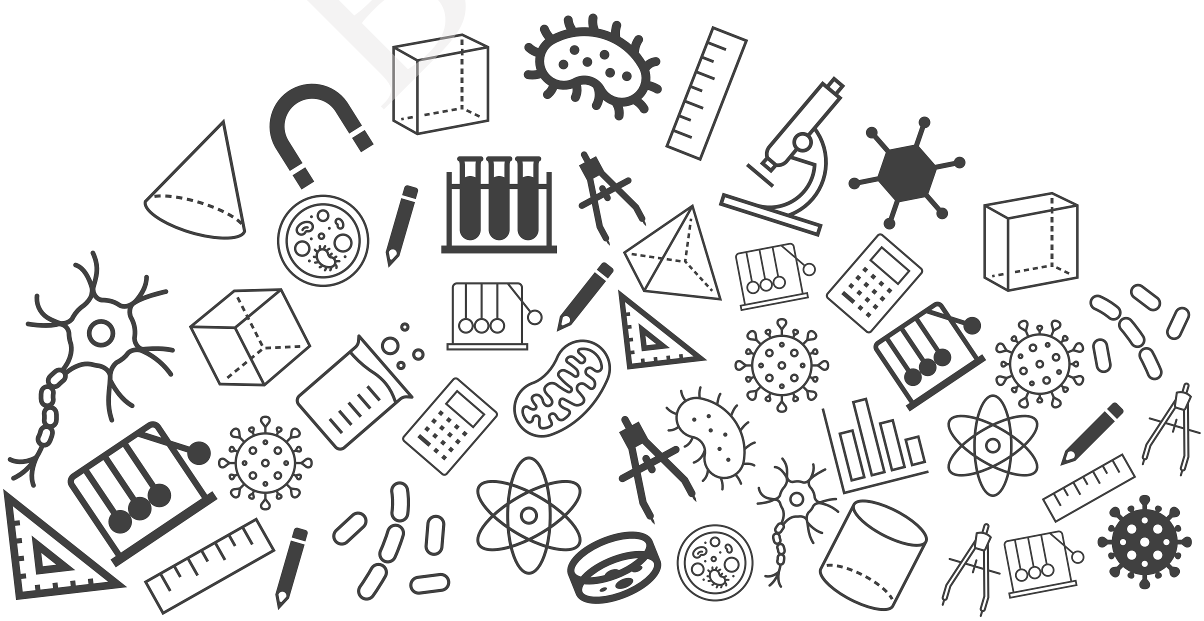
BYJU'S

Grade 10
Mathematics Chapter Notes



MATHEMATICS

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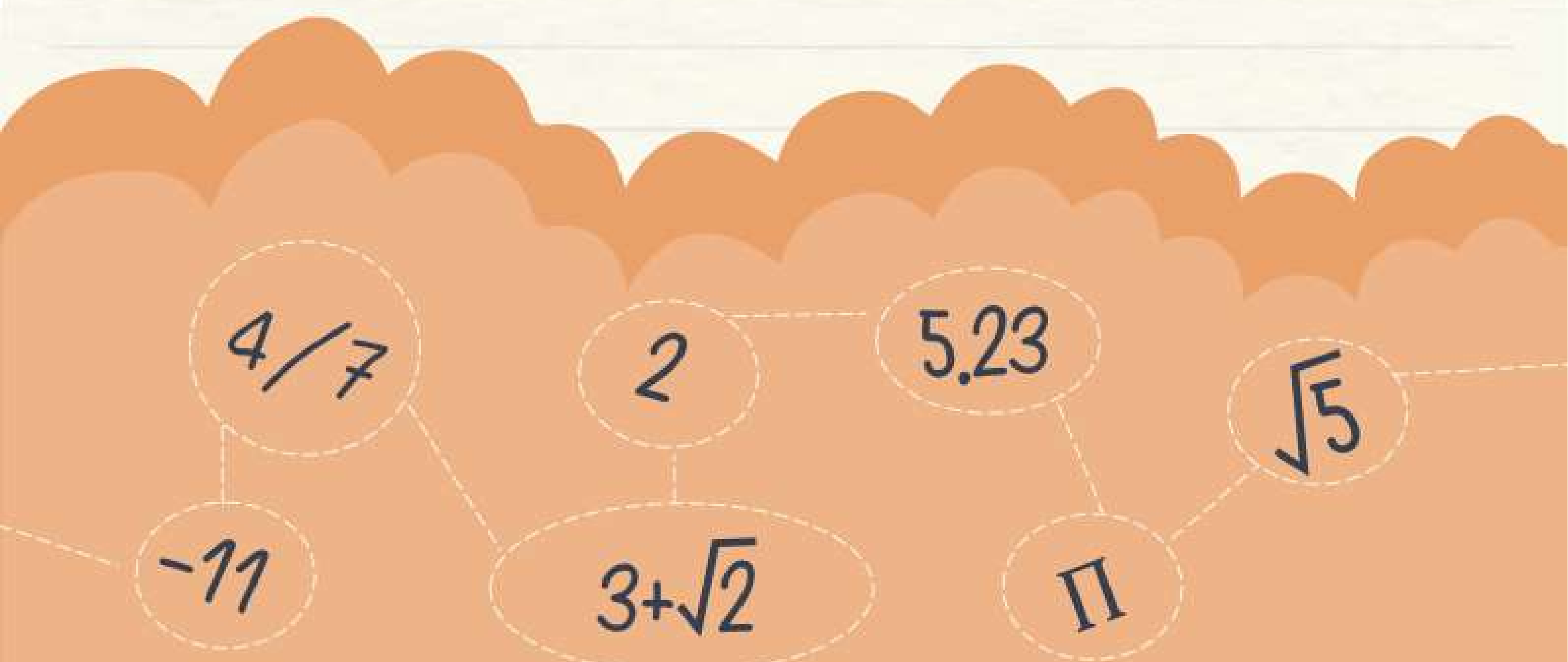
CHAPTER NOTES

Real Numbers

Topics

1. Fundamental Theorem of Arithmetic

2. Irrational Numbers



1. Fundamental Theorem of Arithmetic

Every composite number can be expressed as a product of primes, and this factorisation is unique (apart from the order).

Example

The prime factorisation of the number 8190 is:

$$8190 = 2^1 \times 3^2 \times 5^1 \times 7^1 \times 13^1$$

4.1 Theorem Based on Fundamental Theorem of Arithmetic

If a prime number p divides a^2, then p divides a, where a is a positive integer.

Example

Let us consider, p = 3, a = 9

3 divides 9^2

3 divides 9.

4.2 Relation between HCF and LCM

For any two positive integers **a** and **b**,

$$HCF\,(a, b) \times LCM\,(a, b) = a \times b$$

Note: This relationship only holds good for two numbers.

2. Irrational Numbers

A number 's' is called irrational if it cannot be written in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

Example

Prove that, $\sqrt{2}$ is irrational.

Proof: By using method of contradiction

Assume $\sqrt{2}$ is a rational number.

$\sqrt{2} = \frac{a}{b}$ (a and b are co-primes and $b \neq 0$)

$\Rightarrow b\sqrt{2} = a$

Squaring both the sides

$(b\sqrt{2})^2 = a^2$

$\Rightarrow 2b^2 = a^2$ (a is an even number)

Let $a = 2k$ (k is an integer)

$2b^2 = 4k^2$

$\Rightarrow b^2 = 2k^2$ (b is an even number)

