

→ ① Solid Square Pattern

$n=4 \rightarrow$

```

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

$n=5 \rightarrow$

```

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

① Find No of rows = 4 \rightarrow Outer loop (Har row pe Jane Keliye)
(Horizontal lines)

② Find No of Cols = 4 \rightarrow Inner loop (Row ke andar Col
ke value ke liye)

③ Analyze Each Row \rightarrow formula / relation / observation i.e. x
print karane
ke liye

Ist row $\rightarrow 4*$

IInd row $\rightarrow 4*$

IIIrd row $\rightarrow 4*$

IVth row $\rightarrow 4*$

Each row

me 4*

print karne

hai

\Rightarrow

yahan $n=4$

Each row me

$n*$ print karne

hai

Ex: To understand more with check below Example

$n=3$

```

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

① $n=3$ - No of rows

② No of cols = 3

③

I - 3* Each row

II - 3* row

III - 3* 3*

②

```
for (int row = 1; row <= n; row++)
```

```
{
```

```
    for (int col = 1; col <= n; col++)
```

```
    {
```

```
        cout << "x";
```

```
    }
```

```
}
```

① row pe ane ke liye row ka loop Uthalta hai

②

Har row value ke liye

col ka

loop chalta hai

③ Jaise hi column ka loop khatam hota hai next line pe aate hai

Formula (Rule)

1/p - n, m, x, y, z (will be mentioned in question)

row → (No of rows)

col → (No of columns)

Analyse Each row → obs / formula / relation

③

② Solid Rectangle Pattern

