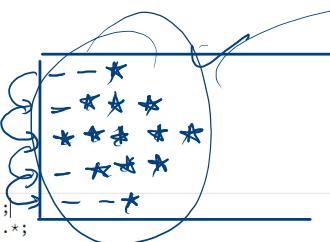
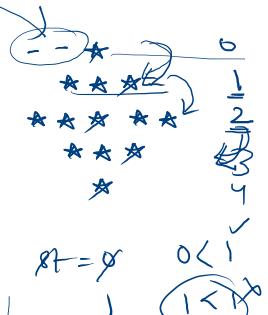


Diamond



```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static void main(String[] args) {
7         Scanner scn = new Scanner(System.in);
8         int n = scn.nextInt();
9         int star = 1;
10        int space = n-1;
11
12        for(int row = 0; row < (2*n-1) ; row++){ //work for 2n-1 times
13            for(int sp = 0; sp < space; sp++){
14                System.out.print(" ");
15            }
16            for(int st = 0; st < star; st++){
17                System.out.print("*");
18            }
19            System.out.println();
20            //update
21
22            if(row < n-1){
23                star += 2;
24                space--;
25            }else{
26                star -= 2;
27                space++;
28            }
29        }
30    }
31 }
32 }
```

$$n=3 \\ nw=5$$



$$star = 1 \\ space = n-1 = 2 \\ 0 < 1 \\ 1 < 2$$

$$3 < 31$$

star = 1
space = n-1 = 2
0 < 1
1 < 2

Pattern 7 - Print a hollow m by n star rectangle.

Sample Input 0

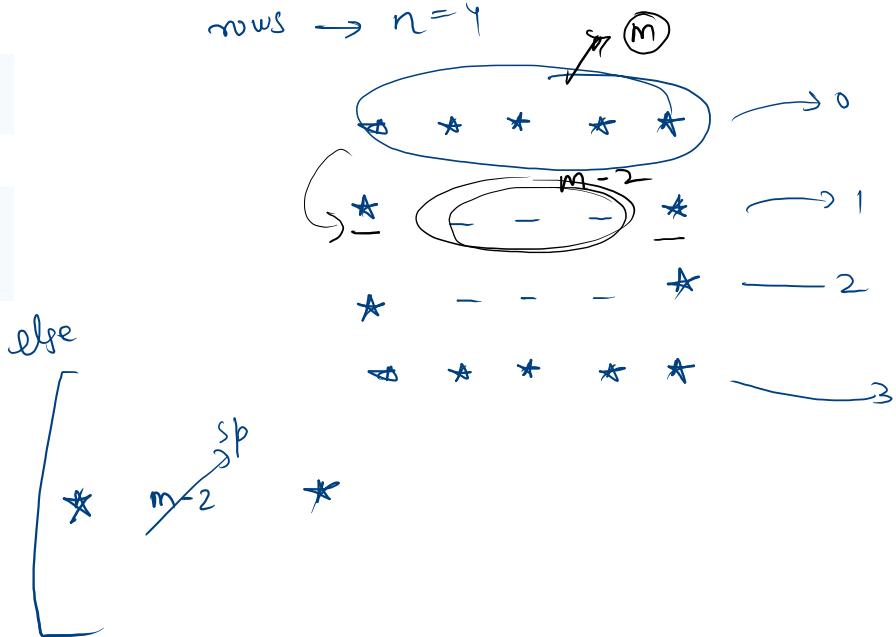


Sample Output 0

```
*****  
* * *  
* * *  
*****
```

$$\text{mws} \rightarrow n = 4$$

if
 $\text{row} = 0$
 $\text{row} = n - 1$ [print m stars.]



