

# Notes

## Algebra III Y

Unit 11 Day 3


Monday, December  
27, 2021

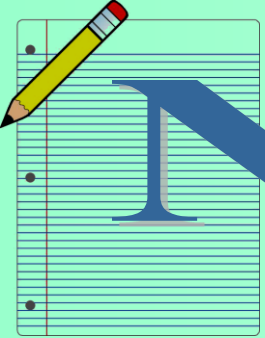
Common  
Ratio

The amount that each term is multiplied by is called the common ratio.

Example:

$$3, 6, 12, 24, 48, 96, \dots$$





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Geometric  
Sequence  
Equation

If the first term ( $a_1$ ) and common ratio ( $r$ ) of an arithmetic sequence is known, then the equation for the  $n^{\text{th}}$  term is:

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



# Discussion

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Find the 13<sup>th</sup> term of this sequence:

2, 6, 18, 54, ...

$$a_1 = 2$$

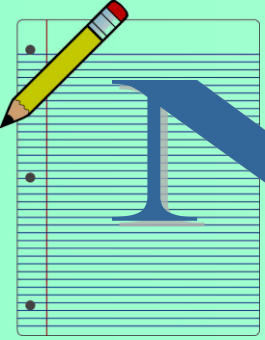
$$a_n = a_1 r^{n-1}$$

$$r = 3$$

$$a_n = 2 \cdot 3^{n-1}$$

$$a_{13} = 2 \cdot 3^{13-1}$$

$$a_{13} = 1,062,882$$



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### Geometric Series

The sum of the terms from 1 to  $n$  of a geometric sequence can be found using this formula:

$$S_n = a_1 \left( \frac{1 - r^n}{1 - r} \right)$$



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Evaluate:

$$\sum_{i=1}^8 2 \cdot 5^i$$

$$a_1 = 2 \cdot 5^1 = 10$$

$$r = 5$$

$$S_n = a_1 \left( \frac{1 - r^n}{1 - r} \right)$$

$$S_8 = 10 \left( \frac{1 - 5^8}{1 - 5} \right)$$

$$S_8 = 976560$$