Objectives: Find the term- to- term rule of sequences.

Identify linear and non- linear sequences.

➢ What Is a Sequence?

A **sequence** is a list of numbers arranged in a special order.
Each number in the sequence is called a **term**.

➢ Examples of Sequences:

a)   1 , 2 , 4, 5 , 6

b)   2 , 4 , 6 , 8 , 10

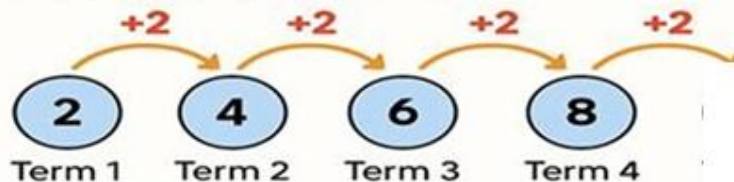c)   25, 20, 15, 10, 5, 0, -5, -10

d)   -20, -10, 0, 10, 20, 30, 40

📖 **TERM-TO-TERM RULE**

A term-to-term rule shows how a number pattern changes from one term to the next. You follow the same rule each time.
- Each number in the pattern is called a **term**
- From one term to the next, we use a **rule** like **add**, subtract, or multiply

+2   +2   +2   +2

2   4   6   8

Term 1   Term 2   Term 3   Term 4

Term-to-Term Rule: Add 2

➢ **Types of sequences : linear and non linear .**

What is a Linear Sequence?

Definition:
A **linear sequence** is a number pattern in which the **difference between terms stays the same.**

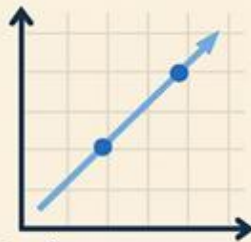This means it increases or decreases by a fixed amount each time.

Key Features:
- The change between numbers is constant
- Patterns form a straight line

Example:
3, 7, 11, 15, 19, ...
This is a linear sequence because:
- The numbers increase like:
  3 → 7 (+4), 7 → 11 (+4)
  11 → 15 (+4)
- There is a common difference: +4

WHAT IS A NON-LINEAR SEQUENCE?

Definition: A non-linear sequence is a number pattern in which the difference between terms *does not* stay the same. This means it doesn't increase or decrease by a fixed number. Instead, the pattern might change by multiplying, squaring, or following another rule.

Example: 1, 4, 9, 16, 25, ...

This is a non-linear sequence because:

The numbers increase like:
1 → 4 (+3), 4 → 9
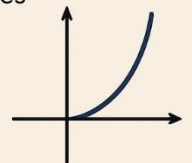9 → 16 (+7), ...

$1^2, 2^2, 3^2, 4^5$

These numbers are perfect squares
$1^2, 2^2, 3^2, 4^5$

This type of pattern does not form a straight line if graphed – that's why it's non-linear!

➢ To **decide** if a sequence is **linear or non-linear sequence:**

Look at each sequence and ask yourself:

➡Are we adding or subtracting the same number every time?
✅ **If YES → It's** Linear
❌ **If NO → It's** Non-Linear

➢ **Steps to find the term-to-term rule.**

Example: **3** , **6** , **9** , **12**

term 1   term 2   term 3   term 4

Step 1: Read the sequence from left to right.

Step 2: Find the difference between the terms by using subtraction.
   the difference between the 2nd term and the 1st term : 6 - 3 = **3**

   the difference between the 3rd term and the 2nd term : 9 – 6 = **3**

   the difference between the 4th term and the 3rd term : 12 - 9 = **3**

Step 3: Check if the difference is the same each time and identify if the numbers in the sequence are increasing or decreasing.

   In the above sequence the difference is always the same (3) , and the numbers are increasing .

   It's always +3 ➝**the term– to–term rule is: Add 3**

Q1) Decide if each of the following sequence is **linear** or **non-linear**.

   a)   3, 6, 9, 12, 15

- What's the difference? ➝____
- Is the difference always the same? _____
  Circle the correct answer ◉ **Linear** ◉ **Non-Linear**

   b)   2, 4, 6, 8, 10

- What's the difference? ➝____
- Is the difference always the same? _____
- Circle the correct answer ◉ **Linear** ◉ **Non-Linear**

What is the term – to - term rule?

c)   1, 2, 4, 7, 11

- Is the difference always the same? _____
  Circle the correct answer   ⊙ **Linear** ⊙ **Non-Linear**

Q2) For each of the following linear sequences, find the term –to- term
rule then write the next two terms in the sequence .

	Sequence	Term-to –Term Rule
a.	18, 20, 22, 24 , _____, _____	
b.	175, 185 , 195 ,_____, _____	
c.	13, 10 , 7 , 4, _____, _____	
d.	-10, -8 , -6 ,-4, _____,_____	
e.	52,58, 64,70, _____,_____	

Q3) Work out the missing numbers in each linear sequence.

a.   175 , 185 , 195, _____, _____ ,225.

b.   89 , 69 , _____ , _____ , 9.

c.   _____ ,_____, 108 , 96 , 84, _____.

d.   -35, -20, _____, _____, 25, 40 , _____.

e.   _____ , _____ , 2834, _____, 2434, 2234.

4

Q4) Complete the table.

	Start	Term – to Term Rule	First three term in the sequence
a.	1	Add 8	_____ , _____, _____
b.	5	Multiply by 10	_____ , _____, _____
c.	100	Divide by 5	_____ , _____, _____
d.	2	Subtract 2	_____ , _____, _____

Q5) Eddy writes a linear sequence starting from 12 .
The difference between the terms in the sequence is constant each time.The term- to term rule is to subtract 5 .
Find the 4th and the 5th terms.

1st term   **5th term**

Q6) Sarah writes this number sequence.

1   , 2 ,   4   ,   7 ,   11 ,   _____

a) Tick the correct answer.
   The sequence is: ☐ linear   ☐ non- linear
b) Explain your answer.
_____

c) Write down the next term in the sequence.

_____

5

Q7) Leo writes parts of a sequence.

☐ ☐ , **4 , 9, 15, 22, 30, 39**

a) Write down the first three terms that come before 9.

_____

b) What is the next term after 39?

_____

c) Write the type of the sequence.

_____

Q8) Generate your **own linear sequence** that has **positive and negative** numbers.