Ch 11

Sequence

A list of numbers in a particular order. Each number in a sequence is called a term.

The terms of an arithmetic sequence are labeled $a_1, a_2, a_3, \ldots$ and so on.

a_1 a_2 a_3

1, 2, 3, 5, 8, 13, 21, . . .

Arithmetic Sequence

A sequence in which each term after the first term is found by adding a constant, called the common difference ***(d)*** to the previous term.

Find the next four terms of the arithmetic sequence:

-8, -6, -4, . . .

+2 +2

d = 2

The following formula generalizes this pattern for any arithmetic sequence:

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

$a_{10} = a_1 + (10-1)d$

a_n - n^{th} term
a_1 – first term
d – common difference
n – any positive integer

$a_1, \_\_, \_\_, \_\_, \ldots \_\_\_\_$
10th
a_{10}

For the example, find the 5th term using the formula

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

-8, -6, -4, -2, 0, 2, . . .

$a_n = a_5 = ?$

$a_1 = -8$

$d = +2$

$n = 5$

$a_5 = -8 + (5-1)2$

$a_5 = -8 + 4(2)$

$a_5 = 0$

Find the first 5 terms of the sequence with $a_1 = 5, d = 3$

5, 8, 11, 14, 17, ...

×3 ×3 ×3

Find the first 5 terms of the sequence with $a_1 = 14, d = -2$

14, 12, 10, 8, 6, . . .

-2 -2 -2 -2

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

Write an equation for the nth term of the arithmetic sequence 1, -1, -3, -5, . . .

-2 -2

$a_1 = 1$

$d = -2$

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

$a_n = 1 - 2n + 2$

$a_n = -2n + 3$

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

Write an equation for the nth term of the arithmetic sequence -8, -6, -4, . . .

$d = 2$

$a_1 = -8$

$a_n = -8 + (n-1)(2)$

$a_n = -8 + 2n - 2$

$\boxed{a_n = 2n - 10}$

Find the 52ND term

$n = 52$

$a_{52} = 2(52) - 10$

$a_{52} = 104 - 10$

$a_{52} = 94$

1) $-22, -10, -4, -1, \ldots$

$+12 \quad +6 \quad +3 \quad +2$

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6) $-2, 1, 6, 13$

SKIP 1-12

13) $a_1 = 16 \quad d = -100$

16, −84, −184, −284, −384, ...
(−100, −100, −100)

15) $a_1 = -28, d = 2$

−28, −26, −24, −22, −20, ...
(+2, +2, +2, +2)

17) $a_2 = 16, d = -20$

36, 16, −4, −24, −44, ...
(−20, −20, −20)

19) $a_2 = -208 \quad d = -200$

−8, −208, −408, −608, −808, ...
(−200, −200, −200, −200)

21) $a_n = 4 + 7n$

$a_1 = 4 + 7(1) = 11$
$a_2 = 4 + 7(2) = 18$ } $d = 7$

11, 18, 25, 32, 39, ...
(+7, +7, +7, +7)

23) $a_n = -3 - 30n$

$a_{n=1} = -3 - 30(1) = -33$
$a_{n=2} = -3 - 30(2) = -63$ } $d = -30$

−33, −63, −93, −123, −153, ...
(−30, −30, −30)

25) $a_n = 41 - 10n$

$a_1 = 41 - 10(1) = 31$
$a_2 = 41 - 10(2) = 21$ } $d = -10$

$a_{52} = 41 - 10(52) = -479$

31, 21, 11, 1, −9, ... −479

27) $a_n = -9 - 4n$

−13, −17, −21, −25, −29

$a_{52} = -217$

$a_1 = -9 - 4 = -13$
$a_2 = -9 - (4 \cdot (2)) = -17$ } $d = 4$

$a_{52} = -9 - 4(52) = -217$

29) $a_1 = -25 \quad a_n = a_1 + (n-1)d$

$a_{n=3} = -21$

$a_3 = a_1 + (3-1)d$

$-21 = -25 + (3-1)d$
(+25, +25)

$4 = (3-1)d$
$4 = 2d$
$2 = d$

−21, −23, −25

31) $a_1 = 29$
$a_4 = 41$ (n = 4) } $41 = 29 + (4-1)d$
(−29, −29)

$12 = (4-1)d$
$12 = 3d$
$4 = d$

29, 33, 37, 41
(a_1, a_2, a_3, a_4)