

Chapter Summary - Real Numbers | Class 10 | Vadivel Vadhiyar | Target 100

Dear students! Welcome back to the 'Vadivel Vadhiyar' you tube channel and your learning platform www.vadivel-vadhiyar.com. I'm proud to say we have now completed the first chapter, Chapter 1 – Real Numbers, from your Class 10 NCERT Mathematics syllabus.

This chapter is the foundation of all number systems and includes powerful tools like prime factorisation, HCF, LCM, and an understanding of irrational numbers.

In this handout, we'll summarise everything we learned — not just the formulas, but also the ideas and logic behind them.

This is designed to make you exam-ready. Let's begin our Target 100 journey!" Best wishes from Vadivel vadhiyar.

Section 1: Euclid's Division Lemma

We began this chapter with Euclid's Division Lemma.

It says: For any two positive integers a and b , there exist unique integers q and r such that

$$a = bq + r, \text{ where } 0 \leq r < b.$$

What does this mean practically? Let's say you divide 23 by 5:

$$23 = 5 \times 4 + 3 \text{ — here, 4 is the quotient, and 3 is the remainder.}$$

This lemma lays the base for Euclid's Division Algorithm, which helps us find the HCF of two numbers.

Section 2: Fundamental Theorem of Arithmetic

Next comes a very important concept:

◆ Every composite number can be expressed as a product of primes in a unique way, apart from the order it arises.

This means:

$$140 = 2 \times 2 \times 5 \times 7$$

or $2^2 \times 5 \times 7$ — and this is unique for 140.

Why is this useful?

✓ It helps us find HCF and LCM quickly.

✓ It helps us prove irrationality (like $\sqrt{2}$ is irrational).

✎ Example:

HCF of 36 and 48

Prime factorisation of 36 = $2^2 \times 3^2$

Prime factorisation of 48 = $2^4 \times 3$

$$\rightarrow \text{HCF} = 2^2 \times 3 = 12$$

$$\rightarrow \text{LCM} = 2^4 \times 3^2 = 144$$

You can verify: $36 \times 48 = \text{HCF} \times \text{LCM}$ ✓”

Section 3: LCM × HCF = Product of the numbers

From the above, we get a beautiful relationship:

Product of two numbers = HCF × LCM

Let's try:

15 and 20

HCF = 5, LCM = 60

Product = $15 \times 20 = 300$

$$\text{HCF} \times \text{LCM} = 5 \times 60 = 300 \quad \checkmark$$

“Always verify your answers in board exams with this formula — it’s a great trick to cross-check.”

Section 4: Theorem 1.2

If p divides a^2 then p divides a .


Section 5: Irrational Numbers

What is an irrational number?

Any number that cannot be written as a fraction a/b where a and b are integers ($b \neq 0$).

Examples: $\sqrt{2}$, $\sqrt{3}$, π

These have non-terminating, non-repeating decimals.

 **Proof:** Let’s assume $\sqrt{2}$ is rational $\Rightarrow \sqrt{2} = a/b$ in lowest terms which means a and b are coprime.

When we square and simplify, we find contradiction: both a and b must be even \Rightarrow not in lowest terms \Rightarrow contradiction \Rightarrow hence, $\sqrt{2}$ is irrational.


This proof method is called as **“proof by contradiction”**. You’ll face questions like “Prove that $3\sqrt{2}$ is irrational” — be ready!”

Section 6: Decimal Expansion of Rational Numbers

Rational numbers have two types of decimal expansions:

1. Terminating — e.g., $1/4 = 0.25$
2. Non-terminating but repeating — e.g., $1/3 = 0.333\dots$

Rule: A rational number in the form of p/q has a terminating decimal only if q (after cancelling) has only 2 and/or 5 as prime factors.

 Example:

$1/40 \rightarrow q = 40 = 2^3 \times 5 \Rightarrow$ Terminating

$1/7 \rightarrow q = 7 \Rightarrow$ Prime factor other than 2 or 5 \Rightarrow non-terminating, repeating

◆ Section 7: Revision of Important Formulas.

