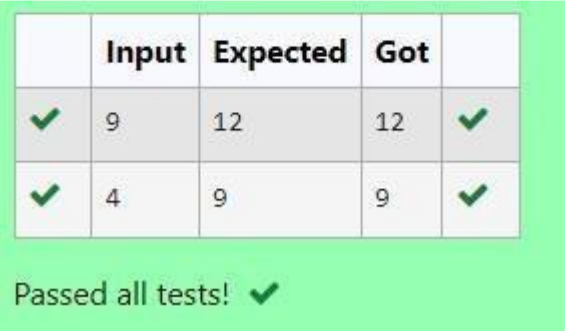
Step 11: Stop

PROGRAM:



```
#include<stdio.h>
void function(int n);
int main()
{
    int n;
    scanf("%d",&n);
    function(n);
}
void function(int n){
    int count=0;
    int i=1;
    count++;
    int s=1;
    count++;
    while(s<=n){
        count++;
        i++;
        count++;
        s+=i;
        count++;
    }
    count++;
    printf("%d",count);
}
```

OUTPUT :



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

Passed all tests! ✓

RESULT:

The above code is executed successfully and gives expected output.

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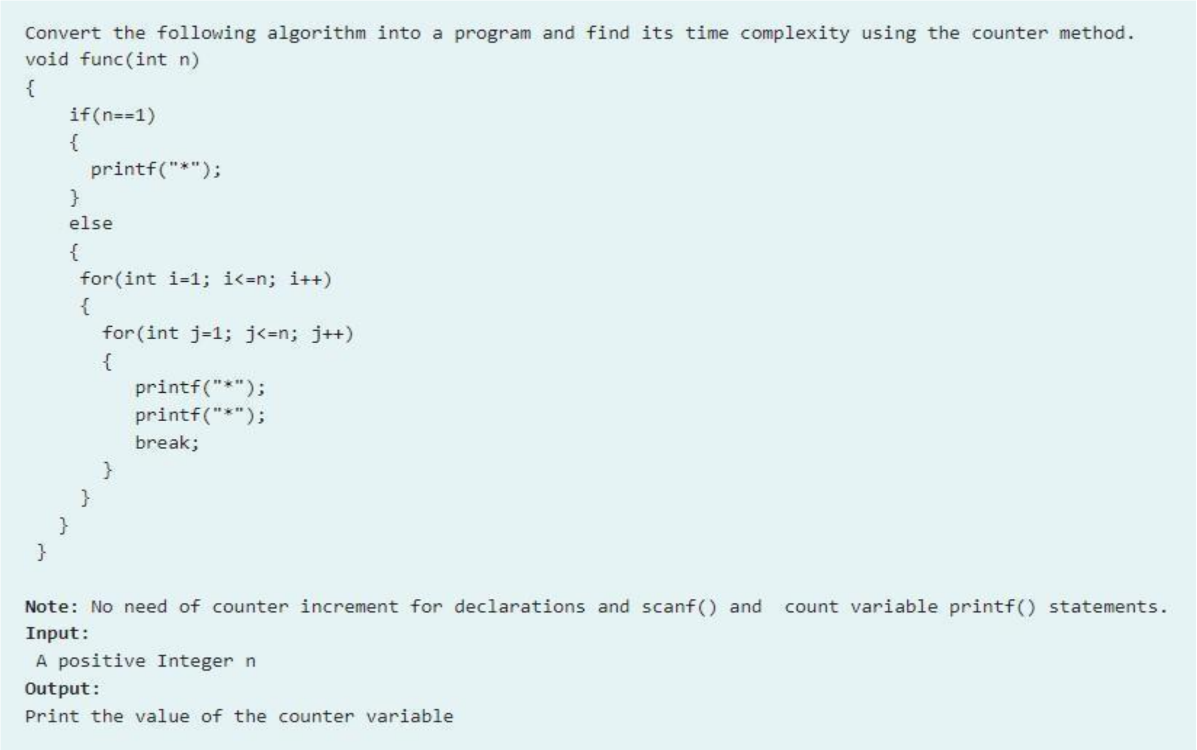
Q:2.B

