90623-95123 P/C .. Aug 3, 2023

$103! \rightarrow (1.2.3 \ldots\ldots 102.103)$

en Highest Power of 2 in this expansion.

$7! \rightarrow 1.2.3.4.5.6.7$

$= 2.\ 2^2.\ (2.3)$

$1+2+1 \Rightarrow 4$

$^nC_0 \quad ^nP_r$

Birthday invitation of a ~~wiser~~ .. (Company)..

$13! \rightarrow 1.2.3.4.5.6.7.8.9.10.11.12.13$

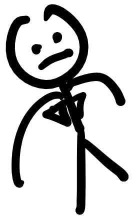
$2^2 \quad 2^2 \quad 2 \quad 2^3 \quad 2 \quad 2.2.$

$1+2+1+3+2+1 \rightarrow 10$

$\left[\frac{13}{2}\right] + \left[\frac{13}{2^2}\right] + \left[\frac{13}{2^3}\right] + \cancel{\left[\frac{13}{2^4}\right]}$

$= 6+3+1 = 10$

P/C + N.T. + Binomial Th



$100 \to 10$

${}^{100}C_{10}$ ways

10 → finalised

8 Avg

5

$${}^{10}C_{10} + {}^{10}C_9 + {}^{10}C_8 + \dots + {}^{10}C_1 + {}^{10}C_0$$

$$= \frac{10!}{10!\,0!} + \frac{10!}{9!\,1!} + \frac{10!}{2!\,8!} + \frac{10!}{\quad} \dots$$

$$= (2^{10} - 1)$$

$${}^nC_1 + {}^nC_2 + \dots + {}^nC_n = 2^n - 1$$

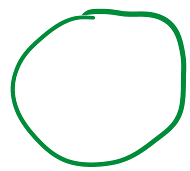
$${}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n = 2^n$$

What happens If only even or only odd

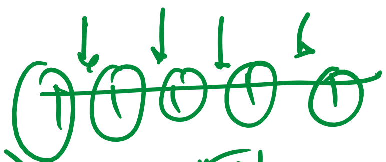
$n$ = Even

${}^nC_1 + {}^nC_3 + \dots + {}^nC_{n-1}$ ?

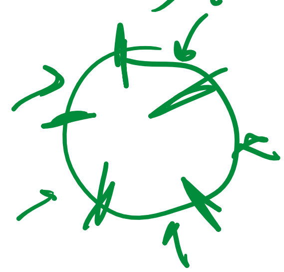
${}^nC_0 + {}^nC_2 + \dots + {}^nC_n$ ? $n$ Even



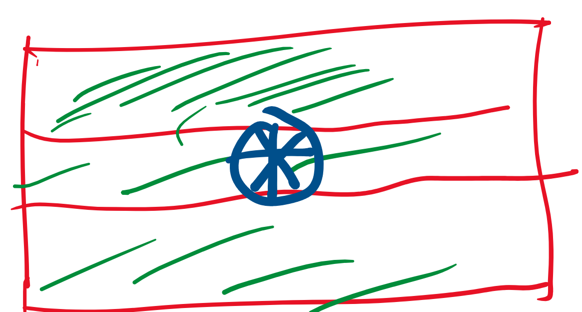
Counting Mechanism (Start Grouping)



