Class - 10

Mathematics

Chapter - 1

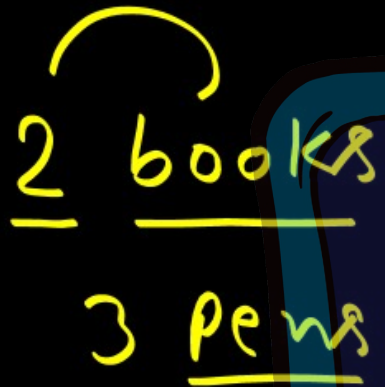
Real Numbers

Part - 1

Harsh Goyal

REAL NUMBERS

NUMBERS

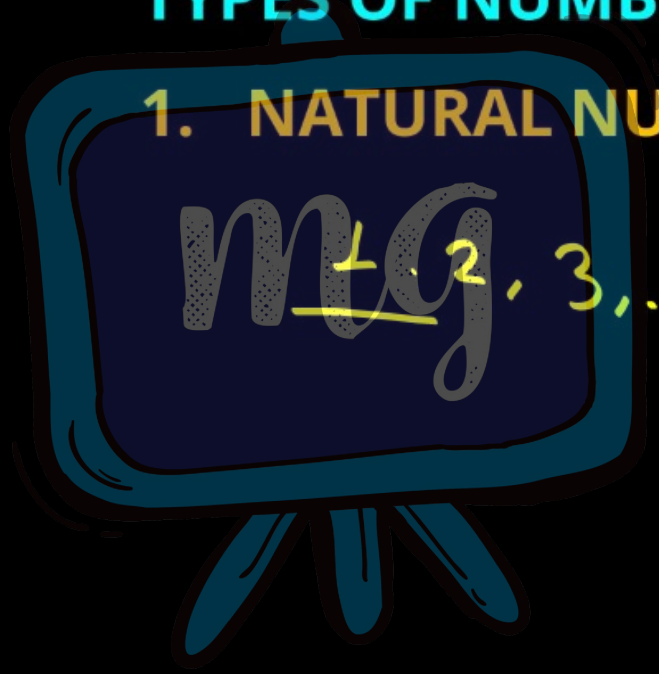


- A number is an arithmetic value used for representing the quantity and used in making calculations.