$m = 6$

$n = 9$

$$\begin{aligned} n-w &= 0 \\ &= n-1 \end{aligned} \quad \left. \right\} m \text{ stars}$$

0	*	*	*	*	*	*	*		
1	*	-	-	-	-	*	else *	m-2	*

Sample Input 2

6
9

Sample Output 2

```
*****
* *
* *
* *
* *
* *
* *
* *
*****
```

2	*		*			
3	*		*			
4	*		*			
5	*		*			
6	*		*			
7	*		*			
8	*	*	*	*	*	*

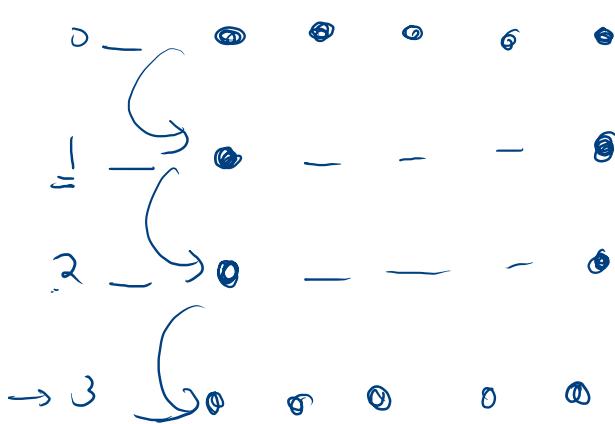
```

1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static void main(String[] args) {
7         Scanner scn = new Scanner(System.in);
8         int m = scn.nextInt();
9         int n = scn.nextInt();
10
11        for(int row = 0; row < n; row++){
12            if(row == 0 || row == n-1){
13                //print m stars
14                for(int st = 0; st < m; st++){
15                    System.out.print("*");
16                }
17            }else{
18                /* m-2 sp */
19                System.out.print("*");
20                for(int sp = 0; sp < m-2; sp++){
21                    System.out.print(" ");
22                }
23                System.out.print("*");
24            }
25        }
26    }
27
28    System.out.println();
29}

```

$$\begin{array}{c} m=5 \\ n=4 \end{array}$$

$$n-1 = 3$$



Pattern 8 - Print a hollow square without top

Sample Input 0

5

$n = 5$

0

*

*

1

*

*

2

*

*

3

*

*

4

*

*

*

*

*

rows $\rightarrow \textcircled{n}$

now $= n-1$

\hookrightarrow n stars

else

\star $n-2$ \star
 sp

```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static void main(String[] args) {
7         Scanner scn = new Scanner(System.in);
8
9         int n = scn.nextInt();
10
11        for(int row = 0; row < n; row++){
12            if(row == n-1){
13                //print n stars
14                for(int st = 0; st < n; st++){
15                    System.out.print("*");
16                }
17            }else{
18                /* n-2 sp *
19                System.out.print("*");
20                for(int sp = 0; sp < n-2; sp++){
21                    System.out.print(" ");
22                }
23                System.out.print("*");
24            }
25
26            System.out.println();
27        }
28    }
29 }
```

Pattern 9 - Square Ladder with top and bottom

$$\left\{ \begin{array}{l} n = 5 \end{array} \right.$$

Take n as an integer input, then

print **n** tab separated stars in the first line,

then in the second line print a star, then **n-2** tabs, then print a star.

then print **n** tab separated stars in the third line.

then in the **fourth** line print a star, then **n-2** tabs, then print a star .

Example: n=5

Pattern will be:



now → even → n star

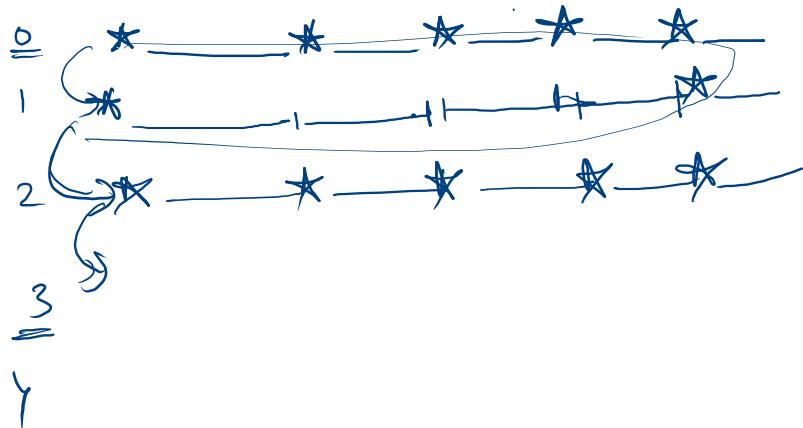
odd \rightarrow ~~n-2~~

17

0	<u>★</u>	-	★	-	★	-	★	-	★
1	★								★
2	<u>★</u>	-	★	-	★	-	★	-	★
3	★								★
4	★	-	★	-	★	-	★	-	★

$$n = 5$$

```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static void main(String[] args) {
7         Scanner scn = new Scanner(System.in);
8         int n = scn.nextInt();
9         for(int row = 0; row < n; row++){
10             if(row % 2 == 0){ // n star
11                 for(int i = 0; i < n; i++){
12                     System.out.print("*\t");
13                 }
14             } else{
15                 System.out.print("*\t");
16                 for(int i = 0; i < n-2; i++){
17                     System.out.print("\t");
18                 }
19                 System.out.print("*\t");
20             }
21         }
22     }
23 }
24 }
```



function.

$$f(x) = x^2$$

{maths}

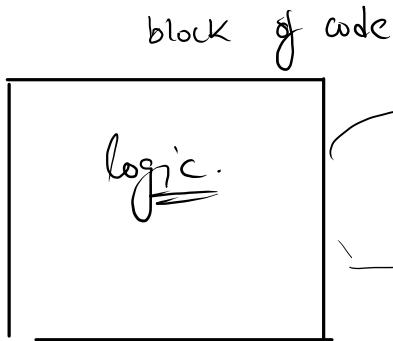
$$f(3) = 9$$

$$f(x, y) = 2x + y$$

$$\begin{aligned} x &= 5 \\ y &= 3 \end{aligned} = 13$$

function

i/p.



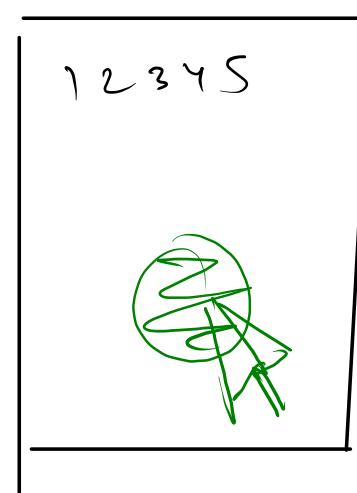
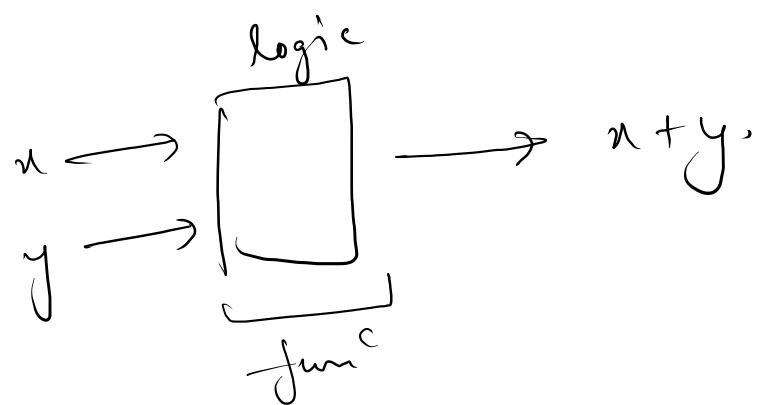
block of code

o/p.

small part of program

particular
task.

function:



