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Elementary Number theory

→ Divisibility and the Division Algorithm
→ Prime Numbers and Factorization.
→ the Fundamental Theorem of Arithmetic
It states that every integer greater than 1 is or can be uniquely identified as a product of prime numbers.

$a =$
$b = 2 \times 3$

→ Greatest common divisor :-

→ modular Arithmetic and congruences.
Two numbers are congruent modulo n if their difference is divisible by n. $a - b$ is divisible by n.
$a \equiv b \pmod n$.

ex. $a = 1$, $b = 5$
$n = 3$.

→ Diophantine equations

$a^2 + b^2 = p^2$ (Pythagorean triples)
(Pythagorian triples)

→ $n_{P_r} = \frac{(n}{(n-r}$

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Permutation:

Arrangement of object is called Permutation.

a, b, c →

All permutation taking all three objects

(a b c) (a c b) (b c a) (b a c) (c a b) (c b a)

= 06

All permutation taking two object

(a, b) (b, a) (a, c) (c, a) (b, c) (c, b) = 06

$$^{n}P_{r} = \frac{|n}{|n-r}$$

Where n = total number of object

r = number of object for Permutation

$$^{3}P_{2} = \frac{|3}{|3-2} = \frac{3 \times 2 \times 1}{1} = 6$$

Find i) $^{6}P_{3}$ ② $^{n}P_{2} = 12$ n = ?

Types of Permutation

- Permutation with Repitition (n^r)
- Permutation with no Repitition →
- ~~Permutation with Multi sets.~~

→ Q. How many ways can 2 letters be arranged from A, B, C (No repetition)

→ How many 2 digits numbers can be formed using digits 1, 2, 3 (No repetition)

→ How many ways can 4 students sit on 4 chairs

→ How many different words can be formed using letters of the word "cat"

With Repetition. (or)

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LEVEL → L = 2 times
E = 2 times
V = 1 times

permutation → $\frac{L^n}{L_1! L_2!} = \frac{5!}{2!2!} = \frac{120}{4} 30 = (30)$

MATHEMATICS

M = 2
A = 2
T = 2

$\frac{11!}{2! \times 2! \times 2!}$

STATISTICS :- (10)

S = 3
T = 3 → $\frac{10!}{3!3!2!}$
I = 2

ENGINEERING :- 11

E = 3
N = 3
G = 2
I = 2

$\frac{11!}{3!3!2!2!}$