



Today's agenda

↳ factorial

↳  ${}^nC_r$  &  ${}^nPr$

↳ 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



H.W

↳ pen paper code

48 hours on your own

↳ Practice for you

↓  
Codes / recordings



## Q) factorial

Given  $n$ , Print factorial of  $n$ .

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

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

## II) 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);
```

3



$n = 4$

```
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;
```

3

System.out.println(ans);

6,24

ans: ~~1234~~ 24  
 $i \leq 4$

$i \leq n$

1 t

2 t

3 t

4 t

5

b  
exit



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//  ${}^nC_8$  and  ${}^nP_8$

Quiz 2:  ${}^5C_3 \rightarrow \frac{15}{12 \cdot 12} = \frac{120}{144} = 10$  |  ${}^nC_8 = \frac{15}{12 \cdot 12 \cdot 10}$

Quiz 3:  ${}^5P_3 \rightarrow \frac{15}{12} = \frac{120}{2} = 60$  |  ${}^nP_8 = \frac{15}{12 \cdot 10}$

Q) Given  $n$  and  $\sigma$ , write an algorithm to calculate  ${}^nC_8$ .



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$$\frac{15}{12 \cdot 12 \cdot 10}$$



### 11 Pseudo code

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

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

```
    int rfact = 1;  
    for (int i = 1; i <= r; i++) {  
        rfact = rfact * i;
```

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

int ans = nfact / (rfact \* nmrfact);

}



→ DRY → Do not Repeat yourself.

function/method

buy Screwdriver → open first nut & bolt.  
use the Screwdriver → open second nut & bolt.  
Took 2 hours ago.

idea of function

fact

input  
 $n=3$   
 $n=4$   
 $n=5$

It calculates the factorial.

output

Syntax:

Public Static int name ( input ) {

output  
→ type

function  
name  
→

input  
→

// Statement 1

// Statement 2

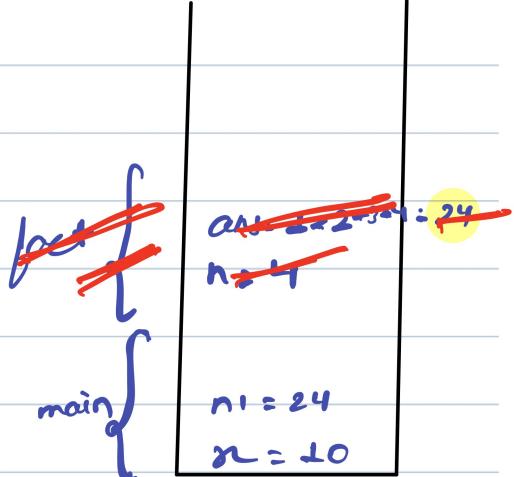
}



## II Pseudo code

### call Stack

```
main() {  
    int n = 10; 24  
    int m = fact(4); ←  
    ↳ System.out.println(m); → 24  
  
→ Public static int fact(int n){  
    int ans = 1;  
  
    for (int i=1; i<=n; i++) {  
        ans = ans * i;  
    }  
    return ans;  
}
```



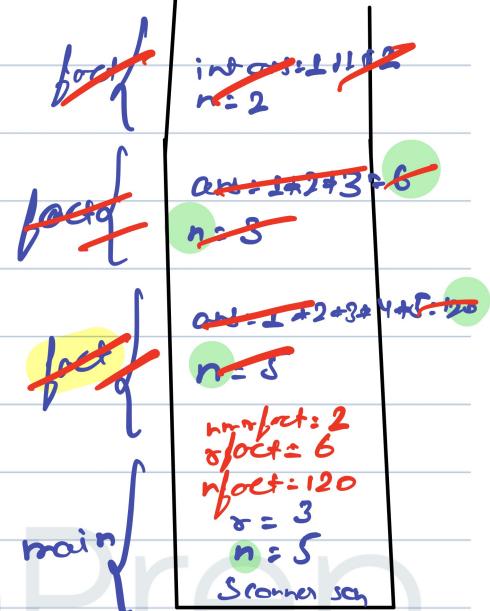
→ Called `fact()` but there is no function named `fact()` in the code. → error

→ Break till 9:35 pm



$nC\sigma$

```
public static void main() {
    Scanner scn = new Scanner(System.in);
    int n = scn.nextInt();
    int r = scn.nextInt();
    int nfact = fact(n);
    int sfact = fact(r);
    int nmrfact = fact(n-r);
    int ans = nfact / (sfact * nmrfact);
    System.out.println(ans);
}
```



$$120 / (6 \cdot 2) = 120 / 12 = 10$$

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

Q) ~~main()~~ <sup>error</sup>  
int ans = sum(10, 20, 30);  
↓  
Public static void sum (int a, int b, int c){  
 → no output

3



Quiz 24:

Public static void main (String[] args) {  
    Product (5, 10);

~~Product~~  
    {

~~b = 10~~  
~~a = 5~~ ↗

3  
Public static int Product (int a, int b) {  
    return a \* b;

~~main~~  
    {

3

↓  
no output

Quiz 25:

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

→ error

3  
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)));  
    ↳ 35  
    ↳ add {  
        ↳ b = 8  
        ↳ a = 27  
        ↳ 35
```

```
    Public static int add (int a, int b) {
```

```
        ↳ return a+b;
```

```
    ↳ 35  
    ↳ int a=2  
    ↳ int b=8
```

```
    Public static int cube (int a) {
```

```
        ↳ return a*a*a;  
        ↳ 27
```

```
    ↳ 27  
    ↳ main {  
        ↳ n1=27
```

↳ 35