REAL NUMBERS

TYPES OF NUMBERS :-

1. NATURAL NUMBERS (N) :-



REAL NUMBERS

2. WHOLE NUMBERS (W) :-



$0, 1, 2, 3, 4 \ldots - \infty$

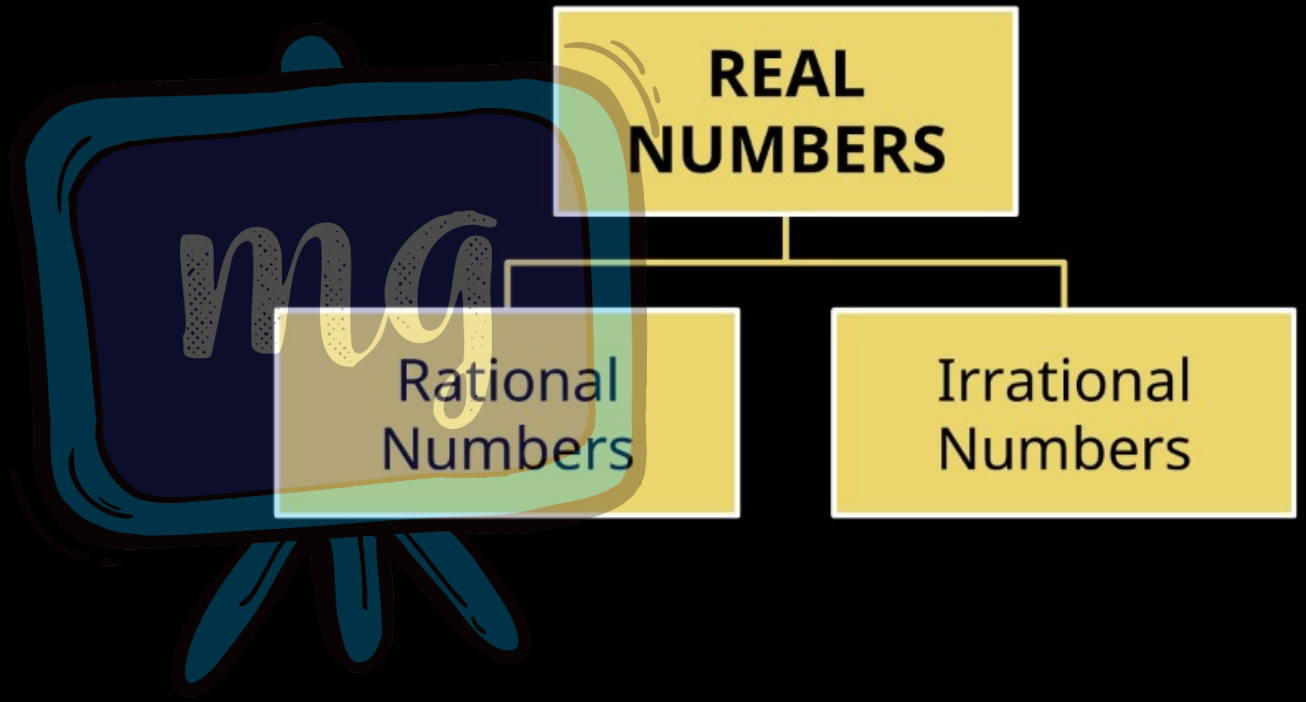
REAL NUMBERS

3. INTEGER NUMBERS (Z) :-

$-\infty \ldots\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots \infty$



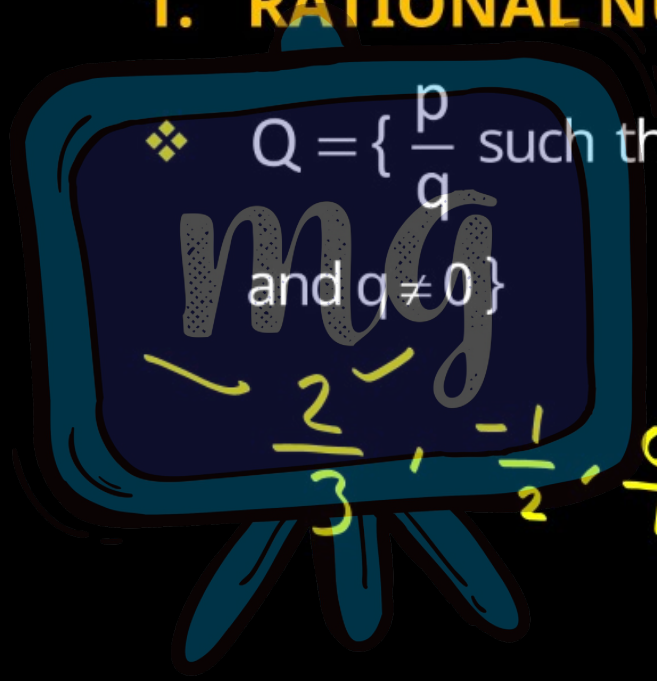
REAL NUMBERS



REAL NUMBERS

1. RATIONAL NUMBERS

- $Q = \{ \frac{p}{q}$ such that p and q are integers and $q \neq 0 \}$



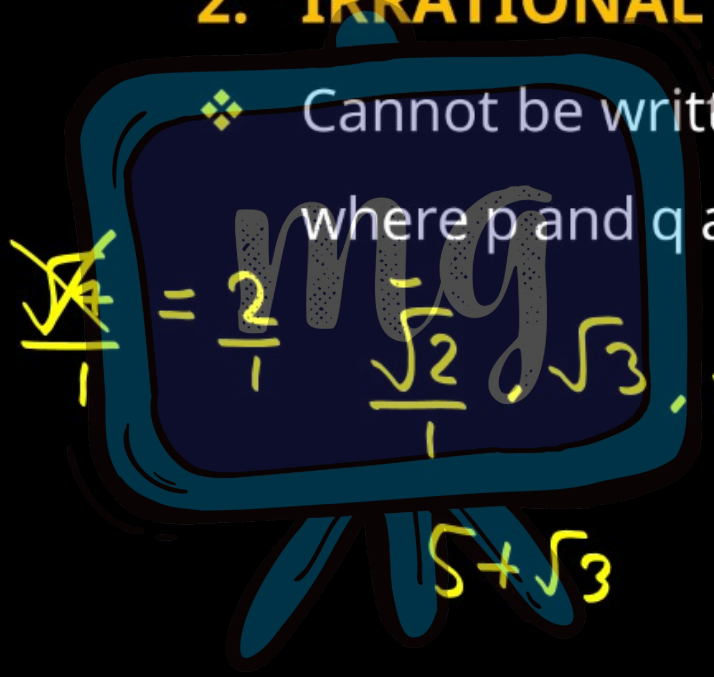
$\frac{2}{3}, \frac{-1}{2}, \frac{0}{1}, \frac{1}{1}, \frac{-1}{1}, \frac{-2}{1}$

