3-3 Geometric Sequences

Objectives:

-I can write the recursive and explicit form for a table, pattern, and situation

- I can see and understand geometric growth

Vocabulary

Geometric: sequence that multiplies

First Term: 1st term $a_1 = f$

Common Ratio: what I multiply by $r =$

Explicit Function: $a_n = f \cdot r^{n-1}$

Recursive Function: $a_n = a_{n-1} \cdot r$, $a_1 = f$

Notation

$a_{n:}$ TERM looking for

n: TERM #

a_{n-1}:

previous TERM

a_{n+1}:

next TERM

6, 18, 54,... (×3, ×3)

State the next 3 terms: 162, 486, 1458

Arithmetic or Geometric?

First Term: 6

Common ~~Factor~~ Ratio: $r = 3$

Recursive: $a_n = a_{n-1} \cdot 3$, $a_1 = 6$

Explicit: $a_n = 6 \cdot 3^{n-1}$

81, 27, 9, ...

$\cdot \frac{1}{3}$ $\cdot \frac{1}{3}$

Predict the next 3 terms: $3, 1, \frac{1}{3}, \frac{1}{9}$

Arithmetic or Geometric?

First Term: 81

Common ~~Factor~~ Ratio: $\frac{1}{3}$

Recursive: $a_n = a_{n-1} \cdot \frac{1}{3}$

$a_1 = 81$

Explicit: $a_n = 81 \cdot \left(\frac{1}{3}\right)^{n-1}$

Find the first five terms of the sequence

$a_1=7$ and $a_n=3a_{n-1}-12$

a_1, a_2, a_3, a_4

$7, 9, 15, 33, 87$

$a_2=3(a_{2-1})-12$

$a_2=3(a_1)-12$

$a_2=3(7)-12$

$=21-12=9$

$a_3=3(a_{3-1})-12$

$=3(9)-12$

$=27-12$

$=$

Find the first 5 terms of the sequence

$a_1 = -2$ and $a_n = (-3)a_{n-1} + 4$

$-2, 10, -26, 82, -242$

$(-3)(-2) + 4 = 10$

$(-3)(10) + 4 = -26$

$(-3)(-26) + 4 = 82$

$(-3)(82) + 4$

Write a recursive formula for each explicit formula

arithmetic

1. $a_n = 5(n-1)+8$

$a_n = d(n-1) + f$

$a = 5 \quad f = 8$

$a_n = a_{n-1} + 5$

$a_1 = 8$

2. $a_n = 4(3)^{n-1}$

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

$f = 4 \quad r = 3$

$a_n = a_{n-1} \cdot 3$

$a_1 = 4$

Write an explicit equation for each recursive formula

1. $a_1 = 4$, $a_n = a_{n-1} + 16$, $n \geq 2$ arithmetic

$f = 4$

$d = 16$

$a_n = 16(n-1) + 4$

2. $a_1 = 22$, $a_n = 4a_{n-1}$, $n \geq 2$ geometric

$f = 22$

$r = 4$

$a_n = 22 \cdot 4^{n-1}$

Allowance Task:

It's getting close to your 16th birthday and you have been trying to save some money so you can buy a car. As of now, your efforts have not brought in very much cash. You have been mowing lawns and also collecting an allowance from doing chores around the house. The car you want is $3,000. You have two different plans to try to get a new car in the next month:

Plan 1) Ask your parents to give you $100 dollars every day you do chores

Plan 2) Ask your parents for a new allowance where you will do the dishes every night for 1¢ on the first night, 2¢ on the second night, 4¢ on the third night, and so on for a whole month.

A) Which plan do you think your parents will agree to?

B) Write an equation for the first plan. How much money will you earn after 30 days?

C) Write an equation for the second plan. How much money will you earn after 30 days?