LESSON PLAN - 6

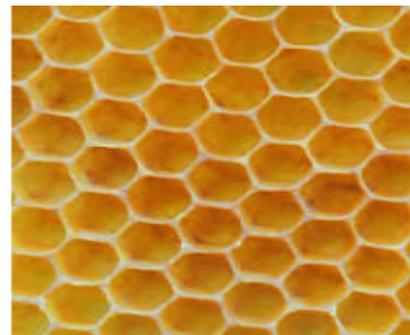Class: **X**   Subject: **Mathematics**

Name of the teacher: School:

Name of the chapter	Topic	Number of periods required (15)	Timeline for teaching		Any specific information
			From	To	
6. PROG RESSI ONS	**6.1** introduction	1			Real life situations
	6.2 Arithmetic Progressions 6.2.1 What is an Arithmetic progression? 6.2.2 Parameters of Arithmetic progressions	4			Historical note
	6.3 n^{th} term of an Arithmetic Progression	3			
	6.4 Sum of first n terms in Arithmetic Progression 6.4.1 How 'Gauss" find the sum of terms 6.4.2 Sum of n terms of an A.P	3			
	6.5 Geometric Progressions	2			
	6.6 nth term of a GP	2			

Prior Concept / Skills:	
1. Knowledge of number system 2. Odd and Even numbers 3. Simple methods of calculating the numbers. 4. Patterns from real life situations like petals of sunflower, holes of honeycomb.. 5. Number patterns collected from NMMS, Bank exams etc.,	

| Learning outcomes	Number of Periods
Students are able to: 1. Represent the patterns mathematically	2
2. observe and analyze patterns in their daily life situations to check if they form an Arithmetic Progression	3
3. Develops strategies to apply the concept of A.P. to daily life situations.	5
4. Derive n^{th} term and sum of nth term of AP and GP.	5

TEACHING LEARNING PROCESS

Induction/Introduction(Generating interest, informing students about the outcomes and expectations for the lesson)

- Introduce the concept of by taking situations like width of space for spectators, dimensions of metal sheet for a box..
- applications of quadratic equations
- Historical note – Calculations in Babylonia time.
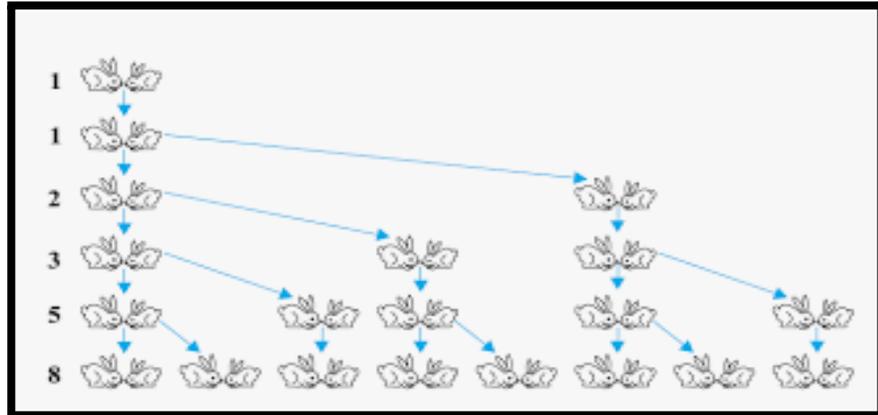
Experience and Reflection(Task/question that helps students explore the concept and connect with their life)

