U7D6_T Applications

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U7D6_T Applicatio...

U7D6MCR 3UI

Sequences & Series Story Questions

Some hints for solving Story Questions:

1. If possible, write out the first few terms of the series.
2. Determine if it is Arithmetic or Geometric, and a Sequence or Series.
3. List "Given" and "Unknowns"
4. Determine which fomula(s) you need to use.
5. Solve and write a conclusion.

Examples:

1. A wall of blocks is built up so that each row has 2 less blocks from the previous row. If there are 43 blocks in the first row and 11 blocks in the top row, how many rows high is the wall?

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

$a = 43$

$t_n = 11$

$d = -2$

$n = ?$

$11 = 43 + (n-1)(-2)$

$11 = 43 - 2n + 2$

$11 = 45 - 2n$

$2n = 34$

$n = 17$

∴ there are 17 rows.

1200, −360,

1200, 840, 588, ...

2. A stereo system costing $1200 depreciates by 30 % per year. Find the value of the stereo after 6 years. $1200 \times 0.7 = 840$ ← after first year

$a = 840 \quad r = 0.7 \quad n = 6$

$S_n = 840 \times 0.7^{6-1}$

$S_n = 840 \times 0.7^5$

$S_n = 840 \times 0.16807$

$S_n = 144.1788$

$S_n = 144.18$

∴ the stereo is worth $144.17

3. Suppose you researched your ancestors back ten generations. How many people would you research? 2, 4, 8, ...

$n=10 \quad a=2 \quad r=2$

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

$S_{10} = \frac{2(2^{10}-1)}{2-1}$

$S_{10} = 2046$

∴ you would research 2046 people

20, 25, 30, ...

4. How many multiples of 5 are from 20 to 200?

$a = 20 \quad d = 5 \quad t_n = 200 \quad n = ?$

$t_{200} = 20 + (n-1)5$

$20 + (n-1)5 = 200$

$(n-1)5 = 180$

$n - 1 = 36$

$n = 37$

$\therefore$ there are 37 multiples of 5.

12, 18, 24, ..., 996

5. How many multiples of 6 are there between 10 and 1000?

$a = 12$
$d = 6$
$t_n = 996$

$996 = 12 + (n-1)6$
$984 = (n-1)6$
$164 = n-1$
$165 = n$

∴ there are 165 multiples of 6.

6. Determine the value of x, such that
$x - 4,\ 2x + 1,\ 5x + 4,$ are consecutive terms of an arithmetic sequence.

$(2x+1)-(x-4) = (5x+4)-(2x+1)$

$2x+1-x+4 = 5x+4-2x-1$

$x+5 = 3x+3$

$2 = 2x$

$\boxed{x = 1}$

7. Determine the value of x such that, $x-2,\ 2-x,\ x+10$, are consecutive terms of a geometric sequence.

$x-2,\ 2-x,\ x+10$

$r = \frac{2-x}{x-2}$ $\quad r = \frac{x+10}{2-x}$ $\quad \leftarrow x \neq 2$

$\frac{2-x}{x-2} = \frac{x+10}{2-x}$

$4 - 4x + x^2 = x^2 + 8x - 20$

$24 = 12x$

$2 = x$ but $x \neq 2$

$\therefore$ no solution!

$\frac{2-x}{x-2} = -1$

$-1 = \frac{x+10}{2-x}$

$x-2 = x+10$

$-2 = 10$

no solution

U7D6 Practice: p. 470 #11, 13-20, p. 477 #7-13