$5!$

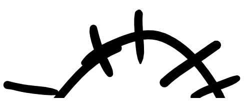


$(5-1)!$
$\Rightarrow 4!$

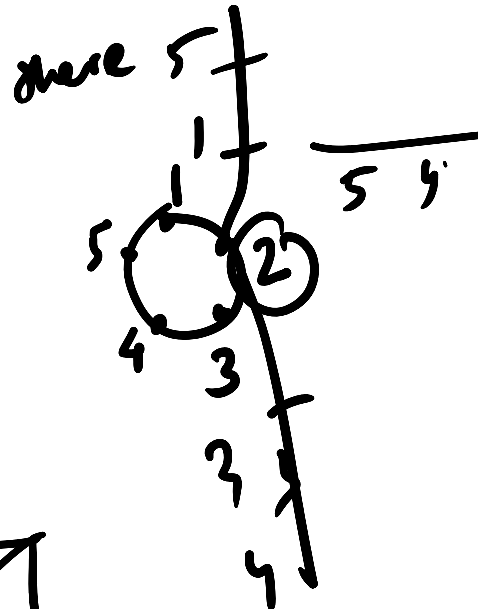



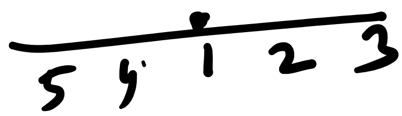
Any 1 Position has to be kept fixed

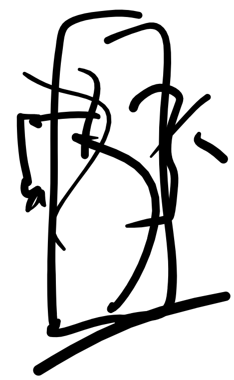
Why?? Because for a Circle

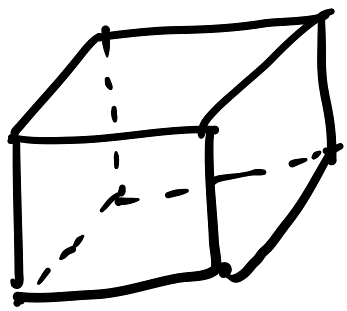


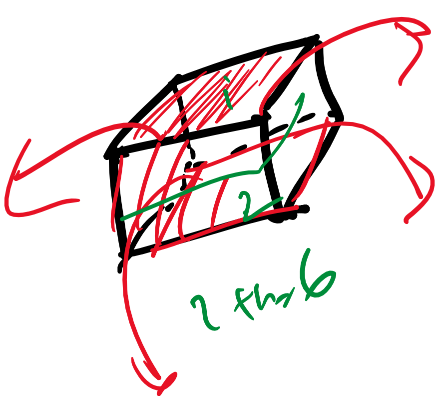
why:. Because for ...

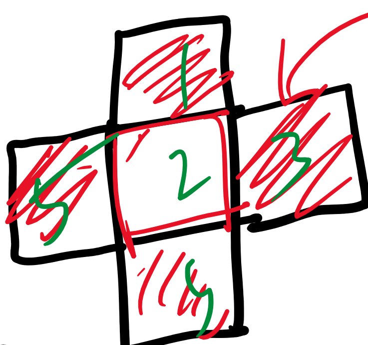









Is it Correct ?!

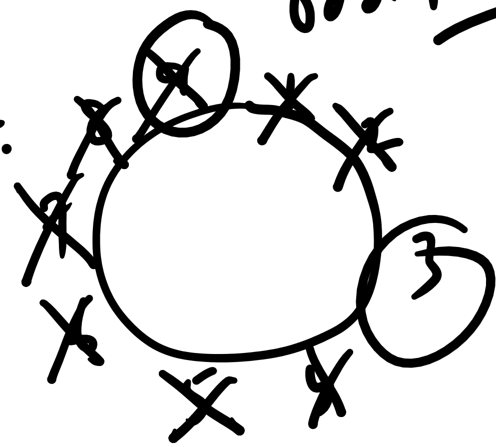
Here Top part is missing

For Surface area Calculations also 1 Side is missing..

Odd Thing

Survival Game...

