# Questions from Homework

① Find a, d, and $t_n$

$t_2 = -12$
$t_2 = a + (2-1)d$
$t_2 = a + d$
$-12 = a + d$

$t_5 = 9$
$t_5 = a + (5-1)d$
$t_5 = a + 4d$
$9 = a + 4d$

$a + 4d = 9$
$(-)\ a + d = -12$
$3d = 21$
$\boxed{d = 7}$

$a + d = -12$
$a + (7) = -12$
$\boxed{a = -19}$

$t_n = a + (n-1)d$
$t_n = -19 + (n-1)(7)$
$t_n = -19 + 7n - 7$
$\boxed{t_n = 7n - 26}$

③ $a = 12$
$d = -1$
$n = 12$
$t_{12} = 1$
$S_{12} = ?$

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

or

$S_{12} = \frac{12}{2}(12 + 1)$
$= 6(13)$
$= 78$

⑦ $S_5 = ?$
$a = 52$
$n = 5$
$r = 0.8$ (decrease of 20%)

$S_n = \frac{a(r^n - 1)}{r - 1}$

$S_5 = \frac{(52)[(0.8)^5 - 1]}{0.8 - 1}$

$= \frac{52(0.32768 - 1)}{-0.2}$

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

$= 174.8$

$\approx 175$ deaths

# Questions from Homework

④ $t_4 = 8x^3$

$t_n = ar^{n-1}$

$t_4 = ar^3$

$8x^3 = ar^3$

$t_9 = 256x^8$

$t_n = ar^{n-1}$

$t_9 = ar^8$

$256x^8 = ar^8$

Elimination by division

$$\frac{256x^8 = ar^8}{8x^3 = ar^3}$$

$32x^5 = r^5$

$(32x^5)^{\frac{1}{5}} = r$

or $\sqrt[5]{(32x^5)} = r$

$\boxed{2x = r}$

$8x^3 = ar^3$

$8x^3 = a(2x)^3$

$$\frac{8x^3}{8x^3} = \frac{a(8x^3)}{8x^3}$$

$\boxed{1 = a}$

$t_n = ar^{n-1}$

$t_n = (1)(2x)^{n-1}$

$t_n = (2x)^{n-1}$

# 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.

7 terms (end at n=7)

$$1+2+4+\ldots+64 = \sum_{n=1}^{7} \boxed{2^{n-1}}$$

$t_n$ 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:
$t_n = n^2$

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

$$= (1)^2 + (2)^2 + (3)^2 + (4)^2$$

$$= 1 + 4 + 9 + 16$$

$$= 30$$

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

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

$$= 55$$

$$3n + 2$$
$$= 3(4) + 2$$
$$= 14$$

$$\sum_{n=3}^{5} (3)\left(\frac{1}{4}\right)^{n-1}$$

$$= (3)\left(\frac{1}{4}\right)^{3-1} + (3)\left(\frac{1}{4}\right)^{4-1} + (3)\left(\frac{1}{4}\right)^{5-1}$$

$$= (3)\left(\frac{1}{16}\right) + 3\left(\frac{1}{64}\right) + 3\left(\frac{1}{256}\right)$$

$$= \frac{3}{16} + \frac{3}{64} + \frac{3}{256}$$

$$= \frac{48}{256} + \frac{12}{256} + \frac{3}{256}$$

$$= \frac{63}{256}$$

Write the following series in *Sigma Notation*

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

What type of series is it?
Find $t_n$

$a = 2$
$d = 3$

$$t_n = 2 + (n-1)(3)$$
$$= 2 + 3n - 3$$
$$= 3n - 1$$

***Sigma Notation***

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

# Homework