ODM EDUCATIONAL GROUP
Changing your Tomorrow

ARITHMETIC PROGRESSOINS
PPT-3

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 **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.

  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.

LEARNING OUTCOME

1.Students will be able to find nth term from the end of the AP.

2.Students will be able to apply the concept learnt in solving problems.

3.Students will be able to solve real life situations involving AP.

1. How many three-digit numbers are divisible by 7.

How many three-digit numbers are divisible by 7?

Sol. The three-digit numbers which are divisible by 7 are 105, 112, 119, ... 994

Here, $a = 105, d = 7, a_n = 994$

$\therefore \quad a + (n-1)\,d = 994$

$\Rightarrow \quad 105 + (n-1)\,7 = 994$

$\Rightarrow \quad (n-1)\,7 = 994 - 105$

$\Rightarrow \quad 7\,(n-1) = 889$

$\Rightarrow \quad n - 1 = \frac{889}{7} = 127$

$\Rightarrow \quad n = 127 + 1 = 128$

2.Find the 20th term from the last term (towards the first term) of the AP : 3,8,13……,253.
(nth term of an AP from the end = $l - (n - 1)\,d$)

Find the 20th term from the last term of the AP: 3, 8, 13, ... , 253.

Sol. Given, AP is 3, 8, 13, ..., 253

Here, $a = 3, d = 8 - 3 = 5$

First term from the last = 253 then $d = -5$

$$a_{20} = a + 19d$$
$$= 253 + 19(-5)$$
$$= 253 - 95 = 158$$

3.The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.

The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.

Sol. Given, $a_4 + a_8 = 24$ and $a_6 + a_{10} = 44$

$\Rightarrow \quad a + 3d + a + 7d = 24$

and $\quad a + 5d + a + 9d = 44$

$\Rightarrow \quad 2a + 10\,d = 24$ and $2a + 14\,d = 44$

$2a + 14d - 2a - 10d = 44 - 24$

$\Rightarrow \quad 4d = 20 \quad \Rightarrow \quad d = \frac{20}{4} = 5$

Now, $\quad 2a + 10\,d = 24$

$\Rightarrow \quad 2a + 10 \times 5 = 24$

$\Rightarrow \quad 2a = 24 - 50$

$\Rightarrow \quad a = \frac{-26}{2} = -13$

4.Which term of the AP : 3, 15, 27, 39, . . . will be 132 more than its 54th term

Which term of the AP: 3, 15, 27, 39, . . . will be 132 more than its 54th term?

Sol. 3, 15, 27, 39, ...

Here, $a = 3, d = 15 - 3 = 12$

Let $a_n = 132 + a_{54}$

$\Rightarrow a_n - a_{54} = 132$

$\Rightarrow (n - 54)12 = 132$

$[\because a_n - a_k = (n - k)\, d]$

$\Rightarrow n - 54 = \frac{132}{12}$

$\Rightarrow n - 54 = 11$

$\Rightarrow n = 11 + 54 = 65 \quad \therefore a_n = 65$

5.Subba Rao started work in 1995 at an annual salary of Rs 5000 and received an increment of Rs 200 each year. In which year did his income reach Rs 7000.

Subba Rao started work in 1995 at an annual salary of ₹ 5000 and received an increment of ₹ 200 each year. In which year did his income reach ₹ 7000?

Sol. Here, $a = ₹\ 5000,\ d = ₹\ 200$

Let $a_n = ₹\ 7000$

We have, $a + (n-1)\,d = 7000$

$\Rightarrow \quad 5000 + (n-1)\,200 = 7000$

$\Rightarrow \quad (n-1)\,200 = 7000 - 5000$

$\Rightarrow \quad (n-1)\,200 = 2000$

$\Rightarrow \quad (n-1) = \frac{2000}{200}$

$\Rightarrow \quad n - 1 = 10$

$\Rightarrow \quad n = 11$

$\Rightarrow \quad 1995 + 11 = 2006$

Hence, in 2006, Subba Rao's income will reach ₹ 7000.

6.Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12

Determine the AP whose 3rd term is 16 and 7th term exceeds the 5th term by 12.

Sol. Given, $a_3 = 16$

$\Rightarrow \quad a + 2d = 16$ and $a_7 - a_5 = 12$

$\Rightarrow \quad a + 6d - a - 4d = 12$

$\Rightarrow \quad 2d = 12 \quad \Rightarrow \quad d = 6$

Since $a + 2d = 16$

$\Rightarrow \quad a + 2(6) = 16 \quad \Rightarrow \quad a + 12 = 16$

$\Rightarrow \quad a = 16 - 12 = 4$

$\therefore$ The required AP is $4, 4 + 6, 10 + 6, 16 + 6 = 4, 10, 16, 22, \ldots$

ODM EDUCATIONAL GROUP
Changing your Tomorrow

HOME ASSIGNMENT Ex. 5.2 Q. No 11 to Q20

AHA

1. Two APs have the same common difference. The difference between their 1000th terms is 1000, what is the difference between their 10000th terms?

ODM EDUCATIONAL GROUP
Changing your Tomorrow

THANKING YOU

ODM EDUCATIONAL GROUP