

10-2A Arithmetic Sequences

sequence: a set of numbers in a specific order.

term: each number in a sequence.

- 1st term in a sequence is a_1 .
- 2nd term in a sequence is a_2 .
- the n^{th} term in a sequence is a_n .

definition of an arithmetic sequence: a sequence in which each term, after the 1st term, is found by adding a constant, called the **common difference**, to the previous term.

$n = \# \text{ of terms}$

n^{th} term of an arithmetic sequence: the n^{th} term, a_n , of an arithmetic sequence with first term a_1 and common difference d is given by:

$$a_n = a_1 + (n - 1)d$$

$d = a_2 - a_1$
 $a_4 - a_3$

arithmetic means: the terms between any two non-consecutive terms of an arithmetic sequence.



Examples

1. Find the next four terms in the arithmetic sequence 33, 39, 45, ...

$$51, 57, 63, 69$$

$$\frac{39}{6} - \frac{33}{6} = \frac{45}{6} - \frac{39}{6} \quad d = 6$$

Find the n th term of each arithmetic sequence.

2. $a_1 = -5, d = 4, n = 9$

$$a_n = a_1 + (n-1)d$$

$$a_9 = -5 + (9-1)4$$

$$a_9 = -5 + 8 \cdot 4$$

$$a_9 = -5 + 32$$

$$a_9 = 27$$

$$-5, -1, 3, 7, 11, 15, 19, 23, 27$$

$$a_n = -5 + (n-1)4$$

$$a_n = -5 + 4n - 4$$

$$a_n = -9 + 4n$$

3. $a_1 = 3, d = -4, n = 6$

$$a_n = a_1 + (n-1)d$$

$$a_6 = 3 + (6-1)(-4)$$

$$a_6 = 3 + 5(-4)$$

$$a_6 = 3 - 20$$

$$a_6 = -17$$

4. Find the four arithmetic means between 19 and 54.

$$19, \boxed{26, 33, 40, 47}, 54 \quad n=6$$

(Note: The numbers 26, 33, 40, 47 are underlined and have a red box around them. Above each number is a red '+7'. Below 19 is a red 'a₁' and below 54 is a red 'a_n'.)

$$a_n = a_1 + (n-1) \cdot d$$

$$54 = 19 + (6-1) \cdot d$$

$$54 = 19 + 5d$$

$$35 = 5d$$

$$\underline{7 = d}$$

5. Find the missing terms of the sequence.

$23, 17, 11, 5, -1, -7$ $n = \cancel{5}$

$\cancel{a_1}$ $\cancel{a_5}$

$$a_n = a_1 + (n-1)d$$

$$-7 = 17 + (5-1)d$$

$$-7 = 17 + 4d$$

$$-24 = 4d$$

$$-6 = d$$

~~5~~ \rightarrow $\dots 101$

5, 8, \dots 101



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14-19 all
20-38 evens
(skip 32)**

