



Today's agenda

- ↳ factorial
- ↳ nC_r & nP_r
- ↳ functions

→ Zoom class because "Nishant bhaiya" will join at the end

↳ Start at 8:05



AlgoPrep

→ H.W → next class → codes
→ recording

Assign class problems →

↓
pen paper code

↓
Practice for you

H.W

4 $\frac{1}{8}$ hours on your own

↓
Codes / recordings



Q) factorial

↳ Given n , Print factorial of n .

Quiz 1: $\text{fact}(4) = 1 * 2 * 3 * 4 = 24$

$\text{fact}(n) = 1 * 2 * 3 * 4 \dots * n$

// Pseudo code

```
public static void main ( ) {  
    Scanner scn = new Scanner (System.in);  
    int n = scn.nextInt();  
  
    int ans = 1;  
  
    for (int i = 1; i <= n; i++) {  
        ans = ans * i;  
    }  
  
    System.out.println (ans);  
}
```



$n = 4$

```
public static void main ( ) {  
    Scanner scn = new Scanner (system.in);  
    int n = scn.nextInt();
```

ans: ~~1122~~ 24

$i \leq 4$

i	i ≤ n
1	t
2	t
3	t
4	t
5	f

```
    int ans = 1;
```

```
    for (int i = 1; i ≤ n; i++) {  
        ans = ans * i;  
    }
```

```
    System.out.println (ans);  
}
```

6, 24

6, exit



AlgoPrep



// nC_r and nP_r

Quiz 2: ${}^5C_3 \rightarrow \frac{5!}{3!2!} = \frac{120}{6 \times 2} = 10$ | ${}^nC_r = \frac{n!}{r!(n-r)!}$

Quiz 3: ${}^5P_3 \rightarrow \frac{5!}{2!} = \frac{120}{2} = 60$ | ${}^nP_r = \frac{n!}{(n-r)!}$

Q) Given n and r , write an algorithm to calculate nC_r .

\downarrow
 $\frac{n!}{r!(n-r)!}$



AlgoPrep



// Pseudo code

```
public static void main ( ) {  
    Scanner scn = new Scanner (system.in);  
    int n = scn.nextInt();  
    int s = scn.nextInt();
```

```
    int nfact = 1;  
    for (int i = 1; i <= n; i++) {  
        nfact = nfact * i;  
    }
```

```
    int sfact = 1;  
    for (int i = 1; i <= s; i++) {  
        sfact = sfact * i;  
    }
```

```
    int nmrfact = 1;  
    for (int i = 1; i <= n-s; i++) {  
        nmrfact = nmrfact * i;  
    }
```

```
    int ans = nfact / (sfact * nmrfact);
```

```
}
```

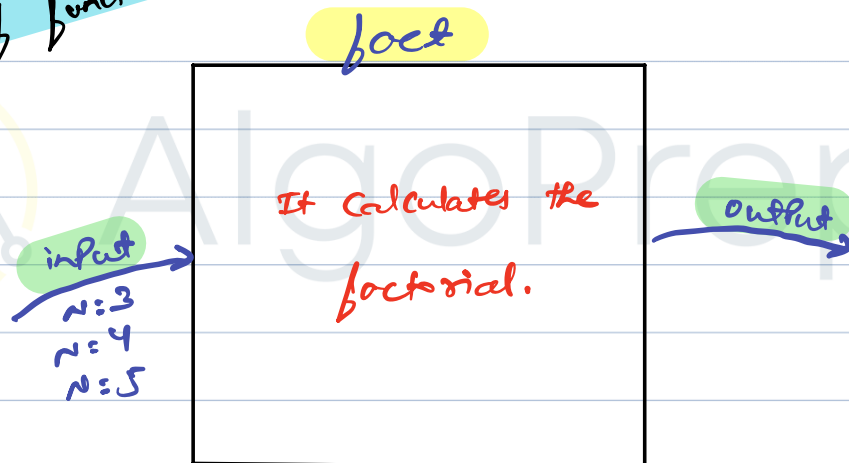


→ **DRY** → Do not Repeat yourself.

↓
function/method

↳ buy **Screwdriver** → open first nut & bolt.
↳ use the **Screwdriver** → open second nut & bolt.
bought **2 hours ago**.

idea of function



Syntax:

Public Static **int** **name** (**input**) {

output type → *function name* → *input*

// Statement 1

// Statement 2

}

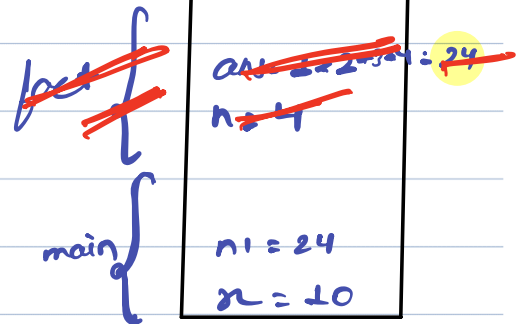


11Pseudo code

```
main() {  
    int n = 10; 24  
    int n1 = fact(4);   
    ↪ system.out.println(n1); → 24  
}
```

call Stack

```
→ public static int fact(int m){  
    int ans = 1;  
    ↪ for (int i = 1; i <= n; i++){  
        ans = ans * i;  
    }  
    return ans;  
}
```



→ Called fact() but there is no function named fact() in the code. → error

→ Break till 9:35 pm



nC_r

```

Public Static void main ( ) {
    Scanner scn = new Scanner (System.in);
    int n = scn.nextInt();
    int r = scn.nextInt();
    int nfact = fact(n);
    int rfact = fact(r);
    int nmrfact = fact(n-r);

    int ans = nfact / (rfact * nmrfact);
    S.o.p (ans);
}

```

~~fact~~

~~fact~~

~~fact~~

main

~~int ans = 1+1+2~~
~~n = 2~~
~~ans = 1+2+3+6~~
~~n = 3~~
~~ans = 1+2+3+4+6+120~~
~~n = 5~~
 nmrfact = 2
 rfact = 6
 nfact = 120
 r = 3
 n = 5
 Scanner scn

```

Public Static int fact (int n) {
    int ans = 1;
    for (int i = 1; i <= n; i++) {
        ans = ans * i;
    }

    return ans;
}

```

$$120 / (6 * 2) = 120 / 12 = 10$$

Q)

```

main ( ) {
    int n = sum (10, 20, 30);
}

```

no output

```

Public Static void sum (int a, int b, int c) {

```

3



Quiz 4:

```
Public Static void main (String[] args) {  
    Product (5, 10);  
}
```

```
Public Static int Product (int5 a, int10 b) {  
    return a * b;  
}
```

~~Product~~

main

~~b = 10~~
~~a = 5~~ → 50

↓
no output

Quiz 5:

```
Public Static void main (String[] args) {  
    int ans = Subtract (5, 10);  
    System.out.println (ans);  
}
```

→ error

```
Public Static void Subtract (int a, int b) {  
    return a - b;  
}
```



Quiz 6:

```
Public Static void main (String[] args) {  
    int n1 = cube(3);  
    ↪ System.out.println (add(n1, cube(2)));  
}  
  
Public Static int add (int a, int b) {  
    ↪ return a + b;  
}  
  
Public Static int cube (int a) {  
    return a * a * a;  
}  
↪ 35
```

add {
 b = 8
 a = 27
 35
}

cube {
 int a = 2
}

main {
 n1 = 27
}