SPECTRUM INTERACTIVE LIVE CLASSES

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MATHEMATICS (CBSE-XI) ARITHMETIC PROGRESSIONS-I DPP-10

1. Show that the sequence $\log a,\ \log\left(\frac{a^2}{b}\right), \log\left(\frac{a^3}{b^2}\right), \log\left(\frac{a^4}{b^3}\right) \dots\dots\dots$ forms an A.P.
2. The nth term of a sequence is $3n-2$. Is the sequence an A.P.? if so find its 10th term. [28]
3. A sequence is defined by $a_n = n^3 - 6n^2 + 11n - 6,\ n \in N$. Show that the first term of the sequence are zero and all other terms are positive.
4. The nth of a sequence is given by $a_n = 2n^2 + n + 1$. Show that it is not an A.P.
5. Let $< a_n >$be a sequence defined by $a_1 = 3$ and $a_n = 3a_{n-1} + 2$, for all $n > 1$. Find the first four terms of the sequence. [3,11,35,107]
6. The Fibonacci sequence is defined by $a_1 = 1 = a_2, a_n = a_{n-1} + a_{n-2}$ for $n > 2$. Find $\frac{a_{n+1}}{a_n}$ for $n = 1,2,3,4,5$.
7. Show that the sequence $\log a \log(ab), \log(ab^2), \log(ab^3), \dots\dots$ is an A.P. find its nth term.
8. Which terms of the sequence of the sequence $4,9,14,19, \dots\dots is\ 142$? [25th]
9. Which term of the sequence $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}$ is the first negative terms? [28]
10. Which terms of the sequence $8-6i, 7-4i, 6-2i, \dots\dots\dots$ is (i) purely real (ii) purely imaginary? [4th, 9th]
11. If pth, qth and rth terms of an A.P are a,b,c respectively, then show that: (i) $a(q-r) + b(r-p) + c(p-q) = 0$ (ii) $(a-b)r + (b-c)p + (c-a)q = 0$
12. If m times of the mth terms of an A.P is equal to n times its nth term, show that (m+n)th term of the A.P is zero.
13. If the pth term of an A.P is q and qth term is p, prove that its nth term $(p+q-n)$.
14. If the mth term of an A.P is 1/n and nth term be 1/m, then show that its (mn)th term is 1.
15. Determine the number of terms in the A.P 3,7,11………407. Also, find the 20th term from the end. $[n = 102, 331]$
16. How many number of two digits are divisible by 7? [13]
17. If an A.P the sum of the terms equidistance from the beginning and end is always same and equal to the sum first and last terms.
18. If the 9th term of an A.P is zero, prove that its 29th is double the 19th term.
19. In a certain A.P the 24th term is twice the 10th term. Prove that the 72th term is twice the 34th term.
20. If (m+1)th term of an A.P is twice the (n+1)th term, prove that (3m+1)th term is twice the (m+n+1)th term.
21. Find the 2nd term and nth term of an A.P. whose 6th term is 12 and the 8th term is 22. $[-8, 5n-18]$
22. The sum of 4th and 8th term of an A.P is 24 and the sum of the 6th and 10th term is 34. Find the first term and the common difference of the A.P $[-\frac{1}{2}, \frac{5}{2}]$
23. The first and the last term of an A.P are a and l respectively. Show that the sum of nth term from the beginning and the nth term from the end is $a + l$.
24. If $< a_n >$ is an A.P such that $\frac{a_4}{a_7} = \frac{2}{3}$, find $\frac{a_6}{a_8}$.
25. Find four number in A.P whose sum is 20 and the sum of whose squares is 120. [2,4,6,8 or 8,6,4,2]
26. Divide 32 into four parts which are in A.P. such that the product of extremes is to the products of means is 7:15. [2,6,10,14]
27. Find the sum of the series: $5 + 13 + 21 + \cdots \dots\dots + 181$. [2139]
28. Find the sum of all three digit natural number, which are divisible by 7. [70336]
29. Find the sum of all natural number between 250 and 1000 which are exactly divisible by 3. [156375]
30. Prove that a sequence is an A.P. if the sum of its n terms is of the form $An^2 + Bn$, where A and B are constants.

