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Math'S Arithmetic Progression Questions and Answers with Solution Sample Paper

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Arithmetic Progression

Basic terms used

Consider the following list of numbers

i. 1,2, 3,4 ...

ii. 100, 70,40, 10 ...

Each of the number in the list is called a **term**.

Let us denote the first term of an A. P. by a_1 , second term by a_2 , ... and n^{th} term by a_n and the common difference by d . then the A. P. becomes $a_1, a_2, a_3 \dots a$

So, $a_2 - a_1 = a_3 - a_2 = a_n - a_{n-1} = d$

N^{th} term of an A. P.

The n^{th} term of an A. P. with first term a and common difference d is given by

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

Sum of first n terms of an A. P.

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

$$S = \frac{n}{2} (a + a_n)$$

Q1. For an A. P: 3, 5, 7, 9, 11,13, 15 ... Write the first term a and common difference d .

Ans. Here, $a = 3$

$$d = 5 - 3 = 2$$

Q2. Find 10^{th} term of an A. P: 2,7, 12 ...

Solution: here, $a = 2, d = 7 - 2 = 5, n = 10$

$$a_n = a + (n - 1) d$$

$$a_{10} = 2 + (10 - 1) 5$$

$$= 2 + 45 = 47$$

Q3. Determine the A. P. whose 3rd term is 5 and 7th term is 9.

Solution: we have

$$a_3 = a + (3 - 1) d = 5 \quad (1)$$

$$a_5 = a + (5 - 1) d = 9 \quad (2)$$

Solving the pair of linear equation

$$a = 3, d = 1$$

Hence the required A. P. is 3, 4, 5, 6, 7 ...

Q4. Find the sum of first 22 terms of an A. P: 8, 3, -2 ...

Solution: Here,

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

We know that

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

$$S = \frac{22}{2} [16 + 21 (-5)] = 11 [16 - 105] = 11 (-89) = -979$$

Q5. How many terms of an A. P: 24, 21, 18 ... must be taken so that their sum is 78?

Solution:

Here, $a = 24$,

$$d = 21 - 24 = -3,$$

$$S_n = 78.$$

$$n = ?$$

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

$$78 = \frac{n}{2} [48 + (n - 1) 3]$$

$$(n - 4)(n - 13) = 0$$

$$n = 4 \text{ or } 13$$

Both values of n are admissible. So, the number of terms is either 4 or 13.