① $\rightarrow n=3, m=5$

② $\rightarrow \text{row}=3, \text{row}=n$

③ $\rightarrow \text{col}=5, \text{col}=m$

④ Analysis

Ist - 5★
IInd - 5★
IIIrd - 5★

} Each Row me 5★

\rightarrow Har row ke andar

⑤ Outer loop - row pe aane

ke liye C.i.e no of cols)

(1 \rightarrow n)

⑥ Inner loop - row pe aane

ke baad \rightarrow print m★

Col ka loop

Chalta hai

C.i.e no of cols)

1/p \rightarrow n, m

length breadth

n=3
m=5

I * * * * * \leftarrow
II * * * * * \leftarrow
III * * * * * \leftarrow
 $\uparrow \uparrow \uparrow \uparrow \uparrow$

⑤

③ Right angled triangle pattern

Question me $1/p$ $n=5$ diya

L → o/p

*

* *

* * *

* * * *

* * * * *

① $n=5$

② No of rows = 5

③ No of cols = (cols are

varying

in each row)

④ Analysis

Ist row → 1st col

IInd row → 2nd col

IIIrd row → 3rd col

IVth row → 4th col

Vth row → 5th col

row ki value

Outer loop

Inner loop
Each row

No of rows pe dependent
hota hai
i.e $1 \rightarrow n$

row ki value
ke barabar
(cols)

Q) why we are starting from row=1 why cant row=0?
 & cond should be

Ans - for understanding purpose we go for $row=1 \times row \leq n$

- If we want to go with $row=0$ there is no issue.

but we have to use the condition $row < n$ not $row \leq n$

④ Hollow Square Pattern

1/p \rightarrow $n=5$

① $n=5$

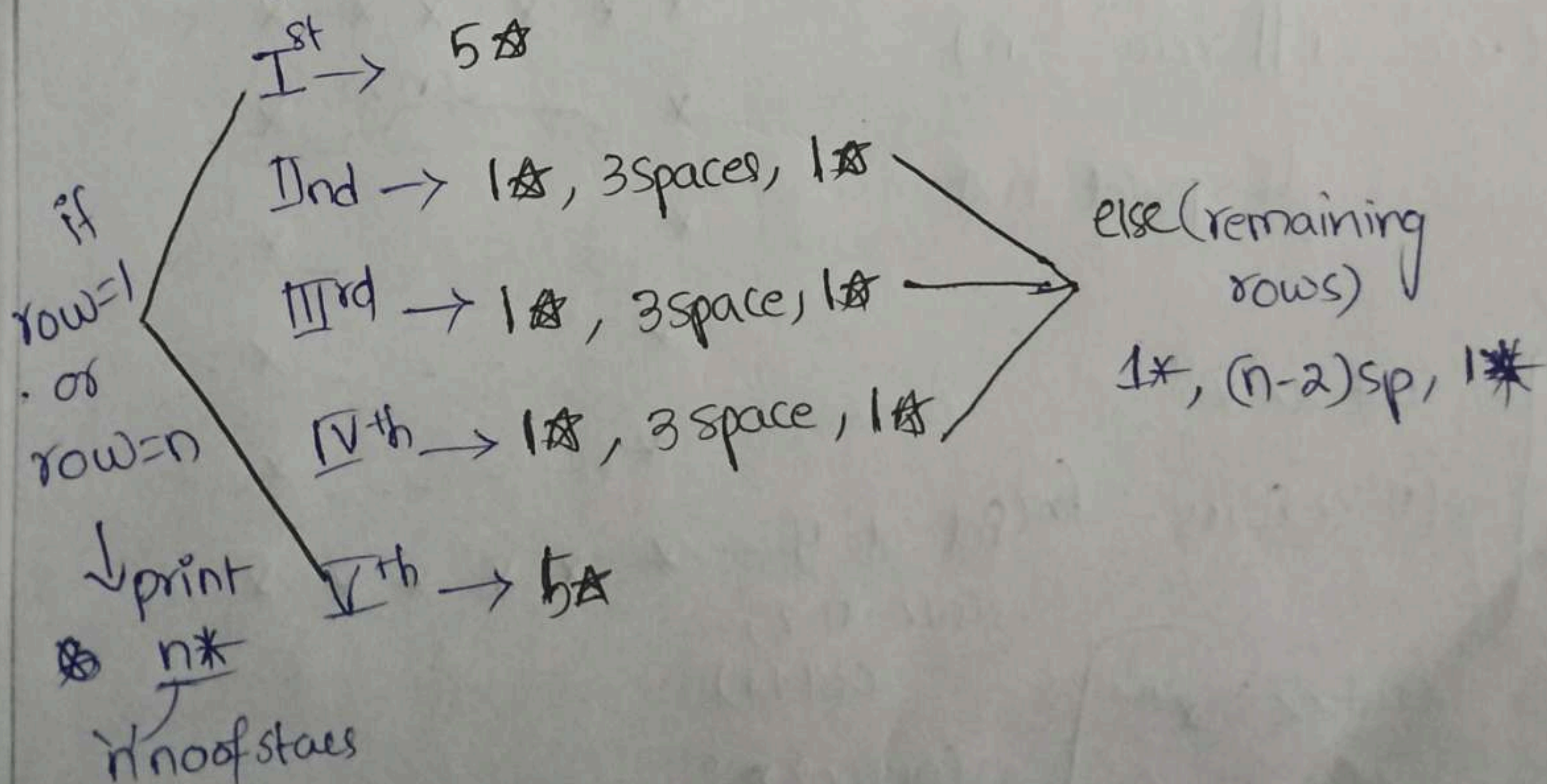
② No of rows = 5 \rightarrow $row=n$

③ No of cols = 5

④ Analysis

