

Questions from Homework

① Find a , d , and t_n

$$\begin{array}{l}
 t_2 = -12 \\
 t_2 = a + (2-1)d \\
 \underline{t_2} = a + d \\
 -12 = a + d
 \end{array}
 \quad \left| \quad
 \begin{array}{l}
 t_5 = 9 \\
 t_5 = a + (5-1)d \\
 \underline{t_5} = a + 4d \\
 9 = a + 4d
 \end{array}
 \right.
 \Leftrightarrow
 \begin{array}{l}
 a + 4d = 9 \\
 \underline{a + d = -12} \\
 3d = 21 \\
 \boxed{d = 7}
 \end{array}
 \left. \begin{array}{l}
 a + d = -12 \\
 a + (7) = -12 \\
 \boxed{a = -19}
 \end{array} \right\}$$

$$\begin{aligned}
 t_n &= a + (n-1)d \\
 t_n &= -19 + (n-1)(7)
 \end{aligned}$$

$$\begin{aligned}
 \dots \quad t_n &= -19 + 7n - 7 \\
 \boxed{t_n} &= \boxed{7n - 26}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{3} \quad a &= 12 \\
 d &= -1 \\
 n &= 12 \\
 t_{12} &= 1 \\
 S_{12} &=?
 \end{aligned}$$

$$\begin{aligned}
 S_{12} &= \frac{12}{2} [2(12) + (12-1)(-1)] \\
 &= 6 [24 - 11] \\
 &= 6(13) \\
 &= 78
 \end{aligned}$$

$$\begin{aligned}
 \text{or} \\
 S_{12} &= \frac{12}{2} (12 + 1) \\
 &= 6(13) \\
 &= 78
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{7} \quad S_5 &=? \\
 a &= 52 \\
 n &= 5 \\
 r &= 0.8 \text{ (decrease)} \\
 &\quad \text{of } 20\%
 \end{aligned}$$

$$\begin{aligned}
 S_n &= \frac{a(r^n - 1)}{r - 1} \\
 S_5 &= \frac{52(0.8^5 - 1)}{0.8 - 1} \\
 &= \frac{52(0.32768 - 1)}{-0.2}
 \end{aligned}$$

$$= \frac{52(-0.67232)}{-0.2} \quad /$$

$$= 174.8$$

$$\approx 175 \text{ deaths} \quad /$$

Sigma Notation

For the *sequence* 1, 2, 4, 8, 16, 32, 64 there is an associated sum called a *series*.

The Greek symbol Σ (**sigma**) is used to write the series in compact form.

$$1 + 2 + 4 + \dots + 64 =$$

$$\sum_{n=1}^7 2^{n-1}$$

7 terms (end at $n=7$)
th or the general term
start at $n=1$

the terms form a geometric sequence with $a = 1$, $r = 2$, $t_n = 1(2)^{n-1}$

This symbol is read as "the sum of the terms of the sequence given by $t_n = 2^{n-1}$ from $n = 1$ to $n = 7$ "

We can also say:

$$S_7 = \sum_{n=1}^7 2^{n-1}$$

Find each sum:

general term:
 $t_n = n^2$

$$S_4 = \sum_{n=1}^4 n^2$$

$= (1)^2 + (2)^2 + (3)^2 + (4)^2$
 $= 1 + 4 + 9 + 16$
 $= 30$



$$S_5 = \sum_{n=1}^5 3n + 2$$

$$= 5 + 8 + 11 + 14 + 17$$

$$= 55$$

$$= 3n + 2$$

$$= 3(4) + 2$$

$$= 14$$

Write the following series in ***Sigma Notation***

$$2+5+8+11+14.$$

What type of series is it?
Find t_n

$$a = 2$$

$$d = 3$$

$$\begin{aligned}t_n &= 2 + (n-1)(3) \\ &= 2 + 3n - 3 \\ &= 3n - 1\end{aligned}$$

Sigma Notation

$$\sum_{n=1}^5 3n - 1$$

Homework