

CLASS 10

MATHS

EXTRA QUESTIONS

Extra Questions: Class 10 Maths Chapter 5 Arithmetic Progressions

Fresh, reasoning-heavy AP problems beyond the standard exercise. See the standard-level Solutions first if you haven't already.

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Extra Questions (HOTS Level): Arithmetic Progressions (Class 10 Maths Chapter 5)

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Extra Questions (HOTS Level): Arithmetic Progressions (Class 10 Maths Chapter 5)

Q1. The sum of three consecutive terms of an AP is 36, and the sum of their squares is 464. Find the terms.

Let the terms be $(a-d)$, a , $(a+d)$. Sum = $3a = 36$, so $a = 12$.

Sum of squares: $(a-d)^2 + a^2 + (a+d)^2 = 464 \rightarrow 3a^2 + 2d^2 = 464 \rightarrow 3(144) + 2d^2 = 464 \rightarrow 2d^2 = 32 \rightarrow d^2 = 16 \rightarrow d = 4$.

Terms: 8, 12, 16.

Q2. Assertion-Reason: Assertion (A): The sequence 1, 4, 9, 16, 25, ... is an AP. Reason (R): A sequence is an AP if the difference between any two consecutive terms is constant. Choose: (i) Both A and R true, R explains A (ii) Both true, R doesn't explain A (iii) A true, R false (iv) A false, R true.

The given sequence is squares of natural numbers ($1^2, 2^2, 3^2, 4^2, 5^2$); differences are 3, 5, 7, 9 — not constant, so it is NOT an AP. R is a true, correct definition of an AP.

Answer: (iv) A is false, R is true.

Q3. A construction company stacks pipes so that each row has one fewer pipe than the row below, starting with 20 pipes in the bottom row and ending with 1 pipe at the top. How many pipes are there in total, and how many rows?

This is an AP: 20, 19, 18, ..., 1 with $a=20$, $d=-1$, $l=1$. Number of terms: $1=20+(n-1)(-1) \rightarrow n=20$. Sum = $n(a+l)/2 = 20(21)/2 = 210$ pipes in 20 rows.

Q4. If the m th term of an AP is $1/n$ and the n th term is $1/m$, show that the sum of the first mn terms is $(mn+1)/2$.

$a+(m-1)d = 1/n$ and $a+(n-1)d = 1/m$. Subtracting: $(m-n)d = 1/n - 1/m = (m-n)/mn$, so $d = 1/mn$.

Substituting back: $a = 1/n - (m-1)/mn = (m - (m-1))/mn = 1/mn$.

$S_{mn} = (mn/2)[2a+(mn-1)d] = (mn/2)[2/mn + (mn-1)/mn] = (mn/2) \cdot (mn+1)/mn = (mn+1)/2$. (Shown.)

Q5. A hall has 30 rows. The first row has 20 seats, and each subsequent row has 2 more seats than the previous row. Find the total seating capacity of the hall.

$a=20$, $d=2$, $n=30$. $S_{30} = (30/2)[2(20)+29(2)] = 15[40+58] = 15(98) = 1470$ seats.

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