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: Input the integer n
Step 3: Initialize c to 0 to count operations
Step 4: If n is equal to 1, go to Step 5, else go to
Step 7 Step 5: Increment c by 1
Step 6: Print "*" and go to Step
12 Step 7: Increment c by 1
Step 8: For each integer i from 1 to n, do Steps 9 to
11 Step 9: Increment c by 1
Step 10: For each integer j from 1 to n, do Steps 10.1 to
10.4 Step 10.1: Increment c by 1
Step 10.2: Increment c by 1
Step 10.3: Increment c by 1
Step 10.4: Break out of the inner loop
Step 11: Increment c by 1
Step 12: Increment c by 1
Step 13: Print the value of
c Step 14: Stop

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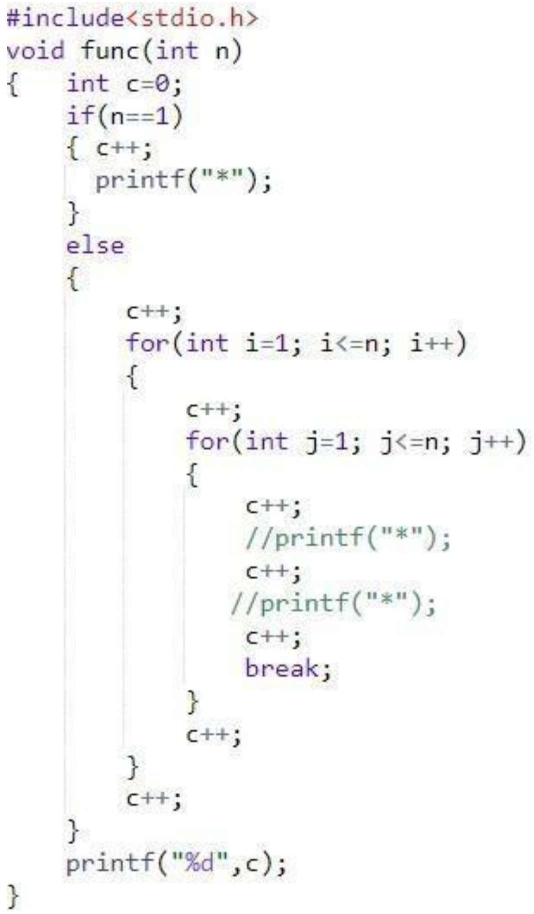
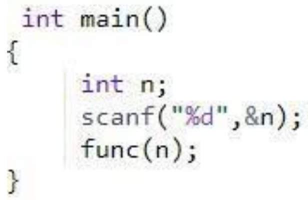
PROGRAM:

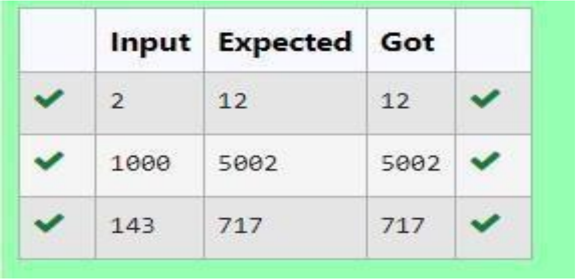


```
#include<stdio.h>
void func(int n)
{   int c=0;
    if(n==1)
    { c++;
      printf("*");
    }
    else
    {
        c++;
        for(int i=1; i<=n; i++)
        {
            c++;
            for(int j=1; j<=n; j++)
            {
                c++;
                //printf("*");
                c++;
               //printf("*");
                c++;
                break;
            }
            c++;
        }
        c++;
    }
    printf("%d",c);
}
```



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

OUTPUT:



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

RESULT:

The above code is executed successfully and gives expected output.

