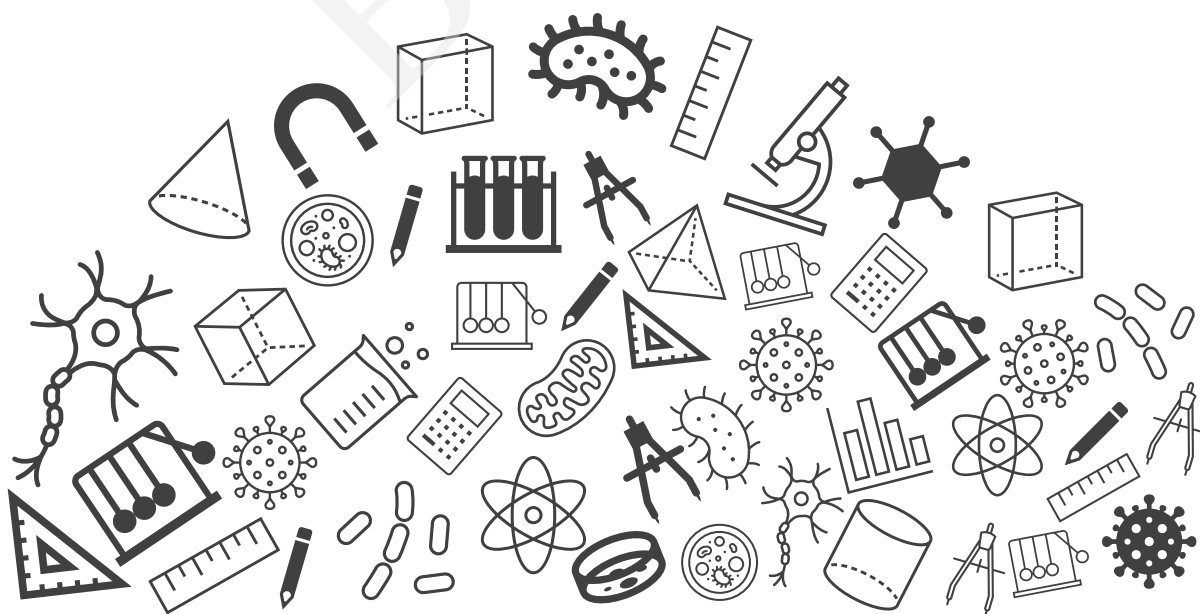# Grade 10
Mathematics Chapter Notes

BYJU'S
CHAPTER NOTES
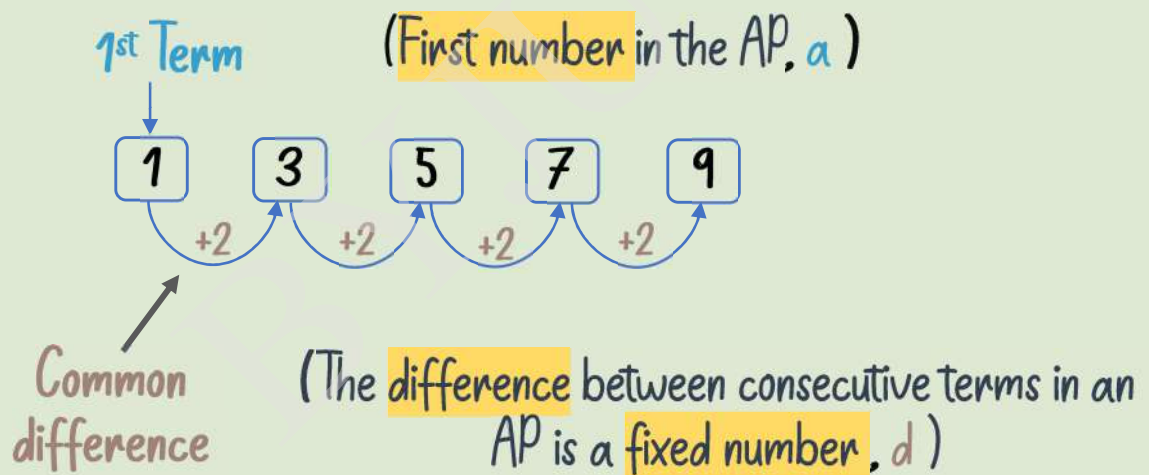
Arithmetic Progressions

