CBSE Class 11 Mathematics

Important Questions

Chapter 9

Sequences and Series

4 Marks Questions

22 23

$$S_n = \frac{a\left(1-r^n\right)}{1-r}$$

24 25

$$= \frac{1\left[1-\left(\frac{2}{3}\right)^n\right]}{1-\frac{2}{3}}$$

26 27

$$= 3\left[1-\left(\frac{2}{3}\right)^n\right]$$

28 29

$$S_5 = 3\left[1-\left(\frac{2}{3}\right)^5\right] = \frac{211}{81}$$

30 31

32

3.Find the sum to n terms of the series $1^2 + \left(1^2+2^2\right) + \left(1^2+2^2+3^2\right) + ----$

33 34

Ans.$a_n = 1^2 + 2^2 + 3^2 + --- + n^2$

35 36

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

37 38

$$S_n = \frac{1}{6}\left[2\sum_{k=1}^{n} k^3 + 3\sum_{k=1}^{n} k^2 + \sum k\right]$$

39 40

$$= \frac{1}{6}\left[2.\frac{n^2(n+1)^2}{4} + \frac{3.n(n+1)(2n+1)}{6} + \frac{n(n+1)}{2}\right]$$

41 42

$$= \frac{n(n+1)}{12}[n(n+1) + (2n+1) + 1]$$

43 44

$$= \frac{n(n+1)}{12}\left(n^2 + n + 2n + 1 + 1\right)$$

45 46

$$= \frac{n(n+1)(n^2 + 3n + 2)}{12}$$

47 48

$$= \frac{n(n+1)^2(n+2)}{12}$$

49 50

51

4.Show that the sum of $(m+n)^{th}$ and $(m-n)^{th}$ terms of an A. P. is equal to twice the m^{th} term.

52 53

Ans. $a_{m+n} = a + (m+n-1)\ d$

54

CBSE Class 12 Mathematics

Important Questions

Chapter 9

Sequences and Series

6 Marks Questions

1. 150 workers were engaged to finish a job in a certain no. of days 4 workers dropped out on the second day, 4 more workers dropped out on the third day and so on. It took 8 more days to finish the work find the no. of days in which the work was completed

Ans. a = 150, d = -4

$$S_n = \frac{n}{2}\left[2\times 150+(n-1)(-4)\right]$$

If total works who would have worked all n days 150(n-8)

$$\text{A T Q } \frac{n}{2}\left[300+(n-1)(-4)\right]=150(n-8)$$

$$n = 25$$

2. Prove that the sum to n terms of the series

$$11+103+1005+----is\ \frac{10}{9}\left(10^n-1\right)+n^2$$

Ans. Sn = 11 + 103 + 1005 + ---- + n terms

Sn = (10+1) + (102 + 3) + (103 + 5) + ----- + [10n + (2n-1)]

$$S_n = \frac{10(10^n-1)}{10-1}+\frac{n}{2}\left(1+2n-1\right)$$

$$= \frac{10}{9}\left(10^n-1\right)+n^2$$

3. The ratio of A M and G. M of two positive no. a and b is m : n show that

$$a:b=\left(m+\sqrt{m^2-n^2}\right):\left(m-\sqrt{m^2-n^2}\right)$$

Ans. $\dfrac{\dfrac{a+b}{2}}{\sqrt{ab}}=\dfrac{m}{n}$

$$\frac{a+b}{2\sqrt{ab}}=\frac{m}{n}$$

by C and D

$$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}}=\frac{m+n}{m-n}$$

$$\frac{\left(\sqrt{a}+\sqrt{b}\right)^2}{\left(\sqrt{a}-\sqrt{b}\right)^2}=\frac{m+n}{m-n}$$

$$\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}=\frac{\sqrt{m+n}}{\sqrt{m-n}}$$

by C and D

$$\frac{\sqrt{a}}{\sqrt{b}}=\frac{\sqrt{m+n}+\sqrt{m-n}}{\sqrt{m+n}-\sqrt{m-n}}$$

Sq both side

$$\frac{a}{b}=\frac{m+\cancel{n}+m-\cancel{n}+2\sqrt{m^2-n^2}}{m+\cancel{n}+m-\cancel{n}-2\sqrt{m^2-n^2}}$$

$$\frac{a}{b}=\frac{m+\sqrt{m^2-n^2}}{m-\sqrt{m^2-n^2}}$$

4. Between 1 and 31, m number have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 7th and (m-1)th no. is 5:9 find the value of m.

Ans. $1, A_1, A_2, A_3, ---A_m, 31$ are in AP

$a = 1$

$a_n = 31$

$a_{m+2} = 314$

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

$31 = a + (m+2-1)d$

$$d = \frac{30}{m+1}$$

$$\frac{A7}{A_{m-1}} = \frac{5}{9} \quad \text{(Given)}$$

$$\frac{1+7\left(\frac{30}{m+1}\right)}{1+(m-1)\left(\frac{30}{m+1}\right)} = \frac{5}{9}$$

$m = 1$

5. The Sum of two no. is 6 times their geometric mean, show that no. are in the ratio (3 + 3 √2) : (3 – 2 √2)

Ans. $a + b = 6\sqrt{ab}$

$$\frac{a+b}{2\sqrt{ab}} = \frac{3}{1}$$

by C and D

$$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}}=\frac{3+1}{3-1}$$

$$\frac{\left(\sqrt{a}+\sqrt{b}\right)^2}{\left(\sqrt{a}-\sqrt{b}\right)^2}=\frac{2}{1}$$

$$\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}=\frac{\sqrt{2}}{1}$$

again by C and D

$$\frac{\sqrt{a}+\sqrt{b}+\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}-\sqrt{a}-\sqrt{b}}=\frac{\sqrt{2}+1}{\sqrt{2}-1}$$

$$\frac{2\sqrt{a}}{2\sqrt{b}}=\frac{\sqrt{2}+1}{\sqrt{2}-1}$$

$$\frac{a}{b}=\frac{\left(\sqrt{2}+1\right)^2}{\left(\sqrt{2}-1\right)^2}$$ (on squaring both side)

$$\frac{a}{b}=\frac{2+1+2\sqrt{2}}{2+1-2\sqrt{2}}$$

$$\frac{a}{b}=\frac{3+2\sqrt{2}}{3-2\sqrt{2}}$$

$$a:b=\left(3+2\sqrt{2}\right):\left(3-2\sqrt{2}\right)$$