Investigation Geomertic Sequences Answers

Investigation Geometric Sequences

Name:

A geometric sequence is a sequence with a constant common ratio, or, in plain language, where you multiply by a certain number to get from term to term.

Example: 1, 2, 4, 8, 16, 32, 64, . . .

common ratio = r = 2

Example: 12, -4, $\frac{4}{2}$, $-\frac{4}{9}$, $\frac{4}{27}$, ...

common ratio = $r = -\frac{1}{2}$

For #1 & 2: a) Determine whether the sequence is geometric or not,

- b) find the common ratio, and
- c) list the next three terms
- 1) $2,1,\frac{1}{2},\frac{1}{4},\frac{1}{8},...$
- a) Geometric? (5) b) r = 2 c) (6) (7) (7) (7) (7) (8) (8) (9) (9) (16
- 2) -4, 12, -36, 108, . . .
 - a) Geometric? <u>UCS</u>

Missing terms in a geometric sequence are called geometric means.

Example: Find the geometric mean of 4 and 36:

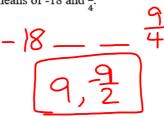
4, 12, 36

multiply by a constant each time.

Since we know this is a geometric sequence, the pattern is to

3) Find three geometric means of 2 and 162.

4) Find two geometric means of -18 and



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Recursive and Explicit Formulae -

The recursive formula for a geometric sequence is:

 $a_n = a_{n-1} \cdot r$

where a_{n-1} is the previous term r is the common ratio

Example:

$$a_1 = 12$$

 $a_n = \frac{1}{2}a_{n-1}$, for $n \ge 1$

What are the first 5 terms? 12, 4

The explicit formula for a geometric sequence is:

 $a_n = a_1 \cdot r^{n-1}$

where a_1 is the first term,

n is the number of the term that you want

r is the common ratio

Example: $a_n = (5)2^{n-1}$

What are the first 5 terms? 5, 10, 20, 40, 80 What is the 21st term? 5, 242, 880

Write a recursive and an explicit formula for each:

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5) $15, 3, \frac{3}{5}, \dots$ Fig. Recursive: $\alpha_1 = 15$ $\alpha_1 = 5$ Recursive: $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 15$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ $\alpha_1 = 5$ Explicit: $\alpha_1 = 5$ $\alpha_1 = 5$

7) If the fifth term of a geometric sequence is 6, and the ninth term is 96

a) What is the common ratio?

c) What is the recursive formula for the sequence? $\begin{cases} \alpha_1 = \frac{3}{8} \\ \alpha_n = 2\alpha_{n-1}, n \ge 2 \end{cases}$ d) What is the explicit formula for the sequence? $\alpha_n = \frac{3}{8}(2) \quad \text{OR} \quad \alpha_n = \frac{3}{8}(-2)$