1.1b Arithmetic Sequences continued.

You need to be able to:

- **Determine a particular term.**

Given 11, 7, 3, -1.... find t_{25}, t_n

$a = 11$

$d = 7 - 11 = -4$

$3 - 7 = -4$

$t_{25} = 11 - 4(24)$

$= 11 - 96$

$= -85$

General Term

$t_n = 11 - 4(n-1)$

$t_n = 11 - 4n + 4$

$\boxed{t_n = 15 - 4n}$

- **Determine the number of terms.**

t_1 t_2 t_n

34, 25, 16, ..., -245

$a = 34$

$d = 25 - 34 = -9$

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

$-245 = 34 - 9(n-1)$

$-245 = 34 - 9n + 9$

$-245 = 43 - 9n$

$-43 \quad -43$

$\frac{-9n}{-9} = \frac{-288}{-9}$

$n = 32$

There are 32 terms.

A farmer decides to plant an apple orchard. He plants 24 apple trees in the first year and 15 more apple trees in each subsequent year. In which year will he be planting 204 apple trees in the orchard?

t_1 t_2 t_3 t_4 t_n

24, 39, 54, 69, ..., 204

$a = 24$

$d = 39 - 24 = 15$

$n = ?$

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

$204 = 24 + 15(n-1)$

$204 = 24 + 15n - 15$

$204 = 9 + 15n$

$-9 \quad -9$

$\frac{195}{15} = \frac{15n}{15}$

$n = 13$

In the 13th year.

- **Determine the position of a given value.**

-3, -8, -13, ... -58

t_1 t_2 t_3 t_n

$a = -3$

$d = -8 + (+3) = -5$

$-58 = -3 - 5(n-1)$

$-58 = -3 - 5n + 5$

$-58 = 2 - 5n$

$\frac{-60}{-5} = \frac{-5n}{-5}$

$n = 12$

$n = 12$

-58 is the 12th term

- **Determine the common difference and find missing terms.**

$t_8 = 33$ and $t_{14} = 57$

t_8 t_{14}

33, 37, 41, 45, 49, 53, 57

$33 + 6d = 57$
$-33 \quad -33$
$\frac{6d}{6} = \frac{24}{6}$
$d = 4$

- **Determine if a term is in an arithmetic sequence.**

35, 22,9,-4,-17,... Does this arith seq contain the term -250?

$a = 35$

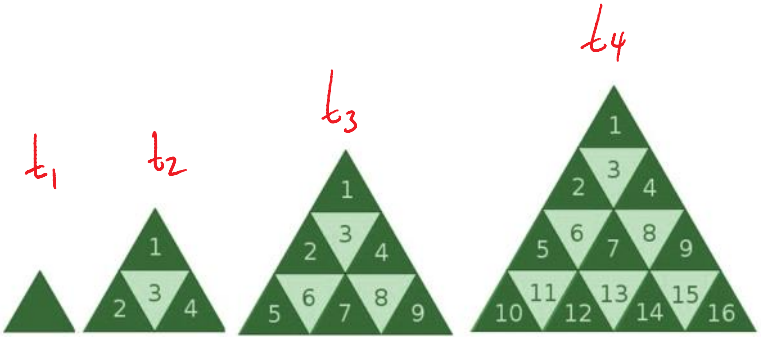
$d = 22 - 35 = -13$

$-250 = 35 - 13(n-1)$
$-250 = 35 - 13n + 13$
$-250 = 48 - 13n$
$-48 \quad -48$
$\frac{-298}{-13} = \frac{-13n}{-13}$
$n = 22.92$

Not an integer
∴ -250 is not a # in this sequence.

- **Find a pattern to create an arithmetic sequence**

The length of each side of the small triangles is one. Determine the following.



Create a chart representing the term number and perimeter.

Term	1	2	3	4			
Perimeter	3	6	9	12			

- **Determine the general term and use it to determine specific terms**

Determine the general term for the pattern above.

$a = 3$ $\qquad t_n = 3 + 3(n-1)$

Determine the general term for the pattern above.

$a = 3$

$d = 3$

$t_n = 3 + 3(n-1)$

$t_n = 3 + 3n - 3$

$t_n = 3n$

Use the general term to determine the perimeter of the 12th diagram

$t_{12} = 3(12) = 36$

Which figure has a perimeter of 108?

$t_n = 3n$

$\frac{108}{3} = \frac{3n}{3}$

$n = 36$

The 36th figure

Ex. A person runs 4 km on day 4 of a training program and 7 km on day 10.

Determine the general term.

t_1 t_2 t_3 t_4 ... t_{10}

2.5, 3, 3.5, 4, —, —, —, —, —, 7

Find d:

$4 + 6d = 7$

$\frac{6d}{6} = \frac{3}{6}$

$d = 0.5$

Find a:

① Work backwards

② Use formula + one term

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

I picked $t_{10} = 7$

$7 = a + 0.5(9)$

$7 = a + 4.5$

$a = 2.5$

General Formula:

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

$t_n = 2.5 + 0.5(n-1)$

$t_n = 2.5 + 0.5n - 0.5$

$t_n = 2 + 0.5n$

Use the general term to determine when the person will run 12.5 km.

$t_n = 2 + 0.5n$

$12.5 = 2 + 0.5n$

$\frac{10.5}{0.5} = \frac{0.5n}{0.5}$

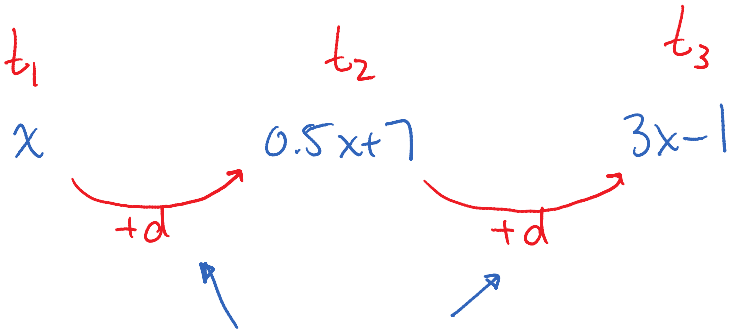
$n = 21$

On day 21.

$$\frac{10.5}{0.5} = \frac{0.5n}{0.5}$$

$$n = 21$$

*The terms x, 0.5x + 7, and 3x - 1 are consecutive terms of an arithmetic sequence. Determine the value of x and state the three terms.



$$d = d$$

$$1(0.5x+7) - x = 1(3x-1) - 1(0.5x+7)$$

$$0.5x + 7 - x = 3x - 1 - 0.5x - 7$$

$$7 - 0.5x = 2.5x - 8$$
$$-7 \quad -2.5x \qquad -2.5x \quad -7$$

$$\frac{-3x}{-3} = \frac{-15}{-3}$$

$$x = 5$$

$t_1 = x = 5$

$t_2 = 0.5(5) + 7 = 9.5$

$t_3 = 3(5) - 1 = 14$

Assignment: p16 # 5, 8, 9, 13, 16ab, 17c, 23, 11*, 24*

good exam question