After completion of lesson, students should know

- Sequence, Series and Arithmetic Progression.
- All formulas and important concepts related to the AP
- Find the nth term of AP from the starting and from the end of the sequences
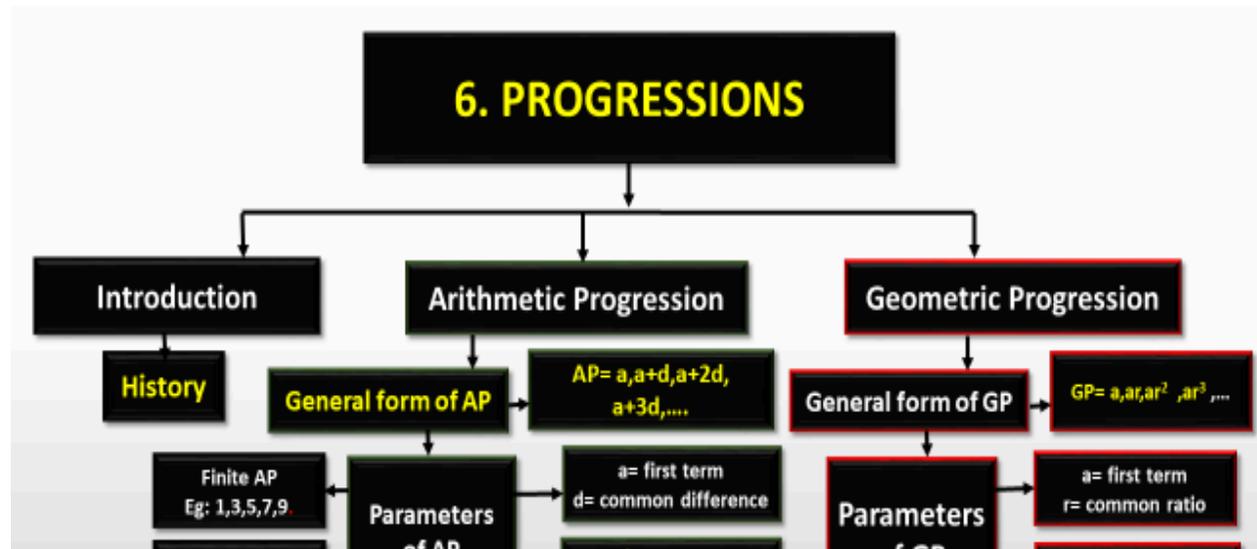
- Apply the concept of GP to real life situations and find nth term of GP

- Represent all concepts through Flow chart.

Explicit Teaching/Teacher Modelling (I Do)	Group Work (We Do)	Independent Work (You Do)	Notes

6.1 **Introduction: (1)**
 	
 At first explain the terms sequence and series.
 Sequence: If different terms are separated by commas then it is called a sequence.
    Ex: 1, 2, 3, 5, 7, 9, 11, 12..
 Series: If different terms are separated by "+ "or " – " then it is called series.
    Ex: 1 + 2 + 3 + 5 + 7 + 11 + 12 +…
	Draw some patterns like
	 The number of unit squares in squares of sides 1, 2, 3
		Student can write some examples to sequences and series of their own:
		 (i)3, 6, 9, 12 …
		 (ii) 3, 9, 27, 81..
		 (iii)3, 6, 10, …
		 Some series:
		 (i)1+2+4+8+..
		 (ii)1+3+9+27+..
			Historical note: Aryabhata was the first to give formula for sum of squares and cubes of natural numbers.
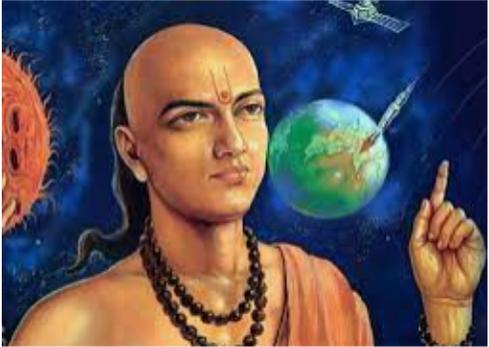
6.2 **Arithmetic Progressions: (4)** Consider some lists of numbers, explain that the successive terms are obtained by adding or subtracting a	● **Try This (page.128)**		