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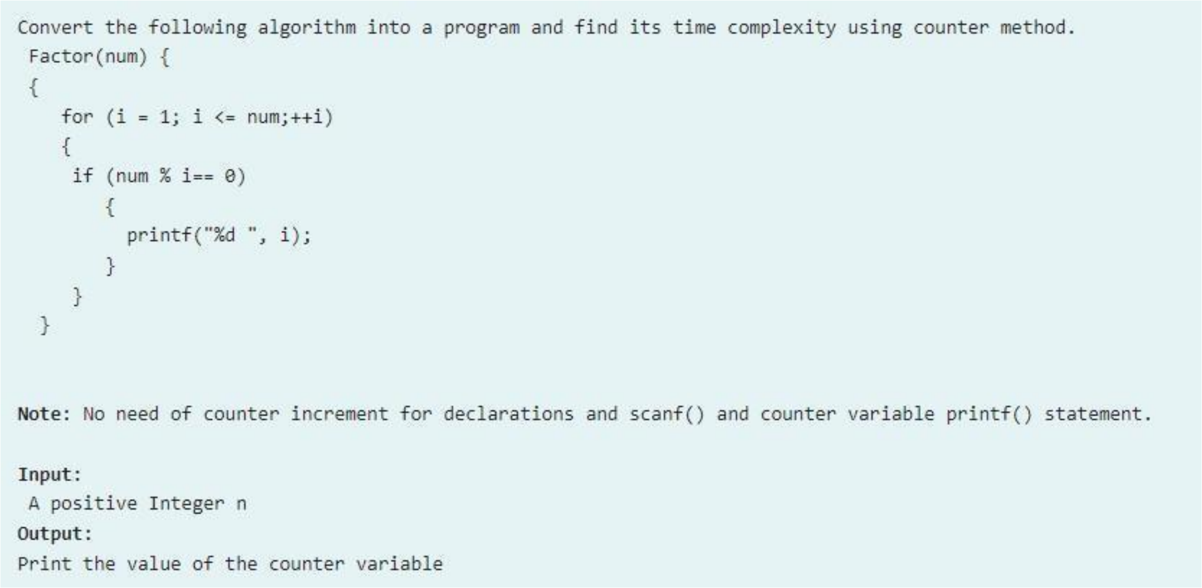
Q:2.C

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: Input the integer n
Step 3: Initialize c to 0 to count operations
Step 4: For each integer i from 1 to n, do Steps 5 to
7 Step 5: Increment c by 1
Step 6: If n is divisible by i (n % i == 0), increment
c by 1 Step 7: Increment c by 1
Step 8: Increment c by 1
Step 9: Print the value of c

Step 10: Stop

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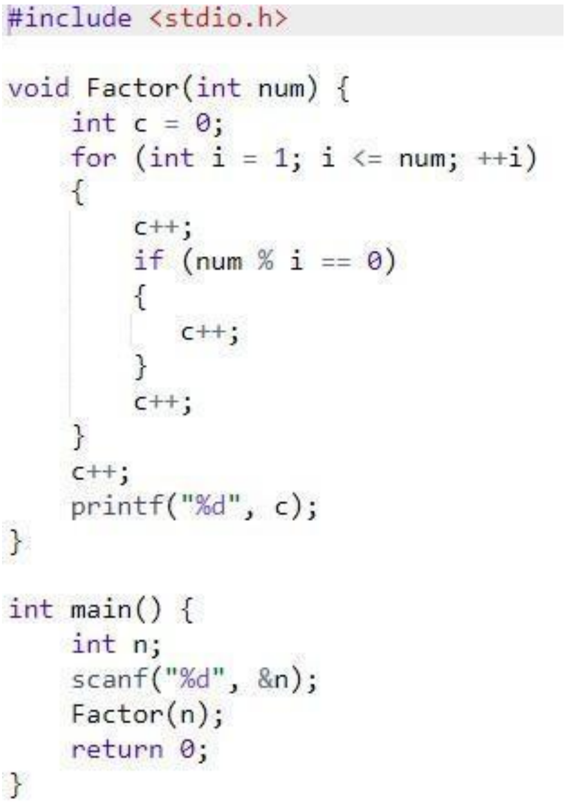
PROGRAM:

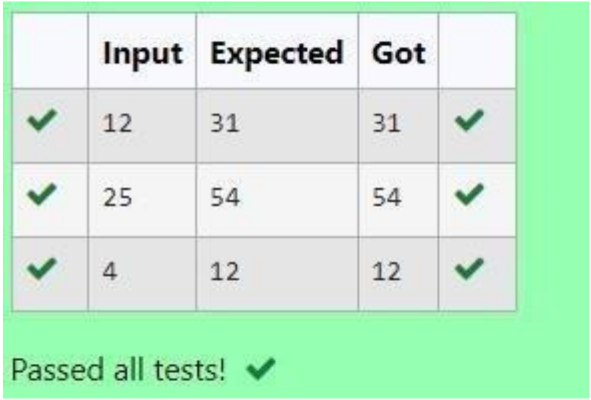


```
#include <stdio.h>

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

int main() {
    int n;
    scanf("%d", &n);
    Factor(n);
    return 0;
}
```

OUTPUT:



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

Passed all tests! ✓

RESULT:

The above code is executed successfully and gives expected output.