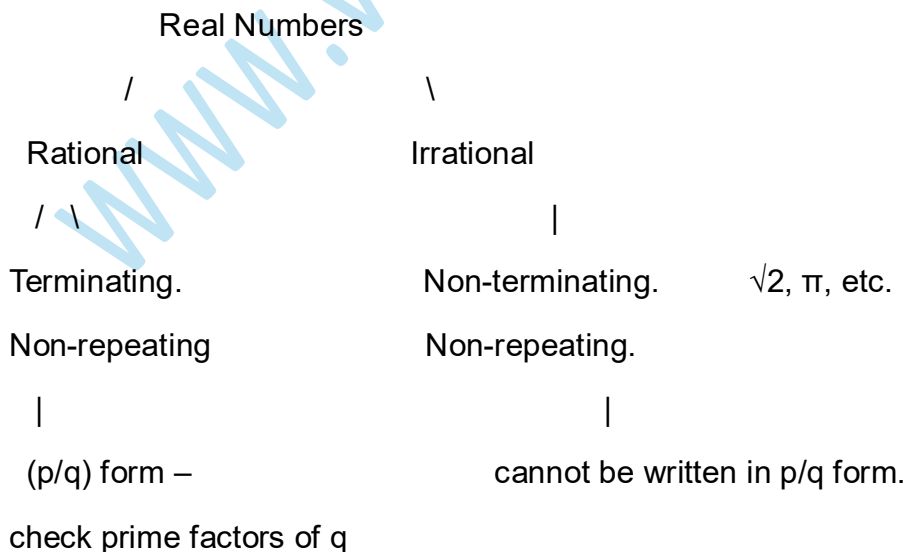
Concept Formula / Rule

1. Euclid's Lemma $a = bq + r$ ($0 \leq r < b$)
2. LCM \times HCF = Product of numbers
3. Decimal Expansion Rule Terminating \leftrightarrow denominator has only 2s, 5s
4. Fundamental Theorem Unique prime factorization of arithmetic

🎯 Section 8: Target 100 Exam Tips

- ◆ Tip 1: Practice Euclid's Algorithm till you're confident.
- ◆ Tip 2: Learn irrational proofs line-by-line — write and recite.
- ◆ Tip 3: Revise prime factorisation of numbers up to 200.
- ◆ Tip 4: Solve all Exercise 1.1 to 1.4 from NCERT – especially examples.
- ◆ Tip 5: Watch all the videos in the order one by one in your learning platform www.vadivel-vadhiyar.com

◆ 📊 Section 9: Mind Map / Summary Visual.



to decide decimal expansion.

 **Conclusion:**

So my dear students, that wraps up the complete chapter on Real Numbers.

We've now learned:

- ✓ The logic behind Euclid's Lemma and its use in HCF
- ✓ Unique prime factorisation
- ✓ HCF and LCM tricks
- ✓ Identifying rational vs irrational numbers
- ✓ Decimal expansion patterns

Don't just learn formulas — understand their use, and practice through examples. You'll find this chapter extremely easy to score.

Remember — mathematics is not about memorisation. It's about clarity. And once you're clear — scoring full marks is very simple.

This is Vadivel Vadhiyar, with you on the journey to Target 100!"

 **1. Euclid's Division Lemma**

For any two positive integers a and b:

$$a = bq + r, \text{ where } 0 \leq r < b$$

□ Used to find the HCF of two numbers using Euclid's Division Algorithm.

 **2. Fundamental Theorem of Arithmetic**

Every composite number can be expressed as a product of prime numbers, and this factorisation is unique, apart from the order of the factors.

□ Example:

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

 **3. LCM \times HCF = Product of Two Numbers**

$$\text{LCM}(a, b) \times \text{HCF}(a, b) = a \times b$$

□ Example:

$$\text{If } a = 15, b = 20$$

$$\rightarrow \text{HCF} = 5, \text{ LCM} = 60$$

$$\rightarrow 15 \times 20 = 5 \times 60 \quad \checkmark$$

 **4. Theorem 1.2**

If p divides a^2 then p divides a. (Proof of this is marked as "Not from examination point of view")

 **5. Rational Number (p/q Form)**

A number is rational if it can be expressed as p/q , where p and q are integers and $q \neq 0$.

❖ 6. Irrational Number

A number that cannot be expressed as p/q is called irrational.

Common examples: $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, π , e

□ Properties:

1. Non-terminating
 2. Non-repeating decimal expansion
-

☒ 7. Decimal Expansion of Rational Numbers

Type	Condition	Example
------	-----------	---------

Terminating Decimal	Denominator (after simplification) has only 2 and/or 5 as prime factors	$1/8 = 0.125$
---------------------	---	---------------

Non-Terminating Repeating	Denominator has prime factors other than 2 or 5	$1/7 = 0.142857\dots$
---------------------------	---	-----------------------

📖 7. Key Proof Concepts

To prove a number is irrational: Use proof by contradiction.

Assume number is rational (p/q), simplify, and show contradiction.

And conclude its irrational as our assumption is incorrect.

Wishing you all success

for your

Target 100 journey.

www.vadivel-vadhiyar.com