```

I   * * * * *
II  (*  - - - *)
III * - - - *
IV  * - - - *
V   * * * * *
    ↑ ↑ ↑ ↑ ↑
  
```



⑥

① $n=8$

② No of rows = 8

③ No of cols = 8

④ Analysis

if (row == 1 || row == 8)

print *

else

→ 1 *
→ (n-2) spaces
→ 1 *

if (row == 1 || row == n)

→ print n *

else

Count < " * "
→ (n-2) stars — for (int col = 1;
col < n-2;
col++)
Count < " * "

row = 1
Ist row → * * * * * * * *
IIrd → * — — — — — *
III → * — — — — — *
IV → * — — — — — *
V → * — — — — — *
VI → * — — — — — *
VII → * — — — — — *
VIII → * * * * * * * *
row = 8

n = 6

* * * * *
* — — — — *
* — — — — *
* — — — — *
* — — — — *
* * * * *

Q1

Stackeliye for (int col=1 \rightarrow \angle =n)

Spacekeliye for (int col=1 \rightarrow \angle =n-2)

Q) Why we use \oplus endl outside of if-else?

Ans If we want to use endl we have to use endl in both.

→ Hollow Rectangle Patten

① $n=4, m=6$

② No of rows = 4 \rightarrow rows = n

③ cols = 6 \rightarrow col = m

④ Analysis

row=1 \rightarrow Ist row \rightarrow 6*

row=2 \rightarrow IInd row \rightarrow 1*, 4sp, 1*

row=3 \rightarrow IIIrd row \rightarrow 1*, 4sp, 1*

row=4 \rightarrow IVth row \rightarrow 6*

Ist row & IVth row = m*

IInd & IIIrd row = 1*, (m-2)sp, 1*

I/P
 $n=4$ $m=6$
| |
length breadth

O/P

```

* * * * *
* - - - - *
* - - - - *
* * * * *
  
```

$n=4$
 $m=6$

8

Q) why we are using $col=1$ as 1^{st} already there on 1^{st} column

Sol • $col=1$ $col < (m-2)$ $col++$ dont relate this column

It is about loop which runs $(m-2)$ times.

• If we want we can use $col=2$ and condⁿ should be

$col < (m-2)$.

(you can check it)

• If we want we can use $col=0$ and condⁿ should be $col < (m-1)$. at the end the loop runs no of times matters.

(Note: if you are getting confused then use 'i' instead of col)

Hollow Right angled triangle.

$n=8$

```

*
* *
*  *
*   *
*    *
*   *
*    *
*   *
*    *
*   *

```

$n=5$

```

O/p 1st - * - NO sp
2nd - * * - NO sp
3rd - * - *
4th - * - - *
5th - * * * * - NO sp

```


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- ① $n = 5$
- ② No of rows = 5
- ③ No of cols = (vary)
- ④ Analyze

row = 1 \rightarrow Ist - 1*

row = 2 \rightarrow IInd - 2*

row = 3 \rightarrow IIIrd - 1*, 1sp, 1*

row = 4 \rightarrow IVth - 1*, 2sp, 1*

row = 5 \rightarrow Vth - 5*

1, 2, n y are not middle rows

if (row == 1 || row == 2 || row == n)

print *

else

middle row Logic { print 1*
for (col = 1; col <= row - 2; col++) print " "
print 1* } (-2 means Subtracting 2 stars)

Rightangle Δ 's Logic :

for (int row = 1; row <= n; row++)

{
for (int col = 1; col <= row; col++)

{
cout << " * ";

}
cout << endl;

}

⑩

①

→ Inverted Right Angled triangle

1/p → n=5

① n=5

② No of rows = 5

③ No of cols = (vary)

④ Analysis

$\left\{ \begin{array}{l} \text{I} - * * * * * \\ \text{II} - * * * * \\ \text{III} - * * * \\ \text{IV} - * * \\ \text{V} - * \end{array} \right.$

n=5 row=1 → Ist Row - 5*

n=5 row=2 → IInd Row - 4*

n=5 row=3 → IIIrd Row - 3*

n=5 row=4 → IVth Row - 2*

n=5 row=5 → Vth Row - 1*

$n - \text{row} + 1$

$5 - 1 + 1$
 \downarrow
 row no

$4 + 1$
 $= 5*$

for each row → * — (n - row + 1) times

* When we define any formula we have to apply & check on each

row if it^{is} giving right answer we can use that

formula on code.

⑪

⑧

Solid Pyramid Pattern

① $n=5$

② No of rows = 5

③ No of cols = (vary)

④ Analysis

