

Chapter 1:

Mathematics in our World

1.1 PATTERNS AND NUMBERS IN NATURE

AND THE WORLD

- Nature is mathematics physical reflection.
- Appreciation comes in if one sees organized patterns in nature.

WHAT IS PATTERN?

- used to describe repeating objects or events.
- The patterns in nature do not come from accident but from the connection and interaction of organisms and other natural objects.
- These patterns do not just give aesthetic to one's eyes but play an important role.

IAN STEWART

- A British mathematician and a popular-science and science-fiction writer.
- Author of Nature's Numbers

"By using mathematics to organize and systematize our ideas about patterns, we have discovered a great secret: nature's patterns are not just there to be admired, they are vital clues to the rules that govern natural processes".

2 TYPES OF PATTERNS:

- 1) Self-organized- patterns
 - formed without external intervention (**own, natural**)
 - flower petals
- 2) Invoked Organized- patterns
 - formed with external intervention (**may involve lain**)
 - pyramid in Egypt

1.2 FIBONACCI SEQUENCE

- a sequence of numbers in which terms are obtained **by adding the two previous terms in the sequence.**

LEONARDO PISANO BIGOLLO

- Also known as **Leonardo Fibonacci.**
- **discovered Fibonacci sequence.**
- an Italian mathematician.

- Discovered after an investigation on the reproduction of rabbits.

1.3 THE POWER OF MATHEMATICS

1.3.1 MATHEMATICS HELPS ORGANIZE

PATTERNS AND REGULARITIES IN THE WORLD

- The numbers present not just in plants but in any other natural objects display mathematical regularities.
- Mathematics helps organize these patterns which are clues to uncover the underlying rules and regularities in the world.

1.3.2 MATHEMATICS HELPS PREDICT THE

BEHAVIOR OF NATURE AND PHENOMENA

IN THE WORLD

- help predict the behavior of nature and phenomena in the world.
- It is often desirable to describe the behavior of some real- life system or phenomenon, whether physical, sociological, or even economic, in mathematical terms.

MATHEMATICAL MODEL

- The mathematical description of a system of phenomenon.
- constructed with certain goals in mind.

Known mathematical models:

- ⇒ Newton's Laws of Motion
- ⇒ Electromagnetic Equations
- ⇒ Theory of Relativity
- ⇒ Pythagorean Theorem
- ⇒ Exponential Growth Model

1.3.3 MATHEMATICS HELPS CONTROL NATURE

AND OCCURRENCES IN THE WORLD FOR

OUR OWN ENDS

- No one has the power to control natural occurrences in the world. However, **experts developed models that will predict natural phenomenon.**
- it will give us information to prepare ourselves from future disaster.

Examples:

- ⇒ Weather forecasting
 - helps us plan our everyday activities

- ⇒ Medical trials
 - helps us discover new treatments, detect, diagnose, and reduce the risk of disease.
- ⇒ Population growth
 - helps us prepare the possible effects in economics, environment, and health.

1.3.4 MATHEMATICS HAS NUMEROUS

APPLICATIONS IN MAKING IT

INDISPENSABLE

Applications of Math in everyone 's everyday life

1. Calculating money and finance
2. Counting number of students in a class
3. Time taken for your travel
4. Building construction
5. Measuring Quantity of liquid, food etc.
6. Distance covered when you walk from point A to point B.

Some Scientific Applications:

- 2) Finding time and position of objects
- 3) Finding paths or trajectories
- 4) Explaining theories in Physics and Chemistry
- 5) Oscillating of currents, string, vibrations, LCR circuits
- 6) Finding area, perimeter and volumes
- 7) Calculating work, potential, torque, momentum
- 8) Population growth of a city or a country
- 9) Decay of nuclei, chemical reactions
- 10) Calculating minimum and maximum values of function
- 11) Solving and analyzing real-life situations