ODM EDUCATIONAL GROUP
Changing your Tomorrow

ARITHMETIC PROGRESSOINS
PPT-2

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 05
CHAPTER NAME : ARITHMETIC PROGRESSIONS

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

PREVIOUS KNOWLEDGE TEST

- An arrangement of numbers in a definite order according to some rule is called a Sequence.
- . In other words, a pattern of numbers in which succeeding terms are obtainedfrom the preceding term by adding/subtracting a fixed number or by multiplying with/dividing by a fixed number, is called sequence or list of numbers.
  e.g. 1,2,3,4,5
- An **arithmetic progression** is a list of numbers in which each term is obtained by adding afixed number to the preceding term except the first term.
- This fixed number is called the common difference of the AP. It can be positive, negativeor zero.
- Let us denote the first term of an AP by a_1, second term by a_2, . . ., *n*th term by a a_n and the common difference by *d*. Then the AP becomes a_1, a_2, a_3, . . ., a_n So, $a_2 - a_1 = a_3 - a_2 = \ldots = a_n - a_{n-1} = d$.
- The general form of an arithmetic progression is given by
  a, $a + d$, $a + 2d$,$a + 3d$, . . .where a is the first term and d the common difference.

LEARNING OUTCOME

1.Students will be able to know the general term of AP.
2.Students will be able to calculate the nth term and required term.
3.Students will be able to solve problems based on finding n when nth term or last term is given.
4.Students will be able to solve problems based on finding the AP or nth term or both, when its two terms are given.

The nth term an of the AP with first term a and common difference d is given by

$a_n = a + (n - 1)\, d.$

https://youtu.be/el8c-dJk2XA **(7.55)**

***n*th Term of an AP**

Let $a_1, a_2, a_3, \ldots$ be an AP whose first term a_1 is *a* and the common difference is d *then*,

the **second term** $a_2 = a + d = a + (2 - 1)\, d$

the **third** term $a_3 = a_2 + d = (a + d) + d = a + 2d = a + (3 - 1)\, d$

the **fourth** term $a_4 = a_3 + d = (a + 2d) + d = a + 3d = a + (4 - 1)\, d$

. . . . . .

Looking at the pattern, we can say that the nth term a_n = a + (n – 1) d.

So, the nth term an of the AP with first term a and common difference d is given by

a_n is also called the general term of the AP.

1. Find the 10th term of the AP: 2, 7, 12, . .

1. Find the 10th term of the AP: 2, 7, 12, .

Here, a = 2, d = 7 – 2 = 5

and n = 10

We have a_n = a + (n – 1) d

So, a_{10} = 2 + (10 – 1) × 5

= 2 + 45

= 47

Therefore, the 10th term of the given AP is 47.

2. Which term of the AP: 21, 18, 15, . . . is – 81? Also, is any term 0? Give reason for your answer.

Here, a = 21, d = 18 – 21 = – 3 and

a_n = – 81, and we have to find n.

As a_n = a + (n – 1) d,

we have – 81 = 21 + (n – 1)(– 3)

– 81 = 24 – 3n

– 81 – 24 = – 3n

So, n = –135/-3

n = 35

Therefore, the 35th term of the given AP is – 81.

Next, we want to know if there is any n for which a_n = 0. If such an n is there, then

21 + (n – 1) (–3) = 0,

i.e., 3(n –1) = 21

i.e., n = 8

So, the eighth term is 0.

3.: Check whether 301 is a term of the list of numbers 5, 11, 17, 23,

3. Check whether 301 is a term of the list of numbers 5, 11, 17, 23,……..
We have :
$a_2 - a_1$ = 11 – 5= 6,
$a_3 - a_2$ = 17 – 11 = 6,
$a_4 - a_3$ = 23 – 17 = 6
As. $a_2 - a_1 = a_3 - a_2 = a_4 - a_3$ …..
So the above the list of numbers is an AP.

Let 301 be a term, say, the nth term of this AP.
We know that
a_n = a + (n – 1) d
So, 301 = 5 + (n – 1) × 6
i.e., 301 = 6n – 1
So, n =302/6
=151/3
n cannot be in fraction. So, 301 is not a term of the given list of numbers

Find the 31st term of an AP whose 11th term is 38 and the 16th term is 73.

Find the 31st term of an AP whose 11th term is 38 and the 16th term is 73.

Sol. Given; $a_{11} = 38$ and $a_{16} = 73$

$\Rightarrow \quad a + 10d = 38$ and $a + 15d = 73$

$\Rightarrow \quad a + 15d - a - 10d = 73 - 38$

$\Rightarrow \quad 5d = 35$

$\Rightarrow \quad d = \frac{35}{5} = 7$

$\therefore \quad a_{11} = a + 10 \times 7 = 38$

$\Rightarrow \quad a = 38 - 70 = -32$

$\therefore \quad a_{31} = a + 30d = -32 + 30 \times 7$

$= -32 + 210 = 178$

The 17th term of an AP exceeds its 10^{th} term by7.

Find common difference

The 17th term of an AP exceeds its 10th term by 7. Find the common difference.

Sol. Given, $a_{17} - a_{10} = 7$

$\Rightarrow \quad (a + 16d) - (a + 9d) = 7$

$\Rightarrow \quad 7d = 7$

$\Rightarrow \quad d = \frac{7}{7} = 1$

If the 3rd and the 9th terms of an AP are 4 and -8 respectively, which term of this AP is zero?

Sol. Given, $a_3 = 4$ and $a_9 = -8$

$\Rightarrow$ $a + 2d = 4$ ...(*i*)

and $a + 8d = -8$ ...(*ii*)

Subtracting (*i*) from (*ii*), we have

$\therefore \quad a + 8d - a - 2d = -8 - 4$

$\Rightarrow \quad 6d = -12$

$\Rightarrow \quad d = \frac{-12}{6} = -2$

Now, $a + 2d = 4$

$\Rightarrow \quad a + 2(-2) = 4$

$\Rightarrow \quad a - 4 = 4$

$\Rightarrow \quad a = 4 + 4 = 8$

Let $a_n = 0$

$\Rightarrow \quad a + (n-1)d = 0$

$\Rightarrow \quad 8 + (n-1)(-2) = 0$

$\Rightarrow \quad 8 = 2(n-1)$

$\Rightarrow \quad \frac{8}{2} = n - 1$

$\Rightarrow \quad 4 = n - 1$

$\Rightarrow \quad n = 4 + 1 = 5$

Hence, 5th term is zero.

HOME ASSIGNMENT Ex. 5.2 Q. No 1 to Q10

AHA

1.Which term of the AP : 121, 117, 113, . . ., is its first negative term?

2. The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP.

ODM EDUCATIONAL GROUP
Changing your Tomorrow

THANKING YOU

ODM EDUCATIONAL GROUP