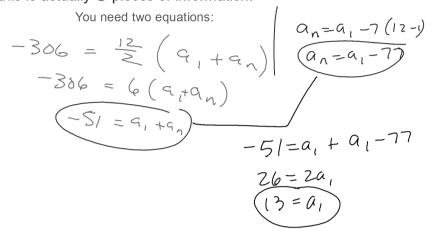
Use the given information to find the first term of this arithmetic sequence.

$$S_{12} = -306$$
  $d = -7$   $m = 12$  this is actually 3 pieces of information!



## Sec 11-5: Geometric Series

A Geometric Series is the sum of the terms of a Geometric Sequence.

You can now finish Hwk #33:

Practice Sheet - Sec 11-4: Arithmetic Series

Due tomorrow

Evaluate this geometric series:

There is nothing "obvious" about how to quickly find the sum of a geometric series like there was when finding the sum of an arithmetic series. But, there is a formula you can use to find the sum of a finite Geometric Series.

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

 $S_n$  = the sum of the first n terms

 $a_1$  = the first term

r = the common ratio

n =# of terms

What doesn't this formula use that you need to know for an arithmetic series? You don't need the last term!

Find the sum of the