

Arithmetic Sequences:

- Determine whether a sequence is arithmetic
- Find the terms of an arithmetic sequence
- Express the n th term of an arithmetic sequence
- Find the partial sum of an arithmetic sequence

Rule for an arithmetic sequence:

1-4 Sequence is given.

- (a) Find the first 5 terms of the sequence
- (b) What is the common difference d ?
- (c) Graph the terms you found in (a)

2. $a_n = 3 - 4(n - 1)$

5-8 Find the n th term of the arithmetic sequence with given first term a and common difference d .
What is the 10th term?

6- $a = -6, d = 3$

9-16 Determine whether the sequence is arithmetic.
If it is arithmetic, find the common difference.

10. 3, 6, 9, 13

17-22 Find the first five terms of the sequence and determine if it is arithmetic.
If it is arithmetic, find the common difference and express the n th term
of the sequence in the standard form $a_n = a + (n - 1)d$

20. $a_n = 1 + \frac{n}{2}$

23-32 Determine the common difference, the fifth term, the n th term, and the 100th term of the arithmetic sequence.

26. 11, 8, 5, 2, ...

32. $-t, -t + 3, -t + 6, -t + 9, \dots$

34. The 12th term of an arithmetic sequence is 32, and the 5th term is 18. Find the 20th term.

The Sum of a Finite Arithmetic Series.

39-44 Find the partial sum S_n

42. $a = 100, d = -5, n = 8$

45-50 A partial sum of an arithmetic sequence is given. Find the sum.

45. $1 + 5 + 9 + \dots + 401$

56. An arithmetic sequence has first term $a_1 = 1$
And fourth term $a_4 = 16$.

How many terms of this sequence must be added to get 2356?

Arithmetic Sequences:

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Rule for an arithmetic sequence:

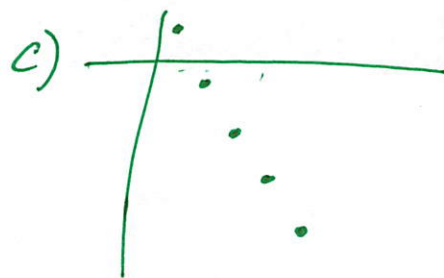
$$a_n = a + (n-1)d$$

a : first term in the sequence
 d : common difference

1-4 Sequence is given.

- (a) Find the first 5 terms of the sequence
 (b) What is the common difference d ?
 (c) Graph the terms you found in (a)

2. $a_n = 3 - 4(n-1)$ a) 3, -1, -5, -9, -13
 b) -4



5-8 Find the n th term of the arithmetic sequence with given first term a and common difference d .
 What is the 10th term?

6- $a = -6, d = 3$ $a_n = -6 + (n-1)(3)$
 $a_{10} = -6 + (9)(3) = 21$

9-16 Determine whether the sequence is arithmetic.
 If it is arithmetic, find the common difference.

10. 3, 6, 9, 13 No

$$6 - 3 = 3$$

$$9 - 6 = 3$$

$$13 - 9 = 4$$

17-22 Find the first five terms of the sequence and determine if it is arithmetic.
 If it is arithmetic, find the common difference and express the n th term
 of the sequence in the standard form $a_n = a + (n-1)d$

20. $a_n = 1 + \frac{n}{2}$

$$d = \frac{1}{2}$$

$$a_1 = 1 + \frac{1}{2} = \frac{3}{2}$$

$$a_4 = 1 + \frac{4}{2} = 3$$

$$a_n = \frac{3}{2} + (n-1)\frac{1}{2}$$

$$a_2 = 1 + \frac{2}{2} = 2$$

$$a_5 = 1 + \frac{5}{2} = \frac{7}{2}$$

$$a_3 = 1 + \frac{3}{2} = \frac{5}{2}$$

23-32 Determine the common difference, the fifth term, the nth term, and the 100th term of the arithmetic sequence.

$$a_n = 11 + (n-1)(-3)$$

26. 11, 8, 5, 2, ... $d = -3$

$$a_5 = 11 + 4(-3) = -1$$

$$a_{100} = 11 + 99(-3) = -286$$

32. $-t, -t+3, -t+6, -t+9, \dots$

$$d = 3$$

$$a_n = \boxed{-t+12}$$

$$-t + (n-1)3$$

$$a_{100} = -t + 99(3)$$

$$= -t + 297$$

34. The 12th term of an arithmetic sequence is 32, and the 5th term is 18. Find the 20th term.

$$d = \frac{32-18}{12-5} = \frac{14}{7} = 2 \quad a_1 = 18 - 4(2) = 10$$

$$a_n = 10 + (n-1)2$$

$$a_{20} = 10 + 19(2) = 48$$

The Sum of a Finite Arithmetic Series.

$$S_n = n \left(\frac{a + a_n}{2} \right)$$

$$S_n = \frac{n}{2} (2a + (n-1)d)$$

n : # terms

a : first term

a_n : last term

d : common difference

39-44 Find the partial sum S_n

42. $a = 100, d = -5, n = 8$

$$S_n = \frac{8}{2} (2(100) + (8-1)(-5))$$

$$4(200 - 35) = 660$$

45-50 A partial sum of an arithmetic sequence is given. Find the sum.

45. $1 + 5 + 9 + \dots + 401$

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

$$401 = 1 + (n-1)4$$

$$400 = (n-1)4$$

$$100 = (n-1) \quad n = 101$$

$$101 \left(\frac{1+401}{2} \right)$$

$$= 302$$

56. An arithmetic sequence has first term $a_1 = 1$
And fourth term $a_4 = 16$.

$$d = \frac{16-1}{4-1} = \frac{15}{3} = 5$$

How many terms of this sequence must be added to get 2356?

$$\frac{3 \pm \sqrt{9 - 4(5)(-4712)}}{2(5)}$$

$$\frac{3 \pm 307}{10} = \frac{310}{10} = 31$$

$$2356 = \frac{n}{2} (2(1) + (n-1)5)$$

$$4712 = n(2 + 5n - 5)$$

$$4712 = 5n^2 - 3n$$

$$5n^2 - 3n - 4712 = 0$$

$$(5n+152)(n-31) = 0$$

$$\boxed{n = 31}$$