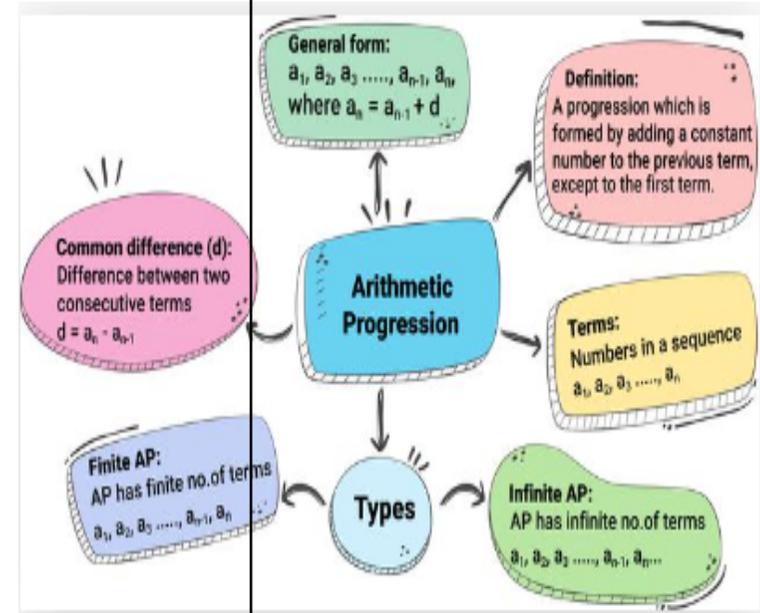|			
fixed number to the preceding terms. Such lists of numbers are called Arithmetic Progressions. Thus introduce the concept of AP. Write few sequences on the board and explain the difference between the A.P and other sequences. **6.2.1 What is an Arithmetic Progression?** We observe that an A.P is a list of numbers formed by adding or subtracting a fixed number to the preceding number except the first number. **General term of AP:** Teacher write general term on board and explain its term and common difference d. a, a + d, a + 2d, a + 3d, …a + (n – 1)d here, the first term = a, the fixed difference = common difference= d n^{th} term $a_n = a + (n – 1)d$ **6.2.2 Parameters of Arithmetic Progression:**	Observe the examples given by teacher and answer **Think – Discuss** (page.129) ● **Activity** (page.129) Make given figures with match sticks and write answers for the questions given in their note books. Solve the example 1 and 2 problems with the help of the teacher. ● Solve the problems given in problem 4 of **Exercise 6.1** by discussing with others	● **Do This** (page.131) Solve the problems 1,2 and 3 of **Exercise.6.1**	**Activity:** Prepare a flowchart of showing concept about AP

(i)To check whether the given list of numbers form an AP or not (ii)To find an Arithmetic progressions we need two parameters **a,** the first term and **d**, the common difference. ## 6.3 nth TERM OF AN ARITHMETCI PROGRESSION: (3) By consider a real life situation, like finding salary for 15th year, 25th year , when starting salary and annual increment is known, gave formula for nth term of an AP , $a_n = a + (n-1)d$ ● Explain the examples 5 to 10 of text book. ● Explain the problems 14 to 17 of Exercise.6.2	Solve the examples3 and 4 problems with the help of the teacher. ● Solve the problems 6 to 13 of **Exercise 6.2**	Solve the problems 1 to 5 of **Exercise 6.2**	Historical Note about Carl Fredrich Gauss
## 6.4 SUM OF FIRST N TERMS IN ARITHMETCI PROGRESSION: (3) By considering the earlier situation how much money will be collected at the time of 21 years, explain why we	Gauss method of finding sum of first 100 natural numbers 	1	2	3	4	5	...	99	100
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100	99	98	97	96	...	2	1
101	101	101	101	101	...	101	101		Now, student	**Project work:** Write steps of finding sum of n terms of an AP, represent the same in a flow chart to get an

need a formula to find sum after 21 years.

6.4.1 How Gauss find sum of terms:

Explain the method of finding sum of first n terms by using Gauss method.