REAL NUMBERS

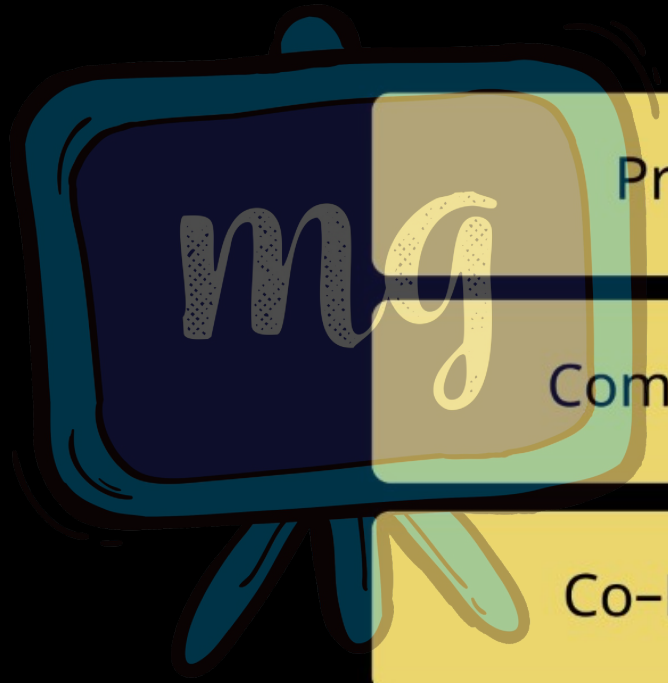
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2. IRRATIONAL NUMBERS

- Cannot be written in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.



