Arithmetic Progressions/Previous Year Question Paper Questions & Answers

CBSE Class 10 Mathematics/Model Questions/Worksheet

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1. Find the sum of all three digit natural numbers, which are multiples of 11?

Answer:

AP is 110, 121, 132, -------, 990

Here a = 110, d= 121-110 = 11, a_n= 990

We know that a_n= a + (n – 1) d = 110 + (n – 1) 11 = 990

(n – 1) 11 = 990 – 110 = 880

n – 1 = $\frac{880}{11}$ = 80

n = 81

S_{81} = $\frac{81}{2}[2\times 110 + (81 - 1)11]$

= $\frac{81}{2}$ [220 + 880]

= $\frac{81}{2}$ $\times$1100 = 44550

2. Find the 4th term from the end of the AP: -11, -8, -5, ---------, 49

Answer:

Here a = -11, d = (-8) – (-11) = 3, a_n= 49

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

49 = (-11) + (n – 1) 3

49 = (-11) + (n – 1)3

60 = (n – 1) 3

n – 1 = $\frac{60}{3}$ = 20

n = 21

4^{th} term from the end is 18^{th} term.

a_{18} = a + 17d = (-11) + 17 $\times 3$ = (-11) + 51 = 40

3. Find the sum of all natural numbers that are less than 100 and divisible by 4

Answer:

AP is 4, 8, 12, 16, ---------, 96

a_n= a + (n – 1) d

96 = 4 + (n – 1) 4

92 = (n – 1) 4

n- 1 = $\frac{92}{4}$ = 23

n = 24

S_n = $\frac{n}{2}$ $[a_1 + a_n]$= $\frac{24}{2}$ [4 + 96] = 12 $\times$100 = 1200

4. How many two digit numbers are divisible by 7?

Answer:

AP is 14, 21, 28, -------- 98

We know that a_n= a + (n – 1) d

98 = 14 + (n – 1) 7

98 – 14 = (n – 1) 7

84 = (n – 1) 7

n – 1 = $\frac{84}{7}$ = 12

n = 13

5. If $\frac{4}{5}$, a, 2 are three consecutive terms of an AP, find the value of a?

Answer:

Common difference d: a - $\frac{4}{5}$ = 2 – a

a + a = 2 + $\frac{4}{5}$

2a = $\frac{14}{5}$

a = $\frac{14}{10}$ = $\frac{7}{5}$

6. The 4^{th} term of an AP is zero. Prove that the 25^{th} term of the AP is three times its 11^{th} term.

Answer:

Given a_4= a +3d = 0

a = -3d

To prove a_{25} = 3a_{11}

a_{25} = a + 24d = -3d + 24d = 21d --------------- (1)

a_{11} = a + 10d = -3d + 10d = 7d ---------------- (2)

From (1) and (2), a_{25} = 3a_{11}

7. How many terms of the AP: 18, 16, 14, ------------ be taken so that their sum is zero.

Answer:

Here a = 18, d = 16 – 18 = -2, S_n= 0

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

0 = $\frac{n}{2}[2 \times 18 + (n-1)(-2)]$

0 = $\frac{n}{2}$[36 -2n+2]

0 = $\frac{n}{2}$[38 – 2n]

$\frac{n}{2}$ = 0 or 38 – 2n = 0

n = 0 or 38=2n

n = $\frac{38}{2}$ = 19

8. The fourth term of an AP is 11. The sum of the fifth and seventh terms of the AP is 34. Find its common difference?

Answer:

Given a_4= 11, a+3d = 11 ------------------ (1)

$a_5 + a_7$ = 34, a+4d+a+6d = 34

2a + 10d = 34 or a+5d = 17--------------- (2)

Solve these equations, we get

a + 3d = 11 -

a + 5d = 17

-2d = -6

d = $\frac{-6}{-2}$ = 3

9. Which term of the AP: 3, 15, 27, 39, ------------------ will be 120 more than its 21st term?

Answer:

a_n = 120 + a_{21}

a_{21} = a + 20d = 3 + 20 $\times$12 = 3 + 240 = 243

a_n = 120 + a_{21} = 120 + 243 = 363

Now a_n= a+ (n-1) d

363 = 3 + (n -1) 12

363 – 3 = (n – 1) 12

360 = (n – 1) 12

(n – 1) = $\frac{360}{12}$ = 30

n = 30 + 1 = 31

Therefore, 31st term of the given AP is 120 more than the 21st term.

10. If in an AP, a = 15, d= -3 and a_n= 0, then find the value of n?

Answer:

a_n = a + (n – 1) d

0 = 15 + (n -1) (-3)

3(n – 1) = 15

(n – 1) = $\frac{15}{3}$ = 5

n = 5 + 1 = 6