6.4.2 Sum of n terms of an AP:

Explain the method of finding sum of n terms of an AP, by using Gauss method as discussed above.

the sum of arithmetic progression equations are:
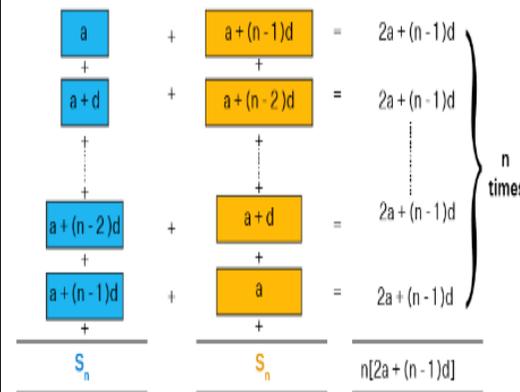
$S_n = \frac{n}{2}(2a+(n-1)d)$ (when a, d are known)

$S_n = \frac{n}{2}(a_1 + a_n)$, when first and last terms are known.

7   Explain examples 11 to 15 of text book
8   Explain problems 11 to 14 of Exercise 6.3

6.5 GEOMETRIC PROGRESSIONS: (2)

$S = \frac{100 \times 101}{2} = 5050$

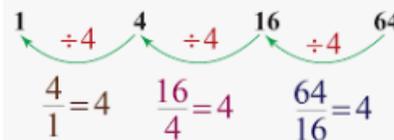Discuss with each other and write steps of finding sum of n terms of an AP, using Gauss method as

$2S_n = n[2a + (n-1)d]$

$S_n = \frac{n[2a + (n-1)d]}{2}$

Solve the problems 8 to 10 of **Exercise 6.3**

Finding common ratio of GP:

$\frac{4}{1} = 4 \qquad \frac{16}{4} = 4 \qquad \frac{64}{16} = 4$
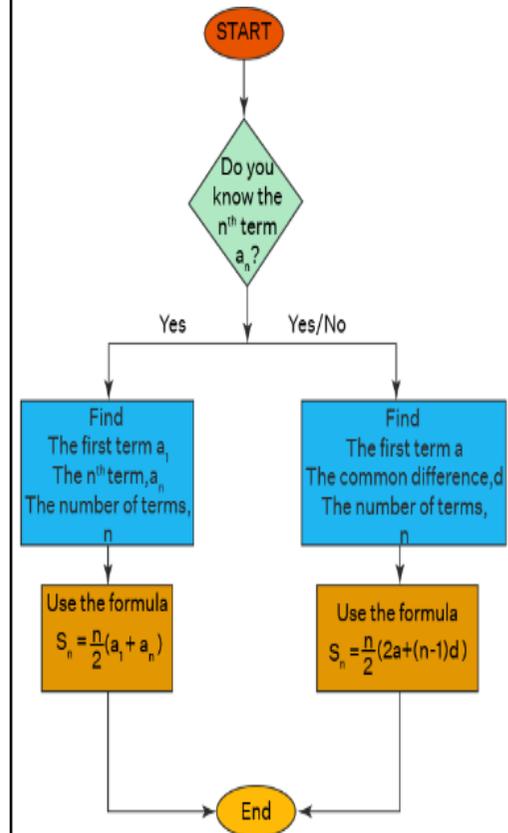
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find the amount that will be collected at the end of 21 years using formula.

● **Do This**

(page.143)

Solve the problems 1 to 7 of **Exercise 6.3**

● **Do This**

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idea of the formula that has to be used to find the sum of arithmetic progression according to the information available to us and hence find the sum of n terms.

