TOPIC: GEOMETRIC SEQUENCES

Intro to Geometric Sequences

EXAMPLE Find the pattern for each sequence of numbers.

(A) $2, 4, 6, 8\ldots$

(B) $2, 4, 8, 16\ldots$

(C) $9, 3, 1, \frac{1}{3}, \ldots$

◆ If each term in a sequence is found by _____ by the same number, we call it a **geometric sequence**.

► The **common ratio** r is the constant multiplier between any two consecutive terms.

New

$r =$ ——

EXAMPLE Find the common ratio of the geometric sequence and then use it to find the next two terms.

$a_1 = 5, a_2 = 20$

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PRACTICE Identify if each sequence is arithmetic, geometric, or neither.

(*A*) $7, 10, 16, 25, 37, \ldots$

[ARITHMETIC | GEOMETRIC | NEITHER]

(*B*) $5, 11, 17, 23, 29, \ldots$

[ARITHMETIC | GEOMETRIC | NEITHER]

(*C*) $10, 5, \frac{5}{2}, \frac{5}{4}, \ldots$

[ARITHMETIC | GEOMETRIC | NEITHER]

PRACTICE Find the common ratio for the geometric sequence.

(*A*) $3, 12, 48, 192, \ldots$

(*B*) $\frac{18}{5}, \frac{6}{5}, \frac{2}{5}, \frac{2}{15}, \ldots$

(*C*) $0.8, 0.12, 0.018, 0.0027, \ldots$

PRACTICE Write the first four terms of the following geometric sequence.

(*A*) $a_1 = -8, \ r = -\frac{1}{2}$

(*B*) $a_1 = \frac{3}{4}, \ r = \frac{2}{3}$

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General Term of a Geometric Sequence

◆ Recall: The terms of a geometric sequence have a common ratio r between any two consecutive terms.

► The general (nth) term a_n of a geometric sequence is based on ___ (the _____ term) & ____.

New **General Term of Geometric Sequences**

$$a_n = a_1 r^{\text{___}}$$

$\{3, 6, 12, 24, \ldots\}$

$a_1 =$ $a_2 =$ $a_3 =$ $a_4 =$

$a_n =$ $a_{20} =$

EXAMPLE Write a formula for the general or n^{th} term for each geometric sequence.

(A) $a_1 = 8, r = 3$

(B) $\frac{16}{27}, \frac{8}{9}, \frac{3}{4}, 2, \ldots$

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PRACTICE Write a formula for the general or n^{th} term for each geometric sequence.

(A) $12, -6, 3, -\frac{3}{2}, \ldots$

(B) $0.8, 0.32, 0.128, 0.0512, \ldots$

PRACTICE Find the indicated term of the following geometric sequence.

(A) $a_n = 10\left(\frac{1}{5}\right)^{n-1}$

Find a_4.

(B) $a_n = 4(0.3)^{n-1}$

Find a_5.

EXAMPLE

A certain medicine decreases in the bloodstream by 20% each hour after it is taken. Right after taking the dose, a patient has 80 mg of the medication in their system. How much of it is remaining after 5 hours? Approximate to the nearest tenths.