```

I  - - - - *
II - - - * * *
III - - * * * *
IV - * * * * *
V * * * * *
  
```

$n=5$ row = 1 - Ist - 4 spaces, 1*

$n=5$ row = 2 - IInd - 3 spaces, 3*

$n=5$ row = 3 - IIIrd - 2 spaces, 5*

$n=5$ row = 4 - IVth - 1 space, 7*

$n=5$ row = 5 - Vth - 0 space, 9*

States all are in odd numbers
- General Expression of
odd number = $(2n-1)$,
 $(2n+1)$

$(n - \text{row})$

$(2 \times \text{row} - 1)$
is getting suitable

- Cross verify the formula

$$2 \times 1 - 1 = 1*$$

$$2 \times 2 - 1 = 3*$$

$$2 \times 3 - 1 = 5*$$

$$2 \times 4 - 1 = 7*$$

$$2 \times 5 - 1 = 9*$$

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→ Solid Pyramid Pattern ✓

Q) why we are adding space everytime?

Ans:

Because we have to add space while printing because

Question dependent

Ex: cout << " * " but In question

So we have to print like

cout << " * " "

* * *
* * *
* * *
↓
here space
three.

→ Inverted Solid Pyramid Pattern:

① n=5

1/p → n=5

② No of rows = 5

↳ o/p

③ No of cols = (vary)

④ Analysis

n=5 → row=1 - 1st Row - 0sp, 9*

n=5 → row=2 - 2nd Row - 1sp, 7*

n=5 → row=3 - 3rd Row - 2sp, 5*

n=5 → row=4 - 4th Row - 3sp, 3*

n=5 → row=5 - 5th Row - 4sp, 1*

* * * * *
- * * * *
- - * * *
- - - * *
- - - - *

(3)

formula for spaces = $(\text{row} - 1)$ by seeing pattern

formula for stars = $(2n - [2\text{row} - 1])$

$(2n - 2\text{row} + 1)$

number
- odd expression can be written as $(2n-1), (2n+1)$

Q How to find formula of any pattern?

Ans: Hit and trial, observation

(10)
→ Number Triangle pattern

$n=4$ C/P
→ O/P

- It is looking like

Right Angled
Triangle.

*
* *
* * *
* * * *

1
2 2
3 3 3
4 4 4 4

- Whenever given these type of patterns instead of '*'

① forget ~~the~~ ~~the~~ ~~the~~ ~~the~~ & consider * only present

② The logic is ~~row~~ $L = \text{row}$

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Rules

① $n=4$

② No of rows = 4

③ No of cols = vary

④ Analysis

for star

for ~~row~~ (value)

$n=4$ - Row = 1 - Ist Row - 1*

① 1 time

$n=4$ - Row = 2 - IInd Row - 2*

② 2 times

$n=4$ - Row = 3 - IIIrd Row - 3*

③ 3 times

$n=4$ - Row = 4 - IVth Row - 4*

④ 4 times

$\text{col} = \text{row}$

Instead of * \rightarrow print the number.

① \rightarrow Floyd's Triangle

I/p $\rightarrow n=4$
 \rightarrow o/p

I - 1

II - 2 3

III - 4 5 6

IV - 7 8 9 10

① $n=4$

② No of rows = 4

③ No of columns = (vary)

B1 Analysis

		Structure (Assume size)	Value
$n=4$	Row=1 - I st Row	1*	1
$n=4$	row=2 - II nd Row	2*	2 3
$n=4$	row=3 - III rd Row	3*	4 5 6
$n=4$	row=4 - IV th Row	4*	7 8 9 10

$col = row$

- Take a count variable & increment it after printing

int count = 1

for (int row=1; row<=n; row++)

{

for (int col=1; col<=row; col++)

{

cout << count << " ";

count++;

}

cout << endl;

}