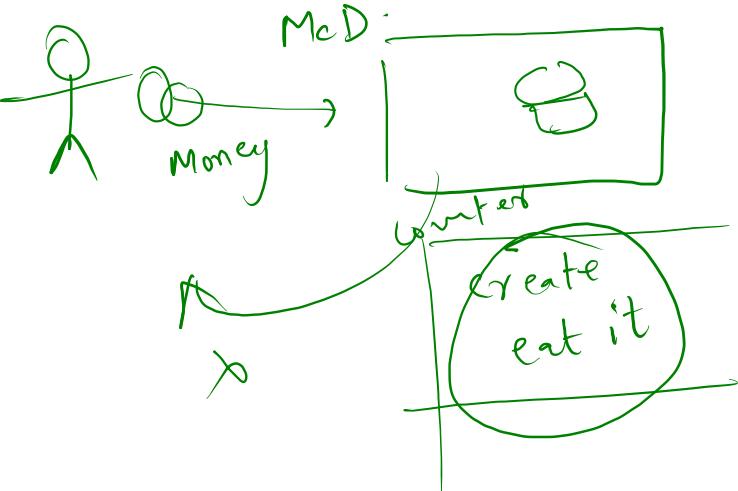
$$5!_6 = 5 \times 4 \times 3 \times 2 \times 1 = \underline{120}$$

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720.$$

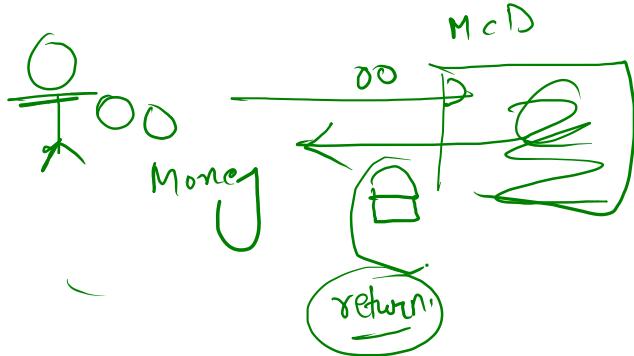
we 5!

```
1
2 public class Main
3 {
4     public static void main(String[] args) {
5         int val = 3;
6         int ans = 1;
7         for(int i = 1; i <= val; i++){
8             ans = ans * i;
9         }
10        System.out.println(ans);
11    }
12 }
13 }
```

void



anything else.



no i/p / void.

```
1 import java.util.*;
2 public class Main
3 {
4
5     public static void mySelf(){
6         System.out.println("Aman");
7         System.out.println("52");
8         System.out.println("Delhi");
9         System.out.println("Pizza");
10    }
11
12
13    public static void main(String [] args){
14        mySelf();
15
16
17    }
18 }
```

no para /int

```
2 public class Main
3 {
4
5     public static int priceOfPen(){
6         return 15;
7     }
8
9     public static void main(String[] args) {
10        int price = priceOfPen();           //price = 10;
11
12
13
14
15        System.out.println("Price in India: " + price);
16        System.out.println("Price in USA: " + (price + 2));
17        System.out.println("Price in China: " + (price-3));
18    }
19
20 }
```

parameters / void.

```
1 import java.util.*;
2 public class Main
3 {
4
5     public static void wishMe(String name){
6         System.out.println("Hi " + name + " I am eating ur burger");
7     }
8
9
10    public static void main(String [] args){
11        Scanner scn = new Scanner(System.in);
12        String s = "Shubham";
13        wishMe(s);
14        wishMe("Nikhil");
15
16
17    }
18
19 }
```

para /int

```
4
5     public static int powerOf2(int n){
6         int ans = 1;
7         for(int i = 0; i < n; i++){
8             ans *= 2;
9         }
10        return ans;
11    }
12
13
14    public static void main(String[] args) {
15        System.out.println(powerOf2(3));
16        System.out.println(powerOf2(5));
17
18    }
19
20 }
```

