Precalc 12.1

Find the nth term and arithmetic means of a sequenc
Find the sum of n terms of an arithmetic sequence

sequence

Read: Math Curse

arithmetic sequence

term $a_1 =$

common difference $d =$

recursive formula

explicit formula



arithmetic means

arithmetic series Sum n terms Sog

$n = ?$

Arithmetic Sequence	An arithmetic sequence is a sequence in which each term after the first, a_1, is equal to the sum of the preceding term and the common difference, d. The terms of the sequence can be represented as follows. $a_1, a_1 + d, a_1 + 2d, \ldots$

Sum of a Finite Arithmetic Series

The sum of the first n terms of an arithmetic series is given by $S_n = \frac{n}{2}(a_1 + a_n)$.

Example 5 **Find the sum of the first 60 terms in the arithmetic series $9 + 14 + 19 + \cdots + 304$.**

$$\frac{n}{2}(a_1 + a_n)$$

$$= 30(9 + 304) = 9420$$

43. Find the sum of the first 11 terms in the series $\frac{3}{2} + 1 + \frac{1}{2} + \ldots$.

$S = \frac{11}{2}\left(\frac{3}{2} + -3.5\right) = -11$

$a_{11} = \frac{3}{2} + (10)\left(-\frac{1}{2}\right)$

$\frac{3}{2} - 5 = -3.5$

45. Find the sum of the first 26 terms in the series $-19 - 13 - 7 - \ldots$.

$13(-19 + 131) = 1456$

$a_{26} = -19 + 25(6)$

$= 131$

$n = ?$ $a_8 = -7 + 7(1.5)$ $n = 8$

46. Find n for a series for which $a_1 = -7$, $d = 1.5$, and $S_n = -14$.

$= \frac{8}{2}(-7 + 3.5)$

$= 4(-3.5)$

$= -14$

2. 1.

$-14 = \frac{n}{2}(-7 + \overbrace{-8.5 + 1.5n}^{-15.5})$

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

$= -7 + (n-1)(1.5)$

$= -7 + 1.5n - 1.5$

$= -8.5 + 1.5n$

$-28 = -15.5n + 1.5n^2$

$1.5n^2 - 15.5n + 28 = 0$

$a \quad b \quad c$

What is 1st term?
Last term?
Gauss...

$$n = \frac{15.5 \pm \sqrt{(-15.5)^2 - 4 \cdot 1.5 \cdot 28}}{1.5 \cdot 2}$$

$$n = \frac{15.5 \pm \sqrt{240.25 - 168}}{3} = \frac{15.5 \pm \sqrt{72.25}}{3}$$

$$= \frac{15.5 \pm 8.5}{3} = \frac{24}{3} = 8$$

$$= \frac{7}{3}$$

$n = ?$



REAL ESTATE Ofelia Gonzales sells houses in a new development. She makes a commission of $3750 on the sale of her first house. To encourage aggressive selling, Ms. Gonzales' employer promises a $500 increase in commission for each additional house sold. Thus, on the sale of her next house, she will earn $4250 commission. How many houses will Ms. Gonzales have to sell for her total commission in one year to be at least $65,000? *This problem will be solved in Example 6.*

$\geq 65{,}000$

3750 4250 4750 ...

$2 \cdot 68000 = \frac{2 \cdot n}{2}(3750 + 3250 + 500n)$

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

$3750 + (n-1)500$

$= 3750 + 500n - 500$

$= 3250 + 500n$

$\frac{130{,}000}{500} = \frac{7000n}{500} + \frac{500n^2}{500}$

$260 = 14n + n^2$

$n^2 + 14n - 260 = 0$

$n = \frac{-14 \pm \sqrt{14^2 - 4 \cdot 1 \cdot -260}}{2}$

$= \frac{-14 \pm \sqrt{196 + 1040}}{2} = \frac{-14 \pm \sqrt{1236}}{2} = \frac{-14 \pm 35.2}{2}$

10.6

-24.6

(11)

6 REAL ESTATE Refer to the application at the beginning of the lesson. How many houses will Ms. Gonzales have to sell for her total commission in one year to be at least $65,000?

1st term?
Last term?
Gauss…

WB 12.1