$\frac{n!}{(n-r)!}$ $<(n-r)$ → Permutation

$n = 3$

$r = 2$

Combination $\frac{n!}{(n-r)!\,r!}$

$\frac{3!}{(3-2)!\,(2)!} = \frac{3 \times 2 \times 1}{1 \times 2 \times 1} = \frac{3}{1} \Rightarrow (3)$

$\frac{2!}{(2-4)!\,4!} = \frac{2 \times 1}{-2 \times -1 \times 0 \times 1 \times 2 \times 4 \times 3 \times 2 \times 1} = \infty = (0)$

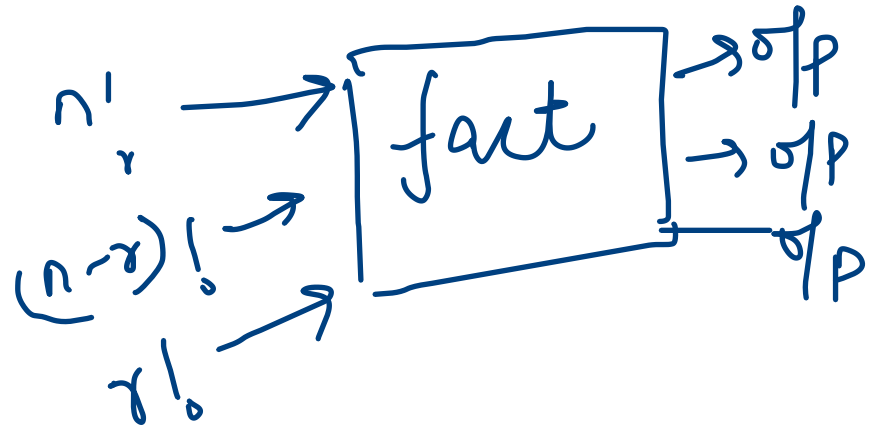
$\frac{n!}{(n-r)!\,r!}$

formula nCr

1) n!

2) (n-r)!

3) r!



1) main

2) factorial

3) nCr

```java
Scanner s = new Scanner(System.in);
int n = s.nextInt();
int r = s.nextInt();

int result = ncr(n, r);
System.out.print(result);

}
// to calculate individual factorial
public static int fact(int n){
    int ans = 1;
    for(int i = 1; i <= n; i++){
        ans *= i;
    }
    return ans;
}

public static int ncr(int n, int r){
    return  fact(n) / (fact(n-r) * fact(r));
}
```

$5C_2$ n = 5, r = 2

ans = 1

i = 1 ≤ 5 T

2 ≤ 5 T

3 ≤ 5 T

4 ≤ 5 T

5 ≤ 5 T

6 ≤ 5 F

1x1 = 1x2x3x4x5 = 120

n = 3

1 ≤ 3 T

2 ≤ 3 T

3 ≤ 3 T

4 ≤ 3 F

1x1x2x3 = 6

n = 2

1x1x2 = 2

120 / 6x2 = 120/12 = 10

fact(n) / (fact(n-r) * fact(r)) → 120 / 6 * 2 → 120

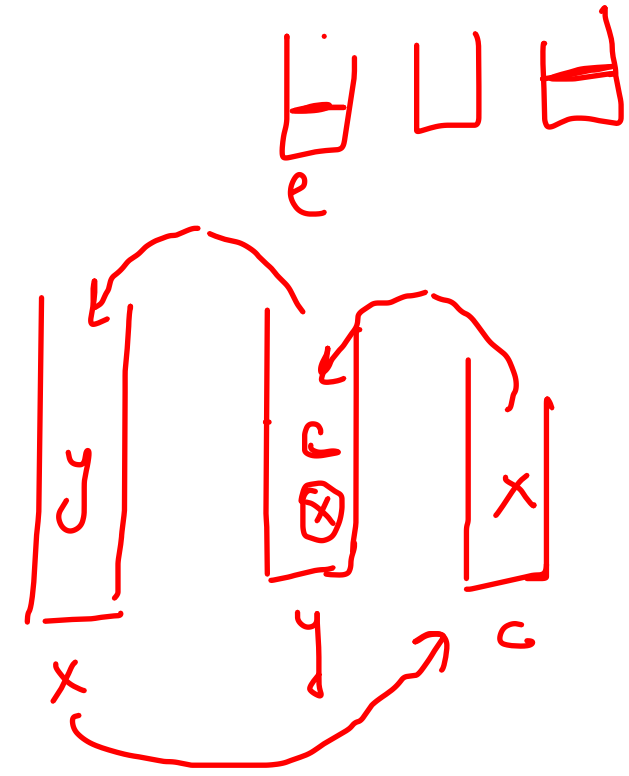
Swap x and y

x = 10
y = 20

→ x = 20
y = 10

→ c = 10 (x)
x = 20 (y)
y = 10 (c)

x = 20
y = 10



c = 20 (y)

i/p
x = 1
y = 2

o/p
x = 2
y = 1

~~x~~ = 10
~~y~~
y = 20

① c =
x = 1 →
y = 2

② c = 1
x =
y = 2

→ ③ c = 1
x = 2
y =

→ ④ c =
x = 2
y = 1

] swap x & y

```java
    Scanner s = new Scanner(System.in);
    int x = s.nextInt();
    int y = s.nextInt();

    swap(x,y);

}

public static void swap(int x, int y){
    int c = x;
    System.out.println("c = " + c);
    x = y;
    System.out.println("x = " + x);
    y = c;
    System.out.println("y = " + y);

     System.out.println("x = " + x);
     System.out.println("y = " + y);
}
```

x = 10
y = 13

c = 10 | x = 15

c = 10 | x = 15

y = 10 | x = 15] o/p
y = 10]

y = 10

HW_Total Salary 2

```java
public static void main(String[] args) {
   Scanner s = new Scanner(System.in);
    int basicSalary = s.nextInt();
    char grade = s.next().charAt(0);

    int totalSalary = totalSalary(basicSalary, grade);
    System.out.println(totalSalary);

}
public static double hra(int basicSalary){
   return 0.20 * basicSalary;
}

public static double da(int basicSalary){
     return 0.50 * basicSalary;
}

public static double allowance(char grade){
    switch(grade){
        case 'A':   // if(grade == 'A')
            return 1700;
        case 'B':  // else if(grade == 'B')
            return 1500;
        default:  // else
            return 1300;
    }
}
```

```java
public static double pf(int basicSalary){
     return 0.11 * basicSalary;
}

public static int totalSalary(int basicSalary, char grade){

    double hra = hra(basicSalary);
    double da = da(basicSalary);
    double allowance = allowance(grade);
    double pf = pf(basicSalary);

    double totalSalary = basicSalary + hra + da + allowance - pf;
    return  (int) Math.round(totalSalary);
}
```