

Board – Foundation	Class – 9 <sup>th</sup>	Topic – A.P.
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1. Find 20<sup>th</sup> term from the end of an AP 3, 7, 11 ... 407.

Solution: Given, last term (l) = 407

Common difference (d) = 4

To find: 20<sup>th</sup> term from the end (n = 20)

$$\begin{aligned} \therefore n^{\text{th}} \text{ term from the end} &= l - (n - 1)d \\ &= 407 - (20 - 1)4 \\ &= 331 \end{aligned}$$

Hence, the 20<sup>th</sup> term from the end of the given A.P. is 331 .

2. Find the 8<sup>th</sup> term from the end of an A.P. having a = 7, d = 3 and number of terms equals 60 .

Solution: Given, a = 7, d = 3

m = 60

$$\begin{aligned} \text{So, } n^{\text{th}} \text{ term from the end} &= a + (m - n)d \\ &= 7 + (60 - 8)3 \\ &= 7 + 52 \times 3 \\ &= 7 + 156 = 163 \end{aligned}$$

Hence, the 8<sup>th</sup> term from the end of the given A.P. is 163 .

But n should be a positive integer.

3. Determine the general term of an AP whose 7<sup>th</sup> term is -1 and 16<sup>th</sup> term is 17.

Solution: Let a be the first term and d be the common difference of the given AP

Let the AP be  $a_1, a_2, a_3, \dots, a_n$  It is given that  $a_7 = -1$  and  $a_{16} = 17$

$$\begin{aligned} a + (7 - 1)d &= -1 \Rightarrow a + 6d = -1 \\ \text{and, } a + (16 - 1)d &= 17 \Rightarrow a + 15d = 17 \end{aligned}$$

Subtracting equation (i) from equation (ii),

$$\text{We get, } 9d = 18 \Rightarrow d = 2$$

Putting  $d = 2$  in equation (i), we get;

$$a + 12 = -1 \Rightarrow a = -13$$

Now, general term

$$= a_n = a + (n - 1)d = -13 + (n - 1) \times 2 = 2n - 15$$

4. Which term of the sequence  $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}$  is the 1<sup>st</sup> negative term?

Solution: Here, 1<sup>st</sup> term,  $a = 20$  and common difference,  $d = 19\frac{1}{4} -$

$$20 = -\frac{3}{4}$$

Let  $n^{\text{th}}$  term of the given AP be the 1<sup>st</sup> negative term

$$\therefore a_n < 0 \text{ i.e. } a + (n - 1)d < 0$$

$$\Rightarrow 20 + (n - 1)\left(-\frac{3}{4}\right) < 0 \Rightarrow \frac{83}{4} - \frac{3n}{4} < 0$$

$$\Rightarrow 3n > 83 \Rightarrow n > \frac{83}{3} \Rightarrow n > 27\frac{2}{3}$$

Since 28 is the natural number just greater than  $27\frac{2}{3}$ .

$\therefore$  1<sup>st</sup> negative term is the 28<sup>th</sup> term.

5. If  $m$  times the  $m^{\text{th}}$  term of an AP is equal to  $n$  times its  $n^{\text{th}}$  term. Show that the  $(m + n)^{\text{th}}$  term of A.P. is zero.

Solution: Let  $A$  be the 1<sup>st</sup> term and  $D$  be the common difference of the given AP

Then,  $ma_m = na_n$  (according to the question)

$$\Rightarrow m[A + (m - 1)D] = n[A + (n - 1)D]$$

$$\Rightarrow mA + mD(m - 1) = nA + nD(n - 1)$$

$$\Rightarrow A(m - n) + D[m(m - 1) - n(n - 1)]$$

$$\Rightarrow A(m - n) + D[m^2 - m - n^2 + n]$$

$$\Rightarrow A(m - n) + D[(m^2 - n^2) - (m - n)]$$

$$\Rightarrow A(m - n) + D[(m + n)(m - n) - (m - n)] = 0$$

$$\Rightarrow (m - n)[A + D[(m + n - 1)]] = 0$$

$$\Rightarrow A + (m + n - 1)D = 0$$

$$\Rightarrow a_{m+n} = 0$$

6. Find the 30th term of the A.P.: 10, 7, 4,....

Solution: The given A.P. is 10,7,4, ... ..

Here,  $a = 10$ ,  $d = 7 - 10 = -3$  and  $n = 30$

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

$$\text{So, } a_{30} = 10 + (30 - 1)(-3)$$

$$\Rightarrow a_{30} = 10 - 87 \Rightarrow a_{30} = -77$$

$\therefore$  The 30<sup>A</sup> term of the given A.P. is  $-77$

7. The 6<sup>th</sup> term of an arithmetic progression is -10 and the 10<sup>a</sup> term is -26 . Determine the 15<sup>a</sup> term of the A.P.

Solution: Let the first term and the common difference of the A.P. be  $a$  and  $d$  respectively.

$$6^{\text{th}} \text{ term} = -10 \quad (\text{Given})$$

$$\Rightarrow a + (6 - 1)d = -10 \quad [ \because a_n = a + (n - 1)d ]$$

$$\Rightarrow a + 5d = -10 \quad \dots (i)$$

$$10^{\text{th}} \text{ term} = -26 \quad (\text{Given})$$

$$\Rightarrow a + (10 - 1)d = -26$$

$$\Rightarrow a + 9d = -26 \quad \dots$$

By solving (i) and (ii) we get

$$a = 10, d = -4$$

Therefore, the 15<sup>th</sup> term of the A.P.

$$= a + (15 - 1)d [ \because a_n = a + (n - 1)d ]$$

$$= a + 14d$$

$$= 10 + 14(-4)$$

$$= 10 - 56 = -46$$

Hence, the 15<sup>th</sup> term of A.P. is -46 .