REAL NUMBERS

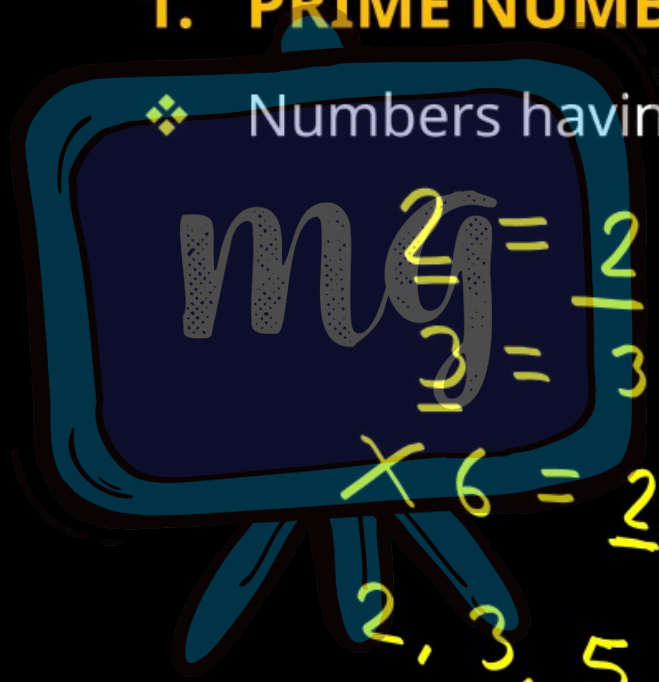


- Prime Numbers
- Composite Numbers
- Co–Prime Numbers

REAL NUMBERS

1. PRIME NUMBERS

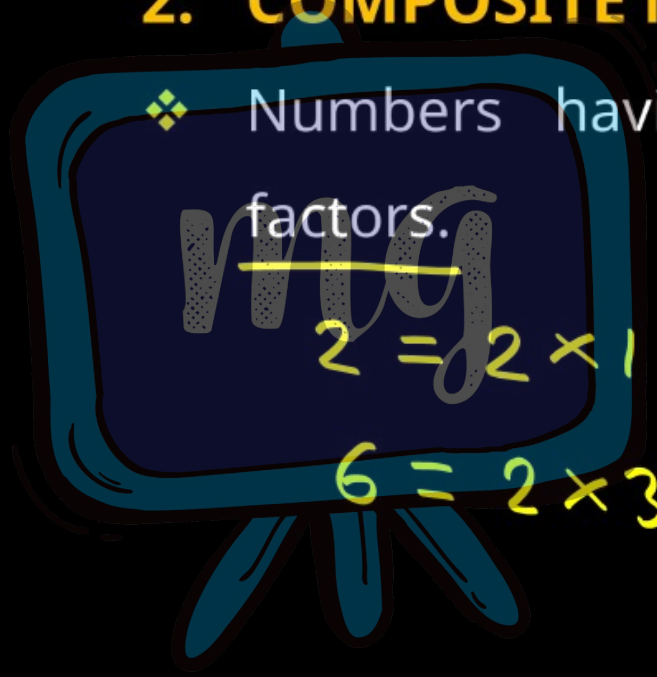
- Numbers having exactly two factors.



REAL NUMBERS

2. COMPOSITE NUMBERS

- Numbers having more than two factors.



REAL NUMBERS

3. CO-PRIME NUMBERS

- Co-Prime numbers are pairs of numbers that do not have any common factor other than 1.