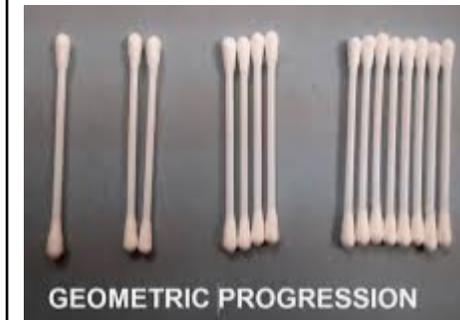|			
By considering some lists and ask to observe the rules behind them, give the definition of GP as A Geometric progression is a list of numbers in which successive number is formed by multiplying or by dividing a fixed number called "common ratio" **The general form of GP:** $a, ar, ar^2, ar^3, ...ar^{n-1}$ here, a = the first term r = common ratio n^{th} term, $a_n = ar^{n-1}$ • Explain examples 16 to 19 of text book • Explain the problems 1 and 4 of Exercise 6.4 **6.6 n^{th} TERMS OF GP: (2)** Considering the problem in which number of bacteria in a certain culture triples every hour, explain how to find the number of bacteria after 10 hours, by using concept of finding sum of nth terms of a GP.	Discuss the examples to GP given by teacher and answer **"Think – Discuss (page.149)"** • Solve the problem 3 of Exercise 6.4 Write the general form of nth term of GP and explain its terms as • Solve the problems 3, 4 of Exercise 6.5	Solve the problems 1 and 2 of **Exercise 6.4** Solve the problems 1, 2 of **Exercise 6.5**	**Lab Activity:** Prepare some Geometric progressions of your own from your daily life situations and write a, r, n^{th} term of that GPs. GEOMETRIC PROGRESSION $$a_n = a_1 (r)^{n-1}$$ a_n = nth term a_1 = first term r = common ratio n = term position

• Explain examples 20 to 22 of text book • Explain the problems 5, 6 and 7 of Exercise 6.5			

Check For Understanding Questions

1. Factual:

- Check whether the following equations quadratic or not? (i)

  $x^2 - 4x - 4 = 0$ $(ii) 4x = 3x^2$ $(iii)(2x + 1)(3x + 1) = b(x - 1)$

- 30th term of the AP: 10, 7, 4,..., is....

- In an AP, if d = -4, n=7, an =4, then a is

- Match the following (i) $b^2 - 4ac = 0$ $\qquad$ (a) Real and distinct roots

  $\qquad\qquad$ (ii) $b^2 - 4ac > 0$ $\qquad$ (b) Real and equal roots

  $\qquad\qquad$ (iii) $b^2 - 4ac < 0$ $\qquad$ (c) Imaginary roots (not real)

- Which of the following sequences form a Geometric Progression?

  (i) 7, 14, 21, 28, ...
  (ii) 1/ 2 , 1, 2, 4, ...
  (iii) 5, 25, 50, 75, ...

2. Open Ended / Critical Thinking:

1. How many terms of an AP must be taken for their sum to be equal to 120 if its third term is 9 and the difference between the seventh and second term is 20 ?

2. Find the geometric progression whose first term and common ratios are given by (i) $a = -7$, $r = 6$ (ii) $a = 256$, $r = 0.5$

3. In a Geometric progression, the 4th term is $\frac{8}{9}$ and the 7th term is $\frac{64}{243}$. Find the Geometric Progression.

4. The product of three consecutive terms of a Geometric Progression is 343 and their sum is $\frac{91}{3}$. Find the three terms.

5. The present value of a machine is ₹40,000 and its value depreciates each year by 10%.

6. Find the estimated value of the machine in the 6th year.

Student Practice Questions & Activities (Exercises from workbook / textbooks/ blackboard)

- In an AP, if $d = -4$, $n=7$, $a_n =4$, then a is

  (i)　　26　(ii)　　28 (iii) 30　　　(iv) 32

  - Which term of the AP: 21, 42, 63.........................is 210?
  - Find the 4th term from the end of the AP: -11,-8, -5...............49
  - Find 20th and nth term of A.P 10, 7, 4....
  - Find the sum of first 50 positive integers divisible by 7
  - Write three terms of G P, when $a = 3$ and $r = 4$
  - Find t so that t, t +4, t + 6 are consecutive terms of a geometric progressions.

Assessment (Think of what children SAY, DO and MAKE while learning that can form the evidence of learning to be used for assessment).

- Project Work: Take any real life situation and convert it into quadratic equation and then find its roots in three different methods and compare the results.
- Graph note books
- Quiz conducted on whole chapter.
- Exercises in Student's notebook.

SIGNATURE OF THE TEACHER   SIGNATURE OF THE HEAD MASTER

VISITING OFFICER WITH REMARKS