n^{th} Term Formula

An nth term formula is one that, given a term number, we can find the term value.

The nth term formula for n geometric sequence is:

$a_n = ar^{n-1}$

where:

a is the first term value
n is the term number
r is the common ratio
a_n is the nth term value

Geometric sequences are characterized by the fact that the quotient of any two consecutive terms, a term divided by its previous, is always the same.

Partial Sum and Infinite Sum Formulas

A **partial sum** formula is one that, given a term number, we can find the sum of the first terms up to that term number.

$S_n = a\dfrac{1-r^n}{1-r}$; $r \neq 1$

where:

a is the first term value
n is the term number
r is the common ratio
S_n is the nth partial sum

An **infinite sum** formula is one that, for an infinite series, we can find the sum the series approaches as the term number approaches infinity.

$S = \dfrac{a}{1-r}$; $|r|<1$

where:

a is the first term value
n is the term number
r is the common ratio
S_n is the nth sum

Writing a Repeating Decimal as a Fraction

1.	$2.3\overline{51}$	Original problem
2.	$2.3+0.051$	Split the number into two parts: the non-repeating and repeating.
3.	$\frac{23}{10}+\frac{51}{1000}$	Write each part as a fraction. Note: The number of zeros in the denominator should match the decimal place of the number. The fraction for the repeating part will be the a_0 of the geometric sequence.
4.	$\frac{51}{100000}$	Get the next repetition of the repeating part. Do this by adding zeros to the denominator – one for each digit in the numerator. This will be the a_1 of the geometric sequence.
5.	$\frac{51}{1000}\times\frac{100000}{51}=\frac{1}{100}$	Calculate the common ratio by dividing out the a_1/a_0.
6.	$\frac{51/1000}{1-1/100}=\frac{51/1000}{99/100}=\frac{51}{990}$	Calculate the infinite sum.
7.	$\frac{23}{10}+\frac{51}{990}=\frac{2277}{990}+\frac{51}{990}=\frac{2328}{990}=\frac{388}{165}$	Add the non-repeating fraction to the infinite sum.