Arithmetic Sequences

Arithmetic Sequence – a sequence where there is a constant difference between consecutive terms

		First Term	Constant Difference
examples	1) 1,3,5,7,9,...	$a = 1$	$d = 2$
	2) 8,11,14,17,...	$a = 8$	$d = 3$
	3) 7,3,-1,-5,...	$a = 7$	$d = -4$

General formula $t_n = a + (n-1)d$

t_n formula for each arithmetic sequence example

1) $t_n = a + (n-1)d$
$= 1 + (n-1)2$
$= 1 + 2n - 2$
$\boxed{t_n = 2n - 1}$

2) $t_n = a + (n-1)d$
$= 8 + (n-1)3$
$= 8 + 3n - 3$
$\boxed{t_n = 3n + 5}$

3) $t_n = a + (n-1)d$
$= 7 + (n-1)(-4)$
$= 7 - 4n + 4$
$\boxed{t_n = -4n + 11}$

find t_{21} and t_{99} for each arithmetic sequence example

21st term 99th term

1) $t_{21} = 2(21) - 1$
$= 41$

$t_{99} = 2(99) - 1$
$= 197$

2) $t_{21} = 3(21) + 5$
$= 68$

$t_{99} = 3(99) + 5$
$= 302$

3) $t_{21} = -4(21) + 11$
$= -73$

$t_{99} = -4(99) + 11$
$= -385$

Ex.1 How many terms are in the following sequences

(a) 3,8,13,18,...63

$t_n = a + (n-1)d$
$= 3 + (n-1)5$
$= 3 + 5n - 5$
$\boxed{t_n = 5n - 2}$

$63 = 5n - 2$
$63 + 2 = 5n$
$65 = 5n$
$\frac{65}{5} = n$
$13 = n$

∴ there are 13 terms in the sequence

(b) -3,4,11,18,...95

$t_n = a + (n-1)d$
$= -3 + (n-1)7$
$= -3 + 7n - 7$
$\boxed{t_n = 7n - 10}$

$95 = 7n - 10$
$95 + 10 = 7n$
$105 = 7n$
$\frac{105}{7} = n$
$15 = n$

∴ there are 15 terms in the sequence.

Ex.2 Given that $t_{13} = -33$ and $t_{20} = -54$, find t_n for the arithmetic sequence