Lesson 13.2

The sum of an arithmetic sequence.

$$S_n = \frac{n}{2}(u_1 + u_n)$$

EXAMPLE #1

Find the sum if $u_1 = 35$ & $u_{32} = 376$.

$$S_n = \frac{32}{2}(35 + 376) = 16(411) = \boxed{6576}$$

The following formula can be used if you DO NOT know the last term.

$$S_n = \frac{n}{2}\left[2u_1 + (n-1)d\right]$$

EXAMPLE #2

Find the sum if $u_1 = 33$, $d = 16$ & $n = 18$.

$$S_n = \frac{18}{2}\left[2(33) + (18-1)(16)\right] = 9(66+272)$$

$$= \boxed{3042}$$

<u>EXAMPLE #3</u>

Find the sum: 145 + 95 + 45 + ... ; 28 terms

$u_1 = 145, \quad d = -50, \quad n = 28$

$$S_n = \frac{n}{2}\left[2u_1 + (n-1)d\right]$$

$$= 14(290 - 1350)$$

$$= \boxed{-14840}$$

EXAMPLE #4

Consider the sequence consisting of all the odd numbers from 1 to 99:

1, 3, 5, 7, 9, … , 97, 99

It is an arithmetic sequence with $u_1 = 1$ and $d = 2$.

a) How many terms are there?

b) What is the total if you add all the terms up?

a) $u_n = u_1 + (n-1)d$

$99 = 1 + (n-1)(2)$

$99 = 1 + 2n - 2$

$99 = 2n - 1$

$100 = 2n$

$\boxed{50 = n}$

b) Method #1

$S_n = \frac{n}{2}(u_1 + u_n)$

$= \frac{50}{2}(1+99)$

$= 25(100)$

$= \boxed{2500}$

Method #2

$S_n = \frac{n}{2}[2u_1 + (n-1)d]$

$= \frac{50}{2}[2(1) + (50-1)(2)]$

$= 25(2+98)$

$= \boxed{2500}$