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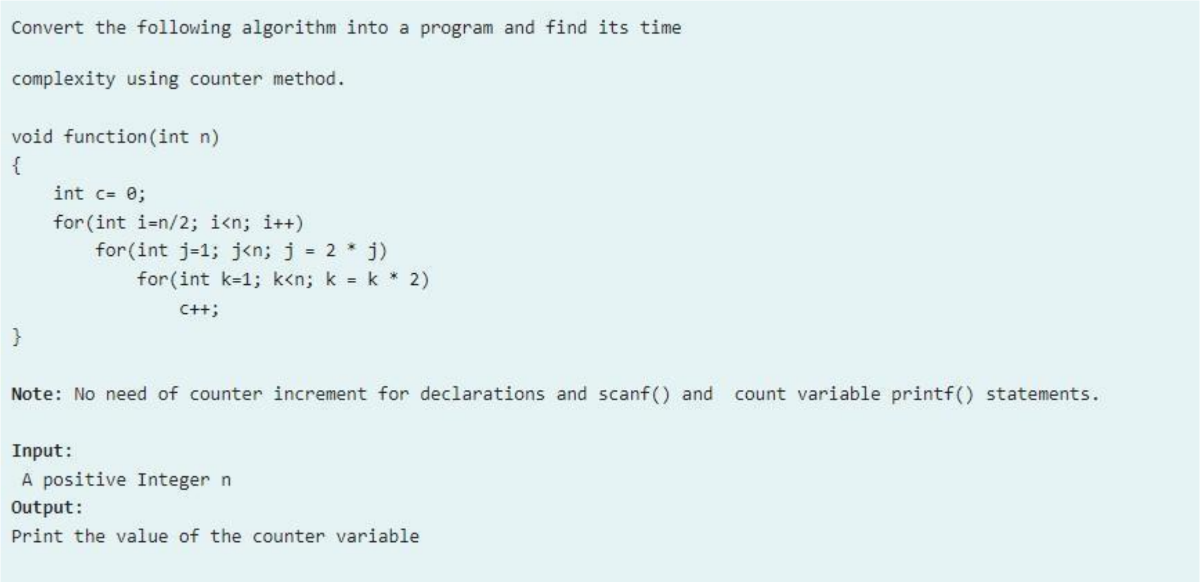
AIM:

QUESTION 2.D



```
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
```

ALGORITM:

Step 1: Start
Step 2: Input the integer n
Step 3: Initialize count to 0 to count
operations Step 4: Initialize c to 0
Step 5: Increment count by 1
Step 6: For each integer i from n/2 to n - 1, do Steps 7 to
9 Step 7: Increment count by 1
Step 8: Initialize j to 1 and while j is less than n, do Steps 8.1 to
8.5 Step 8.1: Increment count by 1
Step 8.2: Initialize k to 1 and while k is less than n, do Steps 8.2.1 to
8.2.4 Step 8.2.1: Increment count by 1
Step 8.2.2: Increment c by 1
Step 8.2.3: Increment count by 1
Step 8.2.4: Multiply k by 2 (k = k
* 2) Step 8.3: Increment count by
1
Step 8.4: Multiply j by 2 (j = j *
2) Step 9: Increment count by 1
Step 10: Increment count by 1
Step 11: Print the value of count
Step 12: Stop

