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ARITHMETIC PROGRESSIONS

ASSIGNMENT NO. 4

1. Find the sum of 2n terms of the series: $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \cdots$
2. If $\mathrm{S_n}$ denotes the sum of n terms of an A.P. whose common difference is d, show that $\mathrm{d} = \mathrm{S_n} - 2\mathrm{S_{n-1}} + \mathrm{S_{n-2}}$
3. Find the sum of all three – digit numbers each of which leaves the remainder 2, when divided by 3.
4. If $\mathrm{a_1, a_2, a_3, \ldots \ldots, a_n}$ are consecutive terms of an A.P., then prove that $\frac{1}{a_1a_2} + \frac{1}{a_2a_3} + \cdots \ldots \ldots \ldots \ldots + \frac{1}{a_{n-1}a_n} = \frac{n-1}{a_1a_n}$
5. The angles of a quadrilateral are in A.P. The greatest angle is double the least. Find all four angles.
6. If a_m, a_{m+n} and a_{m-n} are respectively the $m^{th}, (m+n)^{th}$ and $(m-n)^{th}$ term of an A.P., then prove that $a_{m+n} + a_{m-n} = 2\,a_m$.
7. Show that the sum of an A.P. whose first term is a, the second term b and the last term c, is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$
8. Find a, b and c such that the following numbers are in A.P. : $a, 7, b, 23, c$
9. Determine k so that $k^2 + 4k + 8, 2k^2 + 3k + 6$ and $3k^2 + 4k + 4$ are three consecutive terms of an A.P.
10. Find the sum: $\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b} + \cdots \ldots \ldots ..$ to 11 terms.
11. A thief runs away from a police station with a uniform speed of 100m/minute. After one minute a policeman runs behind the thief to catch him. He goes at a speed of 100 m/minute in first minute and increases his speed 10 m each succeeding minute. After how many minutes, the policeman will catch the thief?