

# NESTED LOOPS:

## Agenda :

- ↳ Nested loops
- ↳ Pattern questions
- ↳ Iteration protocols
- ↳ GCD
- ↳ LCM

Same ↙ GCD = Greatest Common Divisor  
↖ HCF = Highest Common factor

2 : 1 2  
4 : 1 2 4

Ans = 2

$$\begin{array}{ccc}
 \begin{array}{c} \text{prime} \\ \curvearrowright \end{array} & \begin{array}{c} 7 \\ 11 \end{array} & : \begin{array}{c} 1 \\ 1 \end{array} \begin{array}{c} 7 \\ 11 \end{array} \\
 & \curvearrowright & \text{prime}
 \end{array}$$

$$\text{Ans} = 1$$

# Co-primes have 1 as GCD

$$\begin{array}{ccc}
 \begin{array}{c} 6 \\ 8 \end{array} & : & \begin{array}{c} 1 \\ 1 \end{array} \begin{array}{c} 2 \\ 2 \end{array} \begin{array}{c} 3 \\ 4 \end{array} \begin{array}{c} 6 \\ 8 \end{array}
 \end{array}$$

$$\text{Ans} : 2$$

$$\begin{array}{ccc}
 \begin{array}{c} 5 \\ 10 \end{array} & : & \begin{array}{c} 1 \\ 1 \end{array} \begin{array}{c} 5 \\ 2 \end{array} \begin{array}{c} 5 \\ 5 \end{array} \begin{array}{c} 10 \end{array}
 \end{array}$$

$$\text{Ans} : 5$$

$$\begin{array}{ccc}
 \begin{array}{c} 17 \\ 51 \end{array} & : & \begin{array}{c} 1 \\ 1 \end{array} \begin{array}{c} 17 \\ 3 \end{array} \begin{array}{c} 17 \\ 17 \end{array} \begin{array}{c} 51 \end{array}
 \end{array}$$

$$\text{Ans} : 17$$

## # Observations

- i) Find factors
- ii) Find common common factors
- iii) Find Highest

# Highest GCD can only be min. of these numbers

## Factors :

$n = 10$

for i in range(1, n):

if  $n \% i == 0$ :  
print(i)

$m = 5$

## common factor :

if  $n \% i == 0$  and  $m \% i == 0$ :

# then this is a common factor

★ Common factors are going to be in  
range : 1, 2, 3, 4, 5

range : 5, 4, 3, 2, 1

factors of

6 : 1, 2, 3, 6

8 : 1, 2, 4, 8

6	:	it is C.F of both	✗
5	:	" " "	✗
4	:	" " "	✗
3	:	" " "	✗
2	:	" " "	✓
1	:		

LCM : Lowest Common Multiple

2	:	2, 4, 6, 8, 10, ...
4	:	4, 8, 12, ...

Ans : 4

3 : 3, 6, 9, 12 . . . ,  
4 : 4, 8, 12

⇒ max. possibility of LCM :  $n \times m$

Formula :

$$\text{LCM} \times \text{HCF} = A \times B$$

$$\text{LCM} = \frac{A \times B}{\text{HCF}}$$