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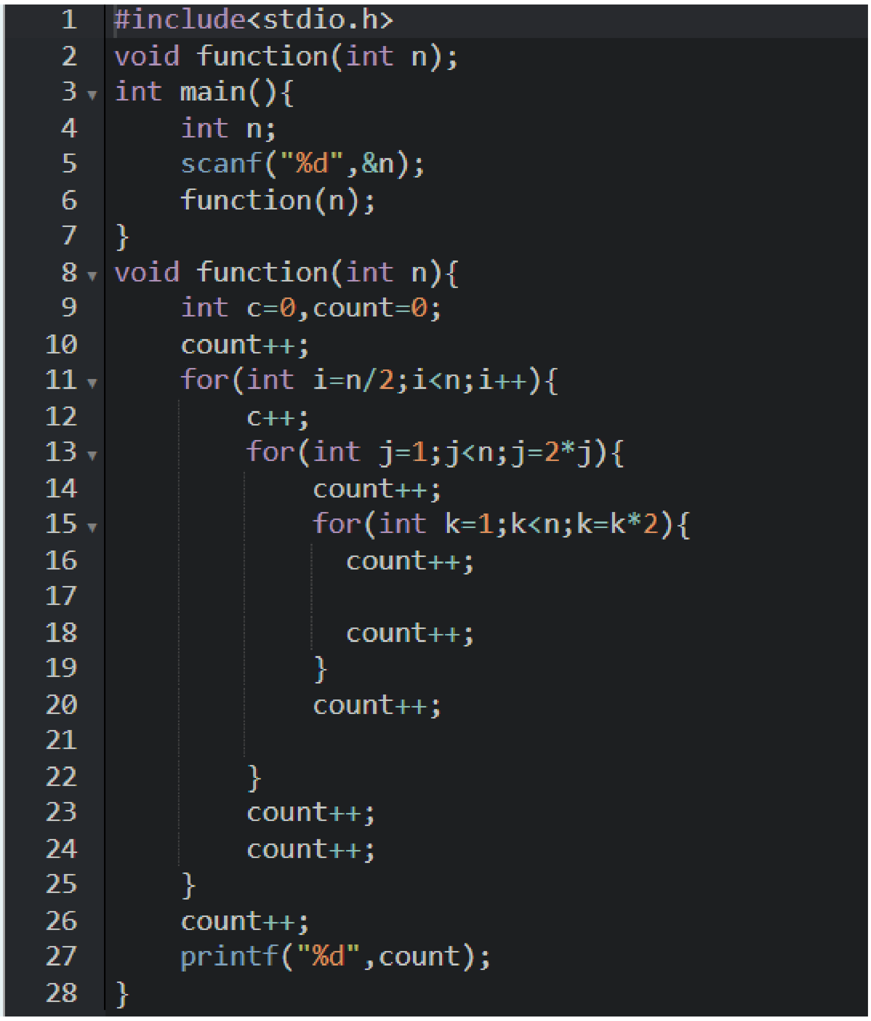
PROGRAM:

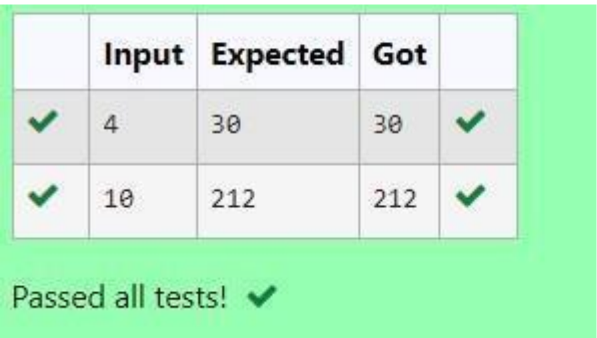


```c
#include<stdio.h>
void function(int n);
int main(){
    int n;
    scanf("%d",&n);
    function(n);
}
void function(int n){
    int c=0,count=0;
    count++;
    for(int i=n/2;i<n;i++){
        c++;
        for(int j=1;j<n;j=2*j){
            count++;
            for(int k=1;k<n;k=k*2){
              count++;

              count++;
            }
            count++;

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

OUTPUT:



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

Passed all tests! ✓

RESULT:

The above code is executed successfully and gives expected output.

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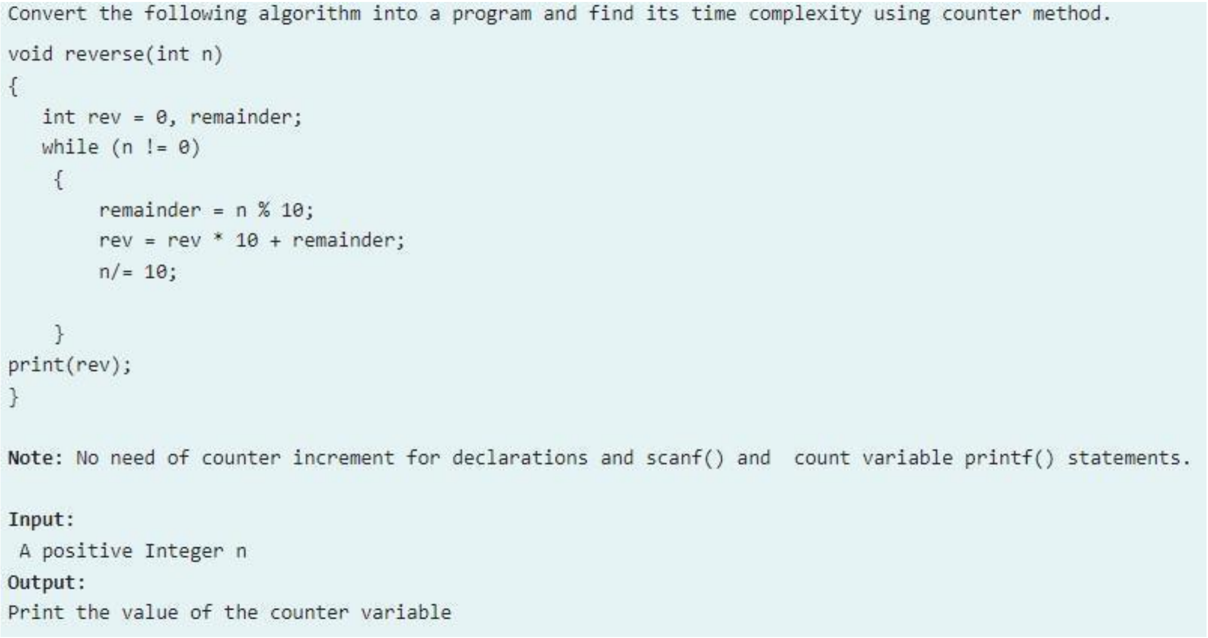
AIM:

QUESTION 2.E



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: Input the integer n
Step 3: Initialize counter to 0 to count operations
Step 4: Initialize rev to 0 and remainder as
unassigned Step 5: Increment counter by 1
Step 6: While n is not equal to 0, do Steps 6.1 to
6.7 Step 6.1: Increment counter by 1
Step 6.2: Calculate remainder as n % 10
Step 6.3: Increment counter by 1