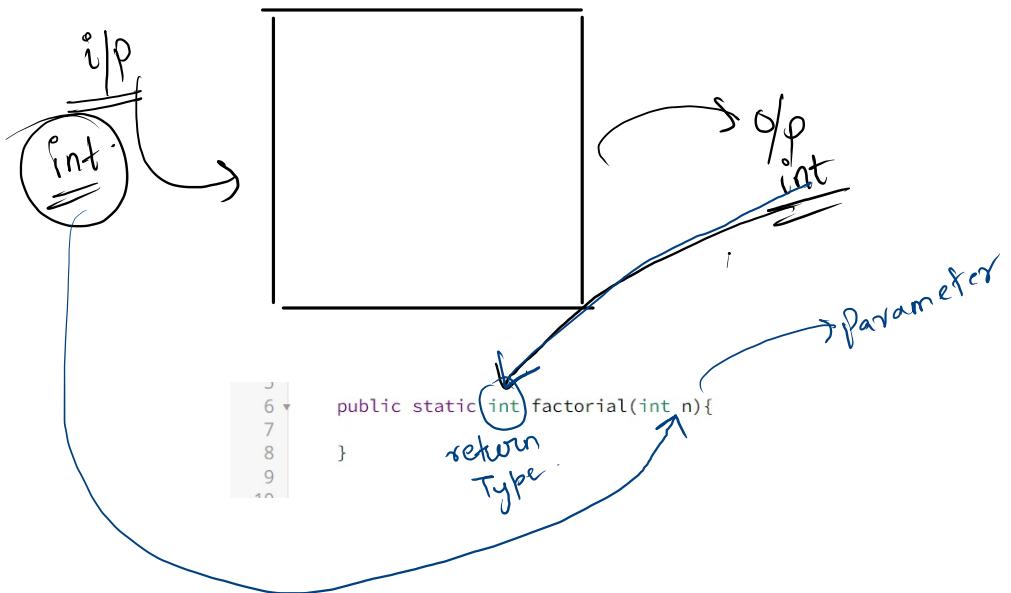
factorial

i/p { n

e.g. $N=3$
 $= 5$

$\rightarrow 6$
 $\rightarrow 120$

int

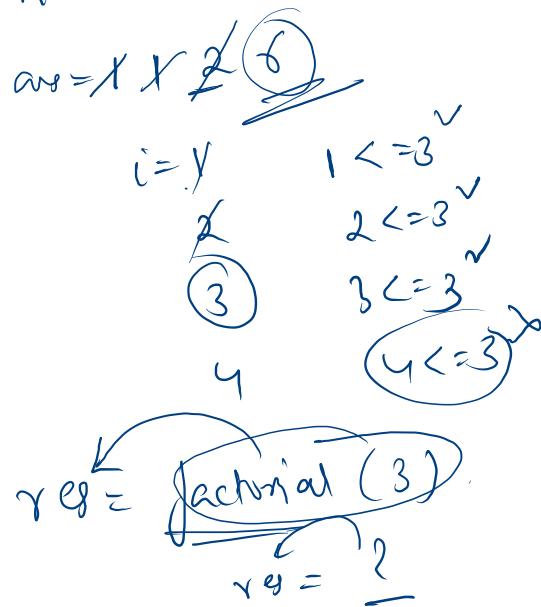


entry pt \rightarrow main

```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static int factorial(int n){
7         int ans = 1;
8         for(int i = 1; i <= n; i++){
9             ans *= i;
10        }
11        return ans;
12    }
13
14
15    public static void main(String[] args) {
16        Scanner scn = new Scanner(System.in);
17        int n = scn.nextInt();
18
19        int res = factorial(n);
20        System.out.println(res);
21    }
22}
```

$y \in \mathbb{R}$

$n = 3$.



```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static long factorial(int n){
7         long ans = 1;
8         for(int i = 1; i <= n; i++){
9             ans *= i;
10        }
11        return ans;
12    }
13
14
15    public static void main(String[] args) {
16        Scanner scn = new Scanner(System.in);
17        int n = scn.nextInt();
18
19        long res = factorial(n);
20        System.out.println(res);
21    }
22 }
```

$$\frac{n!}{r!(n-r)!} = {}^nC_r$$

$$\text{area} = \underline{s * s}$$

Combination.