Topics

1. Arithmetic progression

2. Types of an Arithmetic Progression

3. General form of an AP

4. n^{th} Term of an AP

5. Sum of first n terms of an AP

6. Arithmetic mean
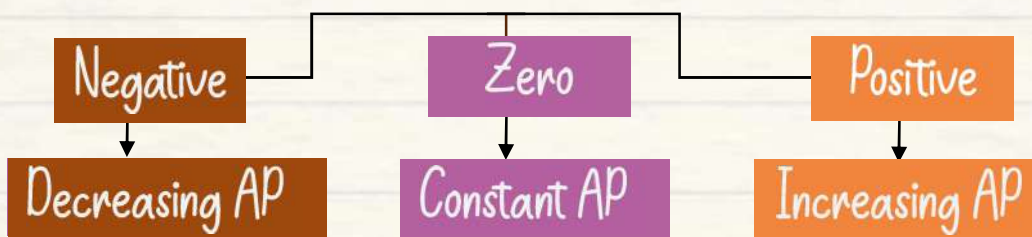
1.Arithmetic Progressions

Definition

An arithmetic progression is a sequence of numbers in which each term is obtained by adding a fixed number to the preceding term, except the first term.

1st Term   (First number in the AP, a)

$$1 \xrightarrow{+2} 3 \xrightarrow{+2} 5 \xrightarrow{+2} 7 \xrightarrow{+2} 9$$

Common difference

(The difference between consecutive terms in an AP is a fixed number , d)

The common difference can be

Negative	Zero	Positive
Decreasing AP	Constant AP	Increasing AP

2.Types of an Arithmetic Progression

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            ┌─────────────────────────────┐
            │   Arithmetic Progression    │
            └─────────────────────────────┘
                          │
            ┌─────────────┴─────────────┐
            ▼                           ▼
      ┌───────────┐              ┌───────────┐
      │ Finite AP │              │ Infinite AP│
      └───────────┘              └───────────┘
            │                           │
            ▼                           ▼
  ┌──────────────────┐        ┌──────────────────┐
  │ Limited/finite   │        │ Unlimited/infinite│
  │ number of terms  │        │ number of terms  │
  └──────────────────┘        └──────────────────┘
            │                           │
            ▼                           ▼
  ┌──────────────────────┐    ┌──────────────────────┐
  │ Ex: 2, 4, 6, 8, and 10│   │ Ex: 0, 1, 2, 3, 4, 5, …│
  └──────────────────────┘    └──────────────────────┘