Step 6.4: Update rev to rev * 10 + remainder
Step 6.5: Increment counter by 1
Step 6.6: Divide n by 10 (n /= 10)
Step 6.7: Increment counter by 1
Step 7: Increment counter by 1
Step 8: Increment counter by 1
Step 9: Print the value of counter
Step 10: Stop

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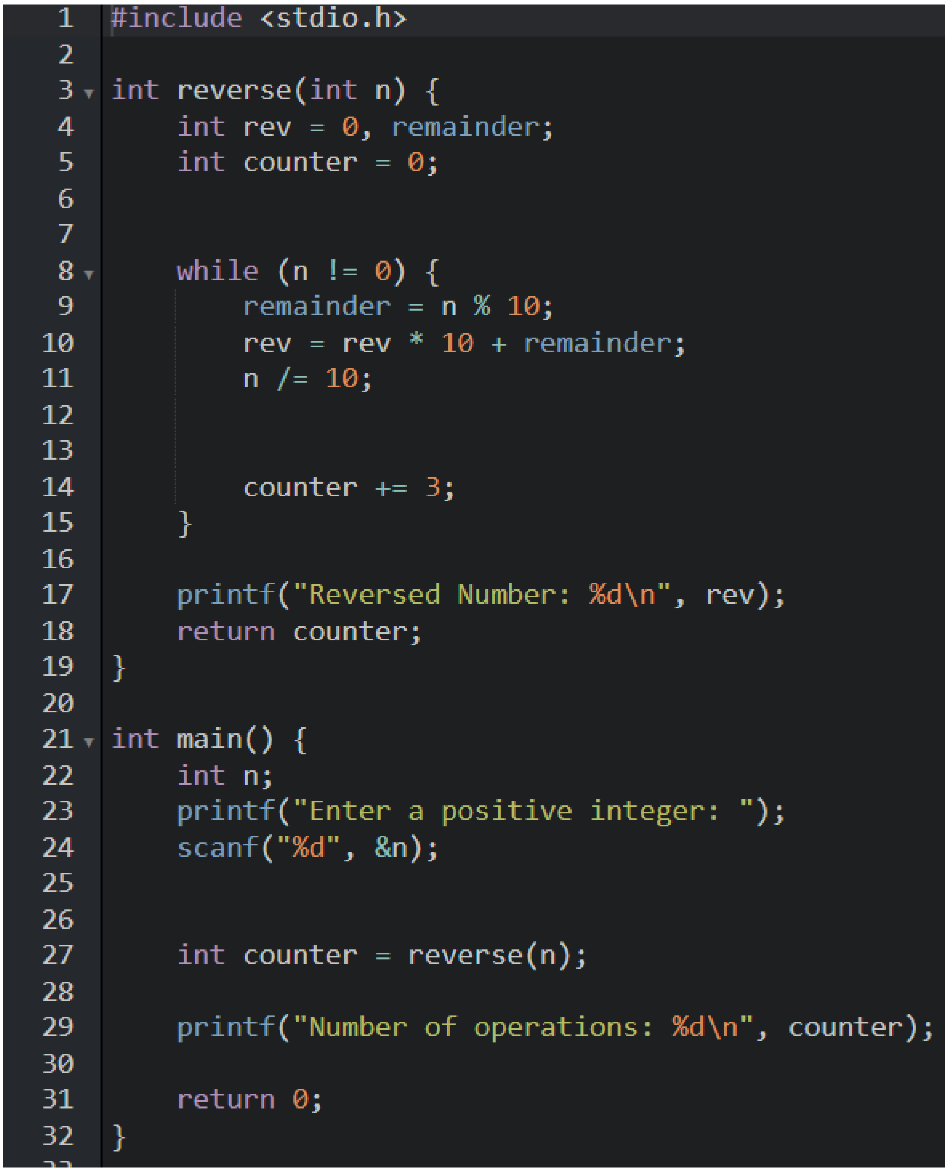
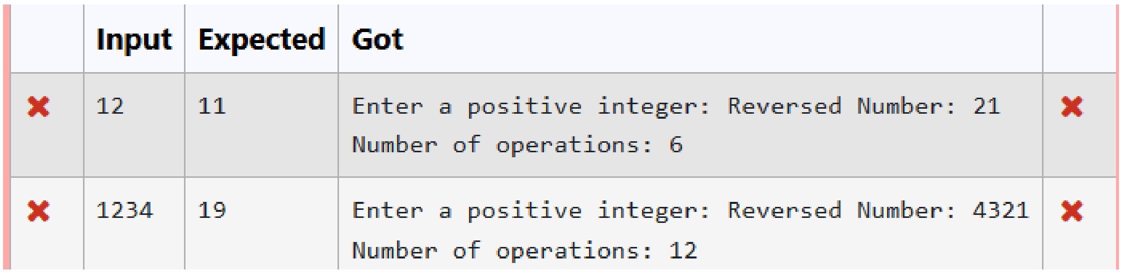
PROGRAM:



```c
#include <stdio.h>

int reverse(int n) {
    int rev = 0, remainder;
    int counter = 0;


    while (n != 0) {
        remainder = n % 10;
        rev = rev * 10 + remainder;
        n /= 10;


        counter += 3;
    }

    printf("Reversed Number: %d\n", rev);
    return counter;
}

int main() {
    int n;
    printf("Enter a positive integer: ");
    scanf("%d", &n);


    int counter = reverse(n);

    printf("Number of operations: %d\n", counter);

    return 0;
}
```

OUTPUT:



	Input	Expected	Got	
✘	12	11	Enter a positive integer: Reversed Number: 21 Number of operations: 6	✘
✘	1234	19	Enter a positive integer: Reversed Number: 4321 Number of operations: 12	✘

RESULT:

The above code is executed successfully and gives expected output.