Math 10FP

8-2: Arithmetic Sequences (day 1)

* An arithmetic sequence is formed by adding a constant (positive or negative) to the previous term.
  - ↳ This means there is a constant change between consecutive terms.
    - ↳ Often called the "common difference" (d)

$$d = t_n - t_{n-1}$$

Ex. Find the common difference:

8, 11, 14, 17, ...
t_1 t_2 t_3 t_4

$d = t_4 - t_3 = 17 - 14 = 3$

$d = t_3 - t_2 = 14 - 11 = 3$

$d = t_2 - t_1 = 11 - 8 = 3$

same.

⊛ doesn't matter which 2 consecutive terms are used.

⊛ The first term in an arithmetic sequence is always t_1, or a

Ex. State a and d for each sequence:

a) −10, −4, 2, 8, ...

$a = -10$
$d = 6$

b) 28, 25, 22, 19, ...

$a = 28$
$d = (-3)$

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

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

t_n = the "n^{th}" term in the sequence
$a = t_1$ = 1ST term
d = common difference
n = position of the term in the sequence.

Ex. For the sequence: $-3, 4, 11, 18, \cdots$

a) Determine the formula for the nth term.
b) Find the value of the 8TH term.
c) Find the value of the 25TH term

a) t_n = what we want
$a = -3$
$d = 18 - 11 = 7$
$11 - 4 = 7$
$4 - -3 = 7$
n = in general

* need these 2 values

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

$t_n = -3 + (n-1)7$

b) 8TH term $\Rightarrow$ $t_8 = -3 + (8-1)7$
$= -3 + (7)7$
$= -3 + 49$
$= 46$

$\boxed{t_8 = 46}$

c) 25TH term $\Rightarrow$ $t_{25} = -3 + (25-1)7$
$= -3 + (24)7$
$= -3 + 168$
$= 165$

$\boxed{t_{25} = 168}$