  ┌──────────────────────────┐  ┌──────────────────────┐
  │ Ex: Multiples of 3 till 30.│ │ Ex: All multiples of 3.│
  └──────────────────────────┘  └──────────────────────┘
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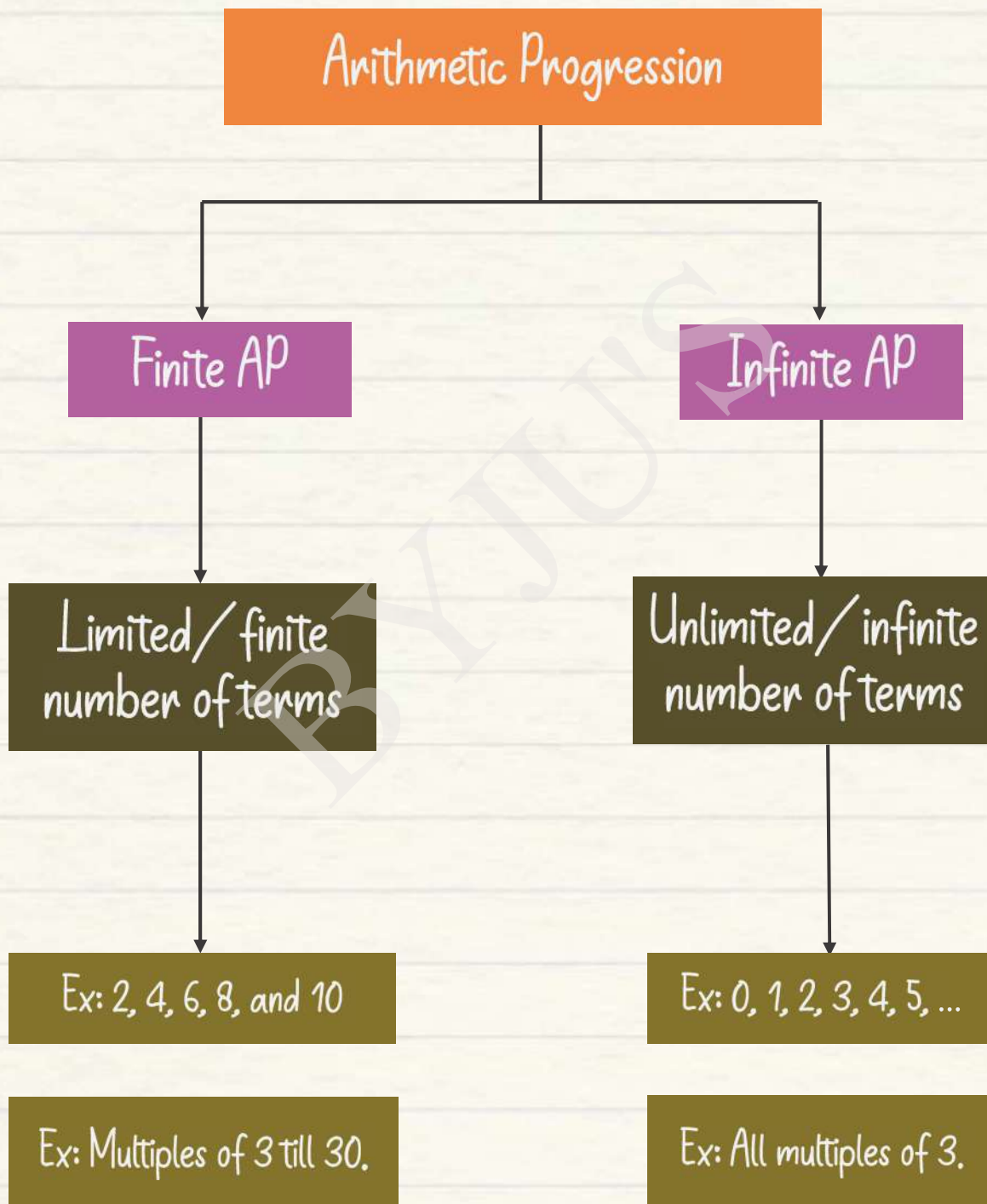
3. General Form of an AP

A sequence of the form

★ $a, a + d, a + 2d, a + 3d, a + 4d$ and so on,

where a is the first term and d is the common difference.

4. n^{th} Term of an AP

$$a_n = \{a + (n - 1)d\}$$

where a is the first term,

d is the common difference

n is the number of terms in the sequence and

a_n is the nth term.

5.Sum of First n Terms in an AP

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

$$S_n = \frac{n}{2}(a + l)$$

(When first term (a) and common difference (d) are known)

(When first term (a) and last term (l) are known)

where n is the number of terms in the sequence and S_n is the sum of first n terms

6.Arithmetic Mean

$$b = \frac{a + c}{2}$$

If a, b and c are in AP, then,

b is the arithmetic mean of a and c.

Important Formulae

n^{th} Term of an AP	$a_n = a + (n-1)d$
Sum of first n terms in an AP (Where first term (a) and common difference (d) are known)	$S_n = \dfrac{n}{2}\{2a + (n-1)d\}$
Sum of first n terms in an AP (Where first term (a) and last term (l) are known)	$S_n = \dfrac{n}{2}(a + l)$
Arithmetic Mean (b) $(a, b$ and c are in AP)	$b = \dfrac{a + c}{2}$

Tips/Points to be Remembered

While solving questions containing consecutive terms, following assumptions can be made to simplify:

NUMBER OF TERMS	CONSECUTIVE TERMS	FIRST TERM	COMMON DIFFERENCE
3	$(a-d), a, (a+d)$	$(a-d)$	d
4	$(a-3d), (a-d), (a+d), (a+3d)$	$(a-3d)$	$2d$
5	$(a-2d), (a-d), a, (a+d), (a+3d)$	$(a-2d)$	d

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General form of an AP

n^{th} Term in an AP

Arithmetic Progression

Sum of first n terms in an AP

Arithmetic mean

Types of an Arithmetic Progression

Finite AP

Infinite AP