Arithmetic Progressions – Chapter 5/CBSE Class 10 Mathematics

Extra Questions for Practice/Model Question Paper

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1. Find the number of terms in the AP: 7, 13, 19, ----------, 205.

Solution:

Given a = 7, d = 13 – 7 = 6, a_n= 205

We know that a_n= a + (n-1) d = 7 + (n-1)6 = 205

7 + 6n – 6 = 205

6n + 1 = 205

6n = 205 – 1 = 204

n = $\frac{204}{6}$ = 34

So number of terms = 34

2. Find the 25th term of an AP whose 11th term is 38 and the 16th term is 73.

Solution:

Given a_{11}= 38 and a_{16}= 73

i.e. a + 10d = 38

a + 15d = 73

By solving, we get -5d = -35

d = $\frac{-35}{-5}$ = 7

Substitute the value of d = 7 in a + 10d = 38, we get

a + 10 $\times$7 = 38

a + 70 = 38

a = 38 – 70 = -32

a_{25} = a + 24d = (-32) + 24 $\times$ 7 = (-32) + 168 = 136

3. Find a and b so that the numbers a, 9, b, 23 are in AP.

Solution:

Since a, 9, b, 23 are in AP, we know that 9 – a = b – 9 = 23 – b

b – 9 = 23 – b

b + b = 23 + 9 = 32

2b = 32

b = $\frac{32}{2}$ =16

Now 9 – a = b – 9 gives 9 – a = 16 – 9 = 7

-a = 7 – 9 = -2

a = 2

4. Find the sum of first 40 terms of an AP whose n^{th} term is given as a_n= 7 – 3n

Solution:

Given a_n = 7 – 3n

a_1 = 7 – 3 = 4

a_2 = 7 – 3 ×2 = 7 – 6 = 1

d = 1 – 4 = -3

Sum of first 40 terms = S_n = $\frac{n}{2}$[2a + (n – 1) d]

= $\frac{40}{2}$[2×4 + (40 – 1) (-3)]

= 20 [8 + 39 ×(-3)]

= 20[8 + -117]

= 20 × (-109)

= -2180

5. Solve the equation 6 + 12 + 18 + --------+ x = 816

Solution:

Here a = 6, d = 12 – 6 = 6

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

$816 = \frac{n}{2}[2 \times 6 + (n - 1) (6]$

$816 = \frac{n}{2}[12 + 6n - 6]$

$816 = \frac{n}{2} [6n + 6]$

$816 = \frac{n}{2} \times 6(n + 1)$

$816 = 3n (n + 1)$

$272 = n^2 + n$

$n^2 + n - 272 = 0$

$n = \frac{(b)\pm\sqrt{b^2-4ac}}{2a} = \frac{(-1)\pm\sqrt{1-4\times1\times(-272)}}{2} = \frac{(-1)\pm\sqrt{1089}}{2} = \frac{(-1)\pm33}{2}$

$= \frac{-34}{2}$ or $\frac{32}{2}$

= -17 or 16

n = -17 is not possible. So we can take n = 16.

So 16th term is x.

$a_{16} = a + (n - 1) d = x$

$6 + 15 \times 6 = x$

x = 96

6. If the nth term of an AP 12, 16, 20, ---------- is 248, find the value of n?

Solution:

Here a = 12, d = 16 – 12 = 4

a_n = a + (n – 1) d = 248

12 + (n – 1) 4 = 248

12 + 4n – 4 = 248

4n + 8 = 248

4n = 240

n = $\frac{240}{4}$ = 60

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

Solution:

a_{17} = a_{10} + 7

a + 16d = a + 9d + 7

16d – 9d = 7

7d = 7

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

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

Solution:

a_n = 132 + a_{54}

a + (n – 1) d = 132 + a + 53d

(n – 1) d = 132 + 53d

(n – 1) 12 = 132 + 53 $\times$ 12

(n – 1) 12 = 768

(n -1) = $\frac{768}{12}$ = 64

n = 64 + 1 = 65