$${}^n C_r = \frac{n!}{r!(n-r)!}$$

$${}^n C_r = \frac{a}{b \times c}$$

$$a = \text{factorial}(n)$$

$$b = \text{factorial}(r)$$

$$c = \text{factorial}(n-r)$$

```

1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static int factorial(int x){
7         int ans = 1;
8         for(int i = 1; i <= x; i++){
9             ans *= i;
10        }
11        return ans;
12    }
13
14    public static void main(String[] args) {
15        Scanner scn = new Scanner(System.in);
16        int n = scn.nextInt();
17        int r = scn.nextInt();
18
19        int a = factorial(n);
20        int b = factorial(r);
21        int c = factorial(n-r);
22
23        int ans = (a) / (b*c);
24        System.out.println(ans);
25    }
26}
27

```

$$nCr = \frac{n!}{r!(n-r)!} = \frac{5!}{3!2!}$$

$$= \frac{5 \times 4 \times 3!}{3! \times 2!}$$

$$= 10$$

$n = 5$

$r = 3$

$$a = 120$$

$$b = 6$$

$$c = 2 \quad \frac{120}{12} = 10$$

$$\cancel{ans} = \frac{a}{b \times c}$$

$$= 120 / (6 \times 2)$$

Find sum using a function

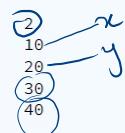
The process goes like:

You have to first take input of two numbers x and y as an integer input.

Wrong - GeeksforGeeks

Then make a function `findSum(int x, int y)`, which takes in these two integers as parameters and prints the final **sum**.

Sample Input 0



Input Format

T will be given as input represents the number of test cases.

For each test case,

x will be given as input in the first line,

y will be given as input in the second line.

Sample Output 0



```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static int sum(int x, int y){
7         return x + y;
8     }
9
10    public static void main(String[] args) {
11        Scanner scn = new Scanner(System.in);
12        int t = scn.nextInt(); //2
13
14        for(int i = 0; i < t; i++){ //2 times
15            int x = scn.nextInt(); // 4 8
16            int y = scn.nextInt(); // 5 2
17
18            int ans = sum(x, y); // find the sum of (4,5) find the sum of (8,2)
19            System.out.println(ans); // 9 10
20        }
21    }
22 }
```

$T=2$

$T_1 \Rightarrow x=10 \quad y=20 \quad 30$

$T_2 \rightarrow x=30 \quad 70$

```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static int factorial(int x){
7         int ans = 1;
8         for(int i = 1; i <= x; i++){
9             ans *= i;
10        }
11        return ans;
12    }
13
14    public static void main(String[] args) {
15        Scanner scn = new Scanner(System.in);
16        int n = scn.nextInt();
17        int r = scn.nextInt();
18
19        int a = factorial(n);
20        int b = factorial(r);
21        int c = factorial(n-r);
22
23        int ans = (a) / (b*c);
24        System.out.println(ans);
25    }
26}
27}
```

Given x and y, print xy

Take x and y digits as integer inputs and then form a number xy from it and then finally print that number.

for eg. if you are given 3 and 4, then you have to form the number 34 from it and then finally print the number 34.

Sample Input 1

```
3  
8  
9  
9  
5  
6
```

i/p

{
 x
 y } int

t = 3

Sample Output 1

```
89  
99  
56
```

$$x = 2 \quad | \quad 26$$
$$y = 6$$

$$x * 10 + y$$

$$2 * 10 + 6$$

$$x = 1$$

$$y = 9$$

$$1 * 10 + 9$$

$$19$$

$$26$$

```
1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5
6     public static int getNumber(int x, int y){
7         return x * 10 + y;
8     }
9
10
11    public static void main(String[] args) {
12        Scanner scn = new Scanner(System.in);
13        int t = scn.nextInt();
14        for(int i = 1; i <=t ; i++){
15            int x = scn.nextInt();
16            int y = scn.nextInt();
17            int ans = getNumber(x, y);
18            System.out.println(ans);
19        }
20    }
21 }
```