$2 = 2 \times 1$

$3 = 3 \times 1$

(2, 3) are coprime numbers

4, 6

$4 = 2 \times 2 \times 1$

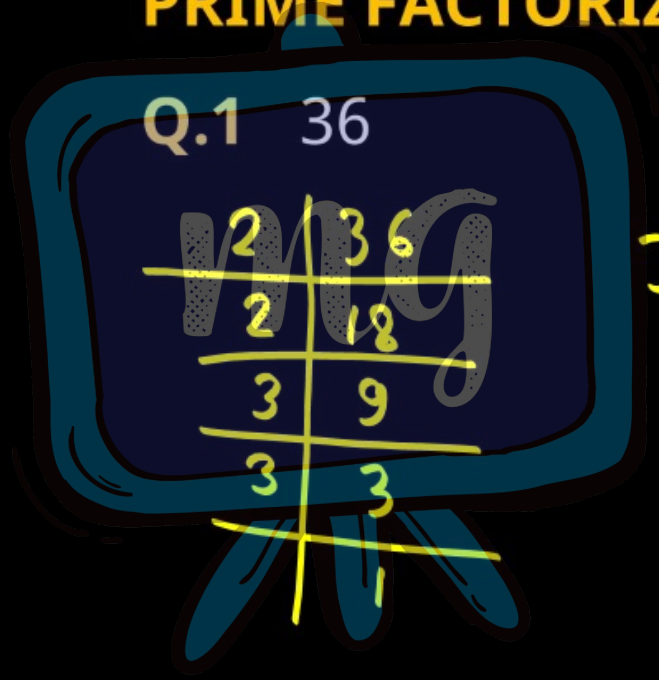
$6 = 2 \times 3 \times 1$

are not coprime

REAL NUMBERS

PRIME FACTORIZATION

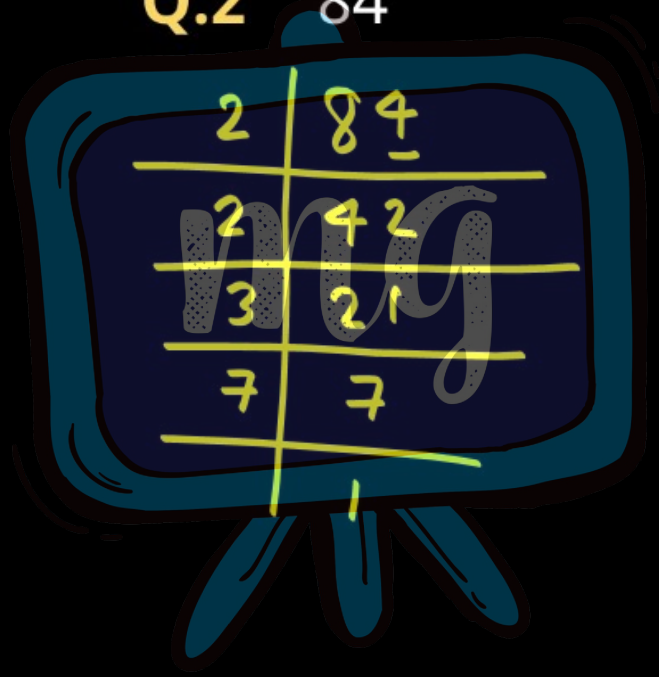
Q.1 36



$36 = 2 \times 2 \times 3 \times 3$

REAL NUMBERS

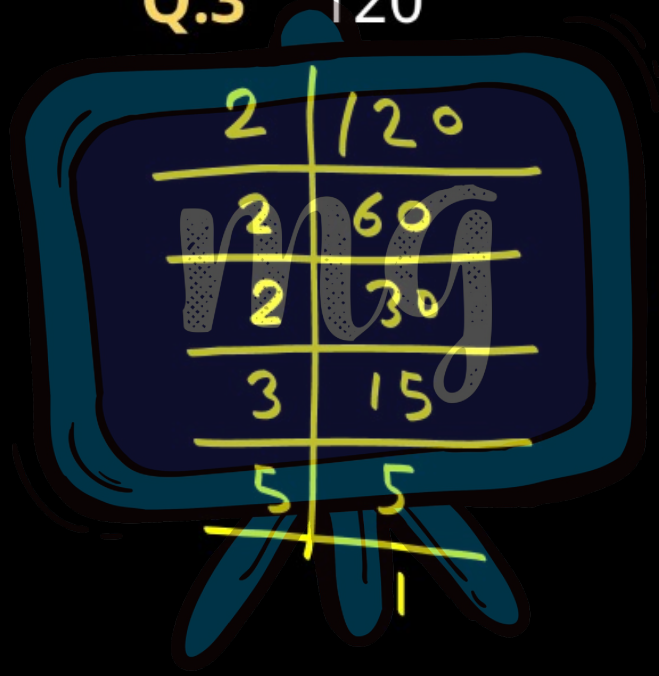
Q.2 84



$84 = 2 \times 2 \times 3 \times 7$

REAL NUMBERS

Q.3 120



$120 = 2 \times 2 \times 2 \times 3 \times 5$

Q.4 The sum of the powers of the prime factors of 196 is –

2	196
2	98
7	49
7	7
	1

(A) 1
(B) 2
(C) 4
(D) 6

$196 = 2 \times 2 \times 7 \times 7$

$= 2^2 \times 7^2$

REAL NUMBERS

FUNDAMENTAL THEOREM OF ARITHMETIC

- Every composite number can be expressed (factorized) as a product of primes, and this factorization is unique, apart from the order in which the prime factors occur.

$$6 = 2 \times 3$$
$$= 3 \times 2$$

REAL NUMBERS

HCF & LCM

- For any two positive integers a and b,
  - HCF (a, b) = Product of the smallest power of each common prime factor in the numbers.
  - LCM (a, b) = Product of the greatest power of each prime factor, involved in the numbers.

Q.5 Find the HCF of 616 & 32.

2	616
2	308
2	154
7	77
11	11
	1

2	32
2	16
2	8
2	4
2	2
	1

$616 = 2 \times 2 \times 2 \times 7 \times 11 = 2^3 \cdot 7^1 \cdot 11^1$

$32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

HCF $= 2^3 = 8$

Q.6 Find the LCM of 72 & 120.

LCM

$= 2^3 \cdot 3^2 \cdot 5^1$

$= 8 \times 9 \times 5$

$= 45 \times 8$

$= 360$

2	72
2	36
2	18
3	9
3	3
	1

2	120
2	60
2	30
3	15
5	5
	1

$72 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \cdot 3^2 \cdot 5^0$

$120 = 2 \times 2 \times 2 \times 3 \times 5 = 2^3 \cdot 3^1 \cdot 5^1$