31. Find the sum of first 20 terms of an A.P., in which 3rd term is 7 and 7th term is two more than thrice of its 3rd term. [740]
32. Find the sum of first 24 terms of the $A.P\ a_1, a_2, a_3, \dots\dots\dots$, if it is known that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$. [900]
33. If the mth term of an A.P is 1/n and the nth term is 1/m, show that the sum of mn terms is $\frac{1}{2}(mn+1)$.
34. Find the number of terms in the series $20, 19\frac{1}{2}, 18\frac{2}{3} \dots\dots\dots$ of which the sum is 300, explain the double answer. [25 or 36]
35. If the first term of an A.P is 2 and the sum of first five terms is equal one fourth of the sum of the next five terms, find the sum of first 30 terms. $[-2550]$
36. The sum of the first p, q, r terms of an A.P are a, b, c respectively. Show that $\frac{a}{p}(q-r) + \frac{b}{q}(r-p) + \frac{c}{r}(p-q) = 0$.
37. The sum of $n, 2n, 3n$ terms of an A.P are S_1, S_2, S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$
38. The pth term of an A.P is a and qth term is b. Prove that the sum of $(p+q)$terms is $\frac{p+q}{2}\left\{a + b + \frac{a-b}{p-q}\right\}$.
39. If the sum of m terms of an A.P is the same as the sum of its n terms, show that the sum of its $(m+n)$terms is zero.
40. If in an A.P the sum of m terms is equal to n and the sum of n terms is equal to m, then prove that the sum of $(m+n)$ terms is $-(m+n)$.
41. The ratio of the sum of n terms of two A.P's is $(7n+1):(4n+27)$. Find the ratio of there mth terms. $[(14m-6):(8m+23)]$
42. The interior angles of a polygon are in A.P. The smallest angle is $120°$ and the common difference is $5°$. Find the number of the polygon. [9]
43. If $S_1, S_2, S_3, \dots \dots S_m$ are the sum of n terms of m A.P.'s fires term are 1,2,3………..m and common difference are 1,2,3,………..,(2m−1) respectively. Show that $S_1 + S_2 + S_3 + \cdots . + S_m = \frac{mn}{2}(mn+1)$.
44. If $S_n = n^2 p$ and $S_m = m^2 p$, $m \neq n$, in an $A.P.$, prove that $S_p = p^3$.
45. If S_1 be the sum of $(2n+1)$ terms of an A.P. and S_2 be the sum of its odd terms, then prove that $S_1 : S_2 = (2n+1):(n+1)$.
46. Find an A.P in which the sum of any number of terms is always three times the squared number of these terms. [3,9,15,21.]
47. If the sum of n terms of an A.P is $nP + \frac{1}{2}n(n-1)Q$, where P and Q are constant, find the common difference. [Q]
48. If a^2, b^2, c^2 are in A.P, then prove that the following are also in A.P. (i) $\frac{1}{a+b}, \frac{1}{c+a}, \frac{1}{a+b}$ (ii) $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$
49. If $\frac{b+c-a}{a}, \frac{c+a-b}{b}, \frac{a+b-c}{c}$ are in A.P., prove that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are also in A.P.
50. If $a^2 + 2bc, b^2 + 2ac, c^2 + 2ab$ are in A.P., show that $\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$ are in A.P.
51. If $(b-c)^2, (c-a)^2, (a-b)^2$ are in A.P, prove that $\frac{1}{b-c}, \frac{1}{c-a}, \frac{1}{a-b}$ are in A.P.
52. If a, b, c are in A.P., then prove that: (i) $(a-c)^2 = 4(b^2 - ac)$ (ii) $a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$
53. If $a^2(b+c), b^2(c+a), c^2(a+b)$ are in A.P., show that either a, b, c are in A.P. or $ab + bc + ca = 0$.