Geometry Sequence

When we want to ad

$2 + 6 + 18 + 54 + 162 = ?$

A sequence that

$a_1 = 2$

$q = \frac{6}{2} = \frac{18}{6} = 3$

n = 5 Number of elements

$S_n = a_i \frac{q^n - 1}{9 - 1}$

$S_5 = 2 \frac{3^5 - 1}{3 - 1} = 3^5 - 1 = 242$

Given

$S_n = 3^n - 1$

1. $a^n = ?$
2. $\frac{a_n}{a_{n-1}} = ?$

$a_n = 3^n - 3^{n-1}$

$= 3.3^{n-1} - 1.3^{n-1} = 2.3^{n-1}$

$a_1 = 2$

$a_2 = 2.3 = 6$

$\frac{a_n}{a_{n-1}} = \frac{2.3^{n-1}}{2.3^{n-2}} = 3 = g$

Given $a_{n-1} + a_n + a_{n+1} = 78$

$q = ?$, $a_n = 18$ Geometry sequence

$\frac{18}{q} + 18 + 18q = 78$

$18(\frac{1}{q} + 1 + q) = 78$ /: 6

$3(\frac{1}{q} + 1 + q) = 13 \Rightarrow 3(1 + q + q^2) = 13q$

$3q^2 - 10q + 3 = 0$

$q = \frac{5 \pm \sqrt{25-9}}{3} = \frac{9}{3} = 3$

$\frac{1}{3}$