PreCalculus 11 Date _____

Unit 1: Sequences & Series

1.1 Arithmetic Sequences

A ***sequence*** is an ordered list of objects. The terms of a sequence are labelled according to their position in the sequence.

- the ***first term*** is t_1
- the ***number of terms*** is n
- the ***general term*** is t_n and is dependent on value of n.

A ***finite sequence*** has a finite # of terms (sequence stops).

e.g. 2, 4, 6, 8, 10 3, 10, 17, ..., 73

An ***infinite sequence*** has an infinite # of terms (sequence continues forever)

e.g. 5, 2, −1, −4, ...

An ***arithmetic sequence*** is an ordered list in which the difference between consecutive terms is constant. This constant is called the common difference (d)

The formula for the ***general term*** helps you find the terms of the sequence

e.g.

numeric ($d = 17$)	algebraic
$t_1 = 5$	$t_1 = t_1$
$t_2 = 5 + 17 = 22$	$t_2 = t_1 + d$
$t_3 = 5 + 17 + 17 = 39$	$t_3 = t_1 + d + d = t_1 + 2d$
$t_4 = 5 + 17 + 17 + 17 = 56$	$t_4 = t_1 + 2d + d = t_1 + 3d$
	$t_n = t_1 + (n-1)d$

The ***general term*** of an arithmetic sequence is $t_n = t_1 + (n-1)d$

where t_1 = 1st term

n = number of terms

d = common difference

t_n = n^{th} term OR general term of the sequence

ex. A visual and performing arts group wants to hire a community events leader. The person will be paid $12 for the first hour of work, $19 for two hours of work, $26 for three hours of work, and so on.

a) Find the general term

Hours	1	2	3
Pay	12	19	26

$t_1 = 12$

$d = 7$

$t_n = t_1 + (n-1)d$

$t_n = 12 + (n-1)7$

$= 12 + 7n - 7$

$\boxed{t_n = 7n + 5}$

b) What will the person get paid for 6 h? 10 h?

$t_6 = 7(6) + 5$

$= \boxed{\$47}$

$t_{10} = 7(10) + 5$

$= \boxed{\$75}$

ex. In 1955 the Banks Island musk-ox population was 9250. If the population increases by 1650 each year, how long would it take to reach 100 000?

$t_n = 100000$

$d = 1650$ $t_1 = 9250$

$n = ?$

$t_n = t_1 + (n-1)d$

$100000 = 9250 + (n-1)1650$

$100000 = 9250 + 1650n - 1650$

$100000 = 1650n + 7600$

$-7600 \quad -7600$

$92400 = 1650n$

$\frac{92400}{1650} = \frac{1650n}{1650}$

$n = \boxed{56 \text{ years}}$

OR

$100000 = 9250 + (n-1)1650$

-9250

$90750 = (n-1)1650$

$\frac{90750}{1650} = (n-1)$

$55 = n - 1$

$n = \boxed{56 \text{ years}}$

ex. Find the first three terms of the arithmetic sequence with t_5=14 and t_{11}= -10.

$t_n = t_1 + (n-1)d$

$t_5 = 14 \Rightarrow 14 = t_1 + (5-1)d$

$t_{11} = -10 \Rightarrow -10 = t_1 + (11-1)d$

$24 = 6d$

$d = -4$

$14 = t_1 + 4(-4)$

$14 = t_1 - 16$

$t_1 = 30$

30, 26, 22

18 14 (t_5)

Practice: p. 16/ # 1-6(ac), 7-11, 13, 17, 22, 26