Arithmetic Progression Class 10: Formulas & Examples

Use the nth-term and sum formulas for an arithmetic progression, with worked examples, a formula sheet and practice answers.

Name: _____ Date: _____

An arithmetic progression (AP) is a sequence with the same difference between every pair of consecutive terms. Before using an AP formula, subtract adjacent terms. A pattern that looks regular, such as 2, 4, 8, 16, is not an AP because its differences change.

AP formula sheet

Quantity	Formula	Meaning
Common difference	$d = a_2 - a_1$	Subtract an earlier term from the next one.
nth term	$a\square = a + (n - 1)d$	a is the first term; n counts positions starting at 1.
Sum of first n terms	$S\square = n[2a + (n - 1)d]/2$	Adds the first n terms, not the nth term alone.
Sum when last term l is known	$S\square = n(a + l)/2$	Use when n and the first and last terms are known.

Find a term and a position

The AP 7, 11, 15, …

1. a = 7 and d = 4. The 20th term is 7 + 19 × 4 = 83.

2. To locate 67, solve 67 = 7 + (n − 1)4. Then n − 1 = 15, so n = 16.

3. To test 68, the same calculation gives n = 16.25. Positions are positive integers, so 68 is not a term.

Find a sum

Add the first 20 terms of 7, 11, 15, …

1. The last of these terms is 83. Pair the first and last: 7 + 83 = 90.

2. There are 10 such pairs, so $S_{20} = 10 \times 90 = 900$.

3. The formula agrees: 20[14 + 19 × 4]/2 = 900.

Decreasing sequences

The AP 30, 27, 24, …

1. d = 27 − 30 = −3. The tenth term is 30 + 9(−3) = 3.

2. $S_{10} = 10(30 + 3)/2 = 165$.

3. Keep d negative throughout; do not turn a decreasing AP into an increasing one.

Practice with answers

1. Find the 15th term of 4, 9, 14, … Answer: 4 + 14 × 5 = 74.

2. Find the sum of the first 12 positive multiples of 3. Answer: 3 + 6 + … + 36 = 12(3 + 36)/2 = 234.

3. Is 52 a term of 5, 11, 17, …? Answer: no; solving gives n = 53/6, not a positive integer.

4. A student saves ☐10 in week 1 and ☐5 more each successive week. Find the first 8 weeks' total. Answer: 8[20 + 7 × 5]/2 = ☐220.

Always label whether your answer is a single term or a total. The twentieth term in the first example is 83, but the sum of twenty terms is 900. Confusing a☐ with S☐ is a common source of otherwise correct-looking answers.

Topic reference: NCERT Mathematics, Arithmetic Progressions: https://ncert.nic.in/textbook/pdf/jemh105.pdf

AI-assisted material; source and answer checks by Codex (AI content review). Report errors through the lesson page.

Read the current web version: https://udayy.com/en/lesson/arithmetic-progression-class-10-formulas