## Warm-Up

- 1. -13, -43, -73, -103, ... Find  $a_{37}$
- 2.  $\sum_{k=1}^{5} (2k-4)$

#### Sequences and Series

2 types:

<u>Arithmetic</u>: Pattern progresses by adding/subtracting (Common difference)

Geometric: Pattern progresses by multiplying/dividing (Common ratio)

Equation for Arithmetic Sequence:

Specific a<sub>n</sub>=a<sub>1</sub>+(n-1) d

term

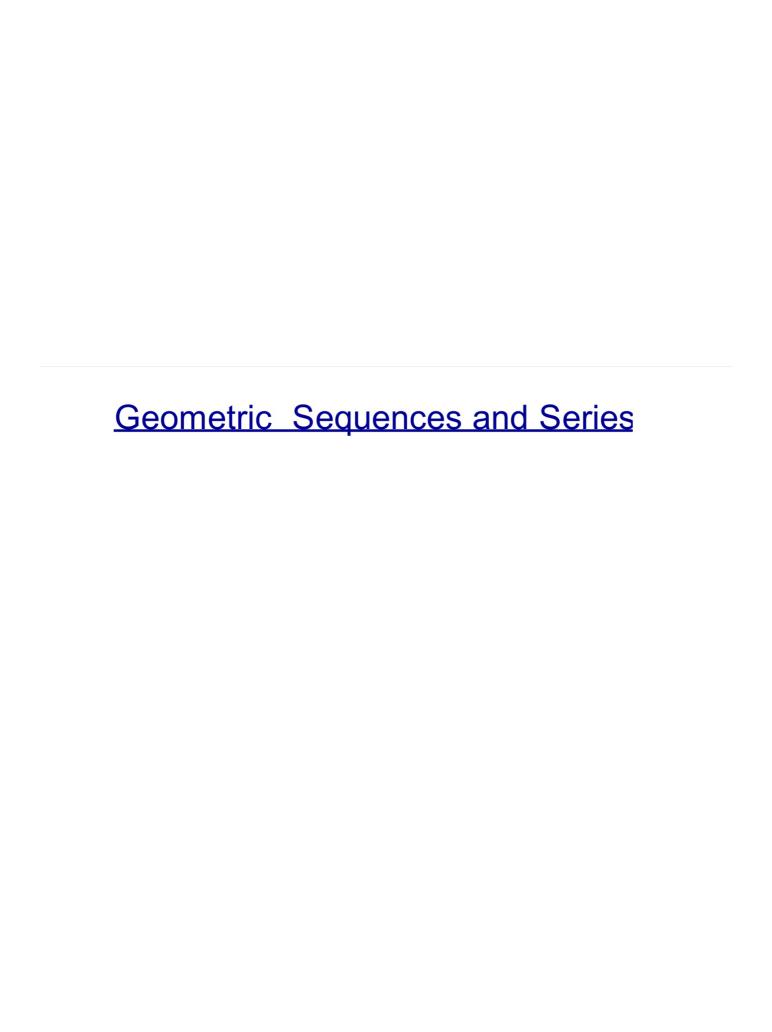
 $a_n$  is the  $n^{th}$  term of the sequence  $a_1$  is the first term d is the common difference

# Arithmetic Series

Equation for arithmetic series:

$$S_n = n \left( \frac{\alpha_1 + \alpha_n}{2} \right)$$

 $S_n$  is the sum of the first n terms of the series



Equation for Geometric Sequence:

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

 $a_n$  is the  $n^{th}$  term of the sequence  $a_1$  is the first term r is the common ratio

term

What you are multiplying by

## **Examples**

1. Write the next term of the sequence. Then write a rule for the n<sup>th</sup> term

a. 4, -8, 16, -32,...

b. 20, 10, 5, 5/2,...

c.-1, 2, -4, 8, -16,... d. 36, 12, 4, 4/3, ...

a. Write a rule for the n<sup>th</sup> term of the sequence

5,2, 0.8, 0.32, .... Then find  $a_{12}$ 

$$Q_{12} = 5.4$$
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 $Q_{12} = 5.0971524$ 

White a rule for the  $n^{th}$  term of the carrence

b. Write a rule for the  $n^{th}$  term of the sequence 1,3,9,27,... Then find  $a_{12}$ 

$$a_n = |\cdot 3^{n-1}|$$
 $a_{12} = |\cdot 3^{n-1}| = |77, 147$ 

#### Geometric Series

Equation for Geometric Series:

$$\sum_{n} S_{n} = \alpha_{1} \left( \frac{1-r^{n}}{1-r} \right)$$

 $S_n$  is the sum of the first "n" terms of the series

1. Consider the geometric series 1+4+16+64+... Find the sum of the first 10 terms.

Find the sum of the first 10 terms.  

$$S_{10} = 9 \cdot \left(\frac{1-r^{1}}{1-r}\right)$$

$$S_{10} = 1 \cdot \left(\frac{1-4^{10}}{1-4}\right)$$

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$$S_{10} = 1 \cdot \left(\frac{349,525}{349,525}\right)$$

$$S_{10} = 349,525$$

## 2. Consider the geometric series:

Find the sum of the first 16 terms.

$$S_{16} = a_{1} \left( \frac{1-r''}{1-r} \right)$$

$$= a_{1} \left( \frac{1-(-z)^{16}}{1-(-z)} \right) = -43,690$$

