Questions from homework

Sequences

Find the first 5 terms of the following sequences:

$t_n = 3^n$

$t_1 = 3^1 = 3$

$t_2 = 3^2 = 9$

$t_3 = 3^3 = 27$

$t_4 = 3^4 = 81$

$t_5 = 3^5 = 243$

$\boxed{3, 9, 27, 81, 243}$

$t_n = n + 5$

$\boxed{6, 7, 8, 9, 10}$

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

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

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

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

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

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

$\boxed{0, 4, 10, 18, 28}$

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

1, 4, 7... $a = 1$ $d = 3$

t_7 $n = 7$

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

$t_7 = 1 + (7-1)3$

$t_7 = 1 + (6)(3)$

$t_7 = 1 + 18$

$\boxed{t_7 = 19}$

$t_{50} = 1 + (50-1)3$

$t_{50} = 1 + (49)(3)$

$t_{50} = 1 + 147$

$\boxed{t_{50} = 148}$

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")

1, 3, 5,... 71 ← last term or "t_n"

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

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

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

x, x+3, x+6,... ,x+33 ← t_n

$a=x$

$d = x+3-x$
$= 3$

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

$t_n = x+33$

$t_n = a+(n-1)d$
$x+33 = x+(n-1)3$
$\frac{33}{3} = \frac{(n-1)\cancel{3}}{\cancel{3}}$
$11 = n-1$
$\boxed{12=n}$

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

Find "a", "d", and "t_n" for the following sequence

4, 7, 10, 13, 16, 19, 22, 25

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

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

$t_5 = a + (5-1)d$

$t_5 = a + 4d$

$16 = a + 4d$

$\boxed{a + 4d = 16}$

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

$t_8 = a + (8-1)d$

$t_8 = a + 7d$

$25 = a + 7d$

$\boxed{a + 7d = 25}$

Elimination Method

$a + 7d = 25$

$(-)\ a + 4d = 16$

$3d = 9$

$\boxed{d = 3}$

$a + 4(3) = 1$

$a + 12 = 16$

$\boxed{a = 4}$

Find t_n:

$a = 4$

$d = 3$

$n = n$

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

$t_n = 4 + (n-1)3$

$t_n = 4 + 3n - 3$

$\boxed{t_n = 3n + 1}$

Homework

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

Geometric Sequences

Ex: 2, 4, 8, 16, 32

Sequences of numbers that follow a pattern of multiplying a fixed number from one term to the next are called geometric sequences.

- To find the next term, multiply the previous term by a common ratio.
- In the sequence 2, 4, 8, 16, 32 we are multiplying by 2.
- This common ratio is called **"r" ($r = t_2/t_1$).**
- The first term is still called **"a"** or **"t_1".**
- The second term is called **"t_2".**
- The last term or an indicated term is called **"t_n".**
- The position of a term or the number of terms is called **"n".**