## WARMUP

1) Calculate the sum $\sum_{k=1}^{6} (3k-7)$

2) What is the 30th term of 2, 5, 8, 11, 14, .... ?

3) What is the 900th term of 4, 9, 14, 19, 24, ... ?

1) $(3\cdot1-7)+(3\cdot2-7)+(3\cdot3-7)+(3\cdot4-7)+(3\cdot5-7)+(3\cdot6-7)$

$-4+(-1)+2+5+8+11=21$

2) $2+29\cdot3=89$

3) $4+899\cdot5=4499$ $\quad 4+899\cdot5=900\cdot5-1$

65) $\sum_{k=1}^{4} (k^3-1)=(1^3-1)+(2^3-1)+(3^3-1)+(4^3-1)$

$=0+7+26+63=96$

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## Section 11.2 Arithmetic Sequences

An example of arithmetic sequence is

3, 7, 11, 15, 19, ....

The difference between any two consecutive terms is the same. This is called the common difference.

In this example, the common difference is 4.

Formulas for arithmetic sequences:

Recursive: $a_1 = a$ , $a_n = a_{n-1} + d$

($d$ ↑ common difference)

In our example, the recursive formula is $a = 3$ , $a_n = a_{n-1} + 4$

$n^{th}$ term: $a_n = a + (n-1)d$ where $a$ is the first term and $d$ is the common difference

In our example, $a = 3$ , $d = 4$

$$a_n = 3 + (n-1)4$$

$$a_n = 3 + 4n - 4$$

$$a_n = 4n - 1 \leftarrow \text{linear}$$

$$a_{1000} = 4 \cdot 1000 - 1 = 3{,}999$$

ex: 3, 6, 10, 13, 17, ... is not arithmetic

ex: 20, 17, 14, 11, 8, ... is an arithmetic sequence with $d = -3$

$$a_n = 20 + (n-1)(-3)$$

$$a_n = 20 + (-3n) + 3$$

$$a_n = 23 - 3n$$

$d$ = slope

**ex:** The 8th term of an arithmetic sequence is 75 and the 20th term is 39. Find the first term and the common difference.

$a_8 = 75 = a_n$ (8, 75)

$a_{20} = 39$ (20, 39)

$n$

$$n = \frac{39-75}{20-8}$$

$$= \frac{-36}{12}$$

$$d = -3$$

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

$$75 = a + (8-1)(-3)$$

$$75 = a - 21$$

$$96 = a$$

$1 + 100$
$2 + 99$
$3 + 98$
$\vdots$
$50 + 51$

$101$
$101$
$101$
$\vdots$
$101$

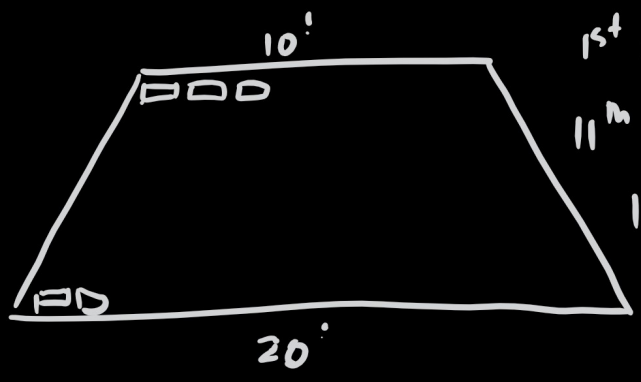
$101$
$50$
$5050$

$$S_{100} = \frac{100}{2}(1+100)$$

$$= 50 \cdot 101$$

$$= 5050$$

The sum of the first $n$ terms of an arithmetic sequence is $S_n = \frac{n}{2}(a + a_n)$




1st row = 10

11th row = 20

11 rows

$$S_{11} = \frac{11}{2}(10+20)$$

$$= 5.5\,(30)$$

$$= 165 \text{ blocks}$$

Assignment: p872-873 3-30 mults of 3, 37, 39, 47, 49, 50