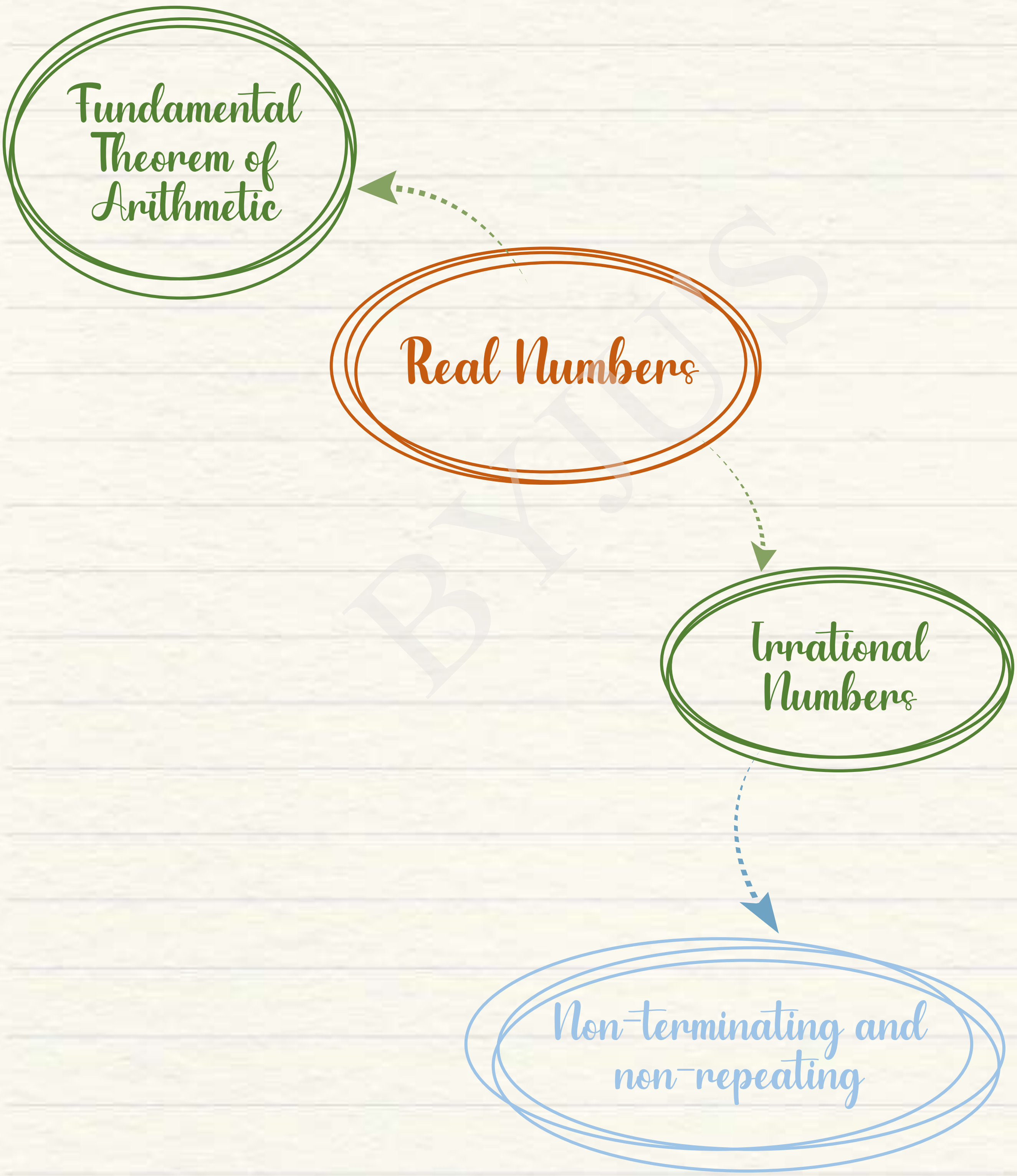
$\therefore$ a and b have 2 as a common factor.

But this contradicts the fact that a and b are co-primes.

This contradiction has arisen because of our incorrect assumption that $\sqrt{2}$ is rational.

Hence $\sqrt{2}$ is irrational.

Mind Map



Fundamental Theorem of Arithmetic
Real Numbers
Irrational Numbers
Non-terminating and non-repeating