

Formulas for Arithmetic and Geometric Sequences

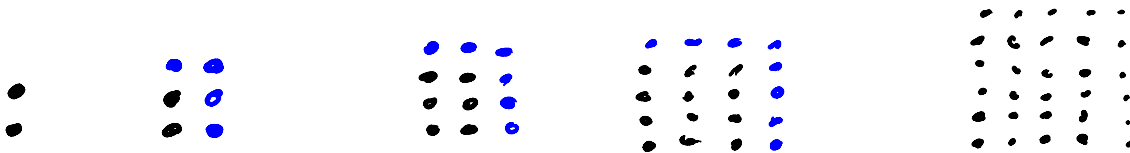
Warm up

1. Find the next two terms: 7, 13, 19, 25, ... _____
2. Find the next three terms: 51, 43, 35, 27, ... _____
3. Find the next three terms: 3072, 768, 192, ... _____

What is a Sequence?

Each element in the range of a sequence is called a _____ of the sequence. The corresponding positive integer in the domain is its _____ in the sequence. Often, the letter n is used to denote the position of a term, and a subscripted variable such as a_n or u_n is used to denote the term itself.

A formula such as _____, which shows the n th term of a sequence in terms of n , is called an _____ formula. In contrast, a _____ formula is one in which the first term or first few terms are given, and then the n th term is expressed using the preceding term(s).



- EX 1. a. Calculate R_6 using the explicit formula.
- b. Assume R_5 is known. Calculate R_6 using the recursive formula.
- c. Find R_{14} using either formula.

Arithmetic Sequences

An _____ sequence is one in which the difference between consecutive terms is constant. The **Explicit** Formula for an arithmetic sequence is:

An example of an arithmetic sequence is:

In general, any arithmetic sequence can be generated both explicitly and recursively.

Determine whether each sequence is arithmetic. Justify your answer

a. 1 2 4 8

b. $\frac{1}{2}$ $\frac{1}{4}$ 0 $-\frac{1}{4}$

Find the 14th term in the arithmetic sequence 9, 17, 25, 33, ...

Write an Explicit and Recursive formula for a sequence:

Consider the arithmetic sequence 12, 23, 34, 45, ...

a. Write an Explicit equation for the n th term of the sequence.

b. Write a Recursive formula for the n th term of the sequence.

c. find the 10th term in the sequence

EX 2. Write the first three terms, and give a recursive formula for the sequence whose n th term is $a_n = 27 - 4n$.

EX. 3 What position does 127 have in the arithmetic sequence below?
16, 19, 22, ..., 127

Geometric Sequences

A _____ sequence is one in which the *ratio* of consecutive terms is constant.

The **explicit** formula for the n th term of a sequence is:

An example of a geometric sequence is:

Determine whether each sequence is geometric.

- a. 0, 5, 10, 15, 20, ...
- b. 1, 5, 25, 125, 625, ...
- c. 56, -28, 14, -7, ...

Find the next three terms in each geometric sequence.

- a. 4, -8, 16, ...
- b. 60, 72, 86.4, ...
- c. 1, -4, 16, -64, ...

Find the sixth term of a geometric sequence in which $a_1 = 3$ and $r = -5$

EX 4. A particular car depreciates 25% in value each year. Suppose the original cost is \$14,800.

a. Find the value of the car in its second year.

b. Write an explicit formula for the value of the car in its n th year.

c. In how many years will the car be worth about \$1,000?