Algebra 2 Geometric Sequence Notes Date:

Geometric Sequence – the ratio between consecutive terms is a constant (*r*)
***r* is called the common ratio.**

Identifying an Geometric Sequence:

ex: $1, -6, 36, -216, \ldots$

$-6 \div 1 = -6$ yes, the sequence is geometric $r = -6$

$36 \div -6 = -6$

$-216 \div 36 = -6$

ex: $2, 4, 6, 8, \ldots$

ex: $100, 90, 81, 72.9, \ldots$

Geometric Sequence Formulas

Recursive	Explicit
$\begin{cases} a_1 = a\ given\ value \\ a_n = a_{n-1} \cdot r \end{cases}$	$a_n = a_1 \cdot r^{n-1}$

$a_1 = first\ term$

$a_n = nth\ term$

$a_{n-1} = the\ previous\ term$

$r = common\ ratio$

ex: Write a recursive and explicit formula for the sequence: $2, -10, 50, -250, \ldots$

$-10 \div 2 = -5$ The sequence is geometric $r = -5$

$50 \div -10 = -5$ $a_1 = 2$

$-250 \div 50 = -5$

Recursive formula

$$\begin{cases} a_1 = 2 \\ a_n = -5 \cdot a_{n-1} \end{cases}$$

Explicit Formula

$$a_n = 2 \cdot (-5)^{n-1}$$

Find the first 5 terms

find the 10^{th} term

ex: Write a recursive and explicit formula for the geometric sequence: $0.7, 0.07, 0.007, \ldots$

Recursive formula

Explicit Formula

APPLICATION: *Suppose you want to enlarge a photo to 120% of its original size. The photo has a length of 10 cm. Find the length of the photo after 5 enlargements of 120%.*

Enlargement	Length
1	$1.20(10) = 12$
2	$1.20(12) = 14.4$
3	$1.20(14.4) = 17.28$

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

$a_5 = 12 \cdot (1.20)^{5-1}$

$a_5 \approx 24.9\ cm$

Geometric Mean – **the geometric mean of any two numbers is positive square root of the product of the two numbers.**

Geometric Mean = $\sqrt{product\ of\ the\ two\ numbers}$

Find the geometric mean of 2 and 50.

Geometric mean = $\sqrt{2 \cdot 50} = \sqrt{100} = 10$

We can use the geometric mean to find a missing term from a geometric sequence.

ex: Find the missing term of the geometric sequence

..., 5, ___ , 911.25, ...

geometric mean = $\sqrt{5(911.25)} = 67.5$

..., 5, 67.5, 911.25, ...

ex: Find the missing terms of the geometric sequence:

2.5, ___ , ___ , ___ , 202.5