Precalc 12.1

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

sequence

Read: Math Curse

arithmetic sequence +

term 3, 5, 7, 9, ...

common difference d

recursive formula in terms of previous values
$a_n = a_{n-1} + 2$
$a_1 = 3$ $n \geq 2$

* explicit formula $a_n = 3 + (n-1)\cdot 2$
$= 3 + 2n - 2$
$a_n = 1 + 2n$

arithmetic means

arithmetic series sum of seq.

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 $9 + 14 + 19 + \cdots + 304$.**

$30(313) =$

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

a_1

$a_{11} = ? \quad \frac{-7}{2}$

$= a_1 + 10d$

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

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

$= \frac{3}{2} - \frac{10}{2} = \frac{-7}{2}$

$\frac{11}{2} \cdot \left(\frac{3}{2} + \frac{-7}{2}\right)$

$\frac{11}{2}\left(\frac{-4}{2}\right)$

$\frac{11}{2}(-2)$

$= -11$

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

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

$= -19 + 150$

$= 131$

$13(-19 + 131)$

1456

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

$-14 = 4(-7+3.5)$

which term?

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

$2 \cdot -14 = 2 \cdot \left(\frac{n}{2}\right)(-15.5 + 1.5n)$

$-28 = n(-15.5 + 1.5n)$

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

$-56 = -31n + 3n^2$

$3n^2 - 31n + 56 = 0$

$n = 8$ $\quad a_8 = 3.5$

$= -7 + 7(1.5)$

$= -7 + 10.5$

$a_n = -7 + (n-1)2$

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

$= -7 + 1.5n - 1.5$

$a_n = -8.5 + 1.5n$

What is 1st term?
Last term?
Gauss

$n = \frac{31 \pm \sqrt{(-31)^2 - 4 \cdot 3 \cdot (56)}}{6}$

$n = 8$

$n =$

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.*

$a_n = 3750 + (n-1)500$

$= 3750 + 500n - 500$

$= 3250 + 500n$

n = ?	
1	3750
2	4250
3	4750
4	5250
⋮	

$\frac{n}{2}(3750 + 3250 + 500n) \geq 65{,}000$

$\frac{n}{2}(7000 + 500n) = 65{,}000$

$\frac{3500n}{250} + \frac{250n^2}{250} = \frac{65{,}000}{250}$

$14n + n^2 = 260$

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

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

$= \frac{-14 \pm \sqrt{1236}}{2}$ $= \frac{-14 \pm 35.15}{2}$

$n = 10.6$

at least 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?**

WB 12.1

1st term?
Last term?
Gauss…