Questions from homework

Sequences

Find the first 5 terms of the following sequences:

$$t_n = 3^n$$

$t_1 = 3^1 = 3$

$t_2 = 3^2 = 9$

$t_3 = 3^3 = 27$

$t_4 = 3^4 = 81$

$t_5 = 3^5 = 243$

$3, 9, 27, 81, 243$

$$t_n = n + 5$$

$6, 7, 8, 9, 10$

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

$t_1 = (3)(0) = 0$

$t_2 = (4)(1) = 4$

$t_3 = (5)(2) = 10$

$t_4 = (6)(3) = 18$

$t_5 = (7)(4) = 28$

$0, 4, 10, 18, 28$

Arithmetic Sequences

Ex: 2, 5, 8, 11, 14

3   3   3   3

- The difference between each term is constant.
- In the sequence 2, 5, 8, 11, 14. the difference between each term is 3.
- The difference is called "d". $d = t_2 - t_1 = t_3 - t_2 = t_4 - t_3$
- The first term is called "a" or "t_1".
- The second term is called "t_2".
- The last term or an indicated term is called "t_n". general term
- The position of a term or the number of terms is called "n".

Arithmetic Sequences

To find any given term in an arithmetic sequence we use the following formula:

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

Example I.

Find the indicated term of the following sequence

$\underline{\underline{1}}, 4, 7...$ $a = 1$
$d = 3$

t_7 $t_n = a + (n-1)d$ $t_{50} = 1 + (50-1)3$

$n = 7$ $t_7 = 1 + (7-1)3$ $t_{50} = 1 + (49)(3)$

$t_7 = 1 + (6)(3)$ $t_{50} = 1 + 147$

$t_7 = 1 + 18$ $\boxed{t_{50} = 148}$

$\boxed{t_7 = 19}$

We can also determine the number of terms in the sequence.

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

Example II.

How many terms are in the following sequences? (Solve for "n")

$\underline{1, 3, 5,... 71}$ ← last term or "t_n"

$a = 1$
$d = 2$
$t_n = 71$

$71 = 1 + (n-1)2$
$71 = 1 + 2n - 2$
$71 = 2n - 1$
$72 = 2n$
$\boxed{36 = n}$

$71 = 1 + (n-1)2$
$70 = (n-1)2$
$35 = n - 1$
$\boxed{36 = n}$

$\underline{x, x+3, x+6,... ,x+33}$ ← t_n

$a = x$

$d = x+3 - x$
$\quad = 3$

$d = x+6 - (x+3)$
$\quad = x+6 - x - 3$
$\quad = 3$

$t_n = x+33$

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

$x+33 = \text{\textcircled{x}} + (n-1)3$

$\dfrac{33}{3} = \dfrac{(n-1)3}{3}$

$11 = n - 1$

$\boxed{12 = n}$

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

Find "a", "d", and "t$_n$" for the following sequence

$$\underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{\quad}, \underline{16}, \underline{\quad}, \underline{\quad}, \underline{25}$$

$$t_5 = 16, \quad t_8 = 25$$

$$t_5 = a + (5-1)d \qquad t_8 = a + (8-1)d$$

$$t_5 = a + 4d \qquad\qquad t_8 = a + 7d$$

$$\boxed{a + 4d = 16} \qquad \boxed{a + 7d = 25} \qquad \text{2x2 system}$$

$$\begin{array}{r} a + 4d = 16 \\ (-)\ \underline{a + 7d = 25} \\ -3d = -9 \\ \boxed{d = 3} \end{array}$$

$$\begin{array}{l} a + 4d = 16 \\ a + 4(3) = 16 \\ a + 12 = 16 \\ \boxed{a = 4} \end{array}$$

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

Homework

#1
#2
#3
#4
#6
#7
#9