odd turn



Round 1 → odd

$\frac{73-1}{2}$

1 ⇒ 36

2 18

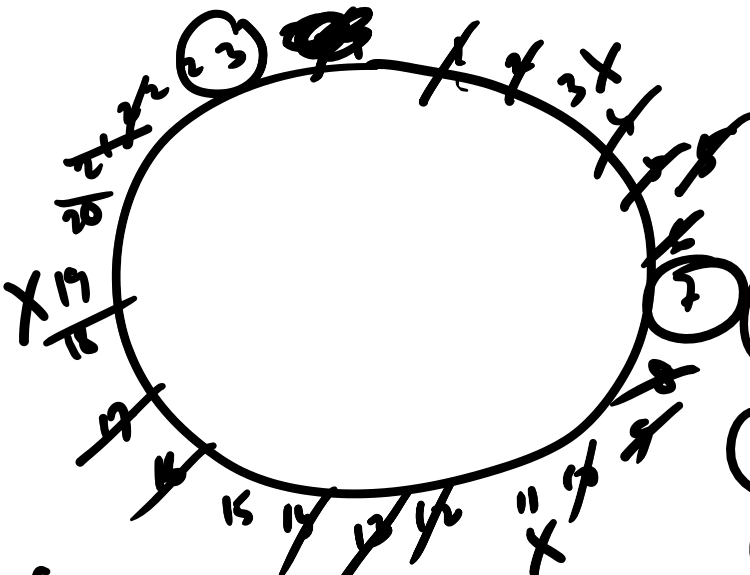
3 9

4 5

5 3

6 2

7 1



6 7 8 11

2 2, 4, 6 ... 22

6 $2^2$ 1, 5, 9, 13, 17, 21,

3 $2^3$ 3, 11, 19,

2 $2^4$ 7, 23

1 11, $2^5+11$

HW

Hw

x6 3x

5 4x

Find the mechanism for Even Odd Case

1 2 - - - 26

3rd round ??

Useful functions

1 2 3

$$^nC_0 + {}^nC_2 + {}^nC_4 + \cdots = {}^nC_1 + {}^nC_3 + \cdots + {}^nC_{n-1} = 2^{n-1}$$

# $^{2n+1}C_0 + {}^{2n+1}C_1 + {}^{2n+1}C_2 + \cdots + {}^{2n+1}C_n = 2^{2n}$

# $^nC_n + {}^{n+1}C_n + {}^{n+2}C_n + {}^{n+3}C_n + \cdots + {}^{2n-1}C_n$

$+ n + {}^{3}C_n + \dots$

$= 2^n C_{n+1}$

If the total solution can be a variable then we can proceed...

$10 \to 9$

$10 \to 8 \dots$

$2^n$

$nC_0 + nC_2 + nC_4 + nC_6$

Bollywood → gf/wife kidnap

Bollywood → Son/Daughter

father

mother

# Divisors Game

$N = p_1^{\alpha_1} p_2^{\alpha_2} p_3^{\alpha_3} \dots p_n^{\alpha_n}$

$N = p_1^{\alpha_1} p_2^{\alpha_2} p_3 \ldots p_n$

$p_1, p_2 \ldots \to$ prime

$\boxed{\text{total divisors}}$ $(\alpha_1+1)(\alpha_2+1)(\alpha_3+1)\ldots(\alpha_n+1)$

$450 \to 5 \cdot 90$

$\to 5 \cdot 5 \cdot 18$

$\to 5^2 \cdot 3^2 \cdot 2$

One plus

$1+1 \to 2$

$1+$

$1+2 \Rightarrow 3$

$1+10 \to$

$450 \to 5^2 \cdot 3^2 \cdot 2^1$

$\to (2+1)(2+1)(1+1)$

$\to \boxed{3 \cdot 3 \cdot 2}$

$\to 18$

$45 \to 5^1 \cdot 3^2 \to (1+1)(2+1)$

$\to 2 \times 3 \Rightarrow 6$

$1 \cdot 45$

$3 \cdot 15$

$5 \cdot 9$

$1+45+3+15+5+9 \to 78$

# Sum of Divisors

$$\left(\frac{1-p_1^{\alpha_1+1}}{1-p_1}\right)\left(\frac{1-p_2^{\alpha_2+1}}{1-p_2}\right)\ldots$$

$$\prod^{n}\left(\frac{1-p_i^{\alpha_i+1}}{\ldots}\right)$$

$$\Rightarrow \prod_{i=1} \left( \frac{1 - p_i}{1 - p_i} \right)$$

$$45 \rightarrow 5^1 \cdot 3^2 \rightarrow \left( \frac{1 - 5^2}{1 - 5} \right) \left( \frac{1 - 3^3}{1 - 3} \right)$$

$$\Rightarrow \frac{2\cancel{4}}{\cancel{4}} \times 13$$

$$6 \times 13 \rightarrow 78$$

# Sum of proper divisors (exclude 1, n)

$45 \rightarrow 1, 5, 9, 3, 15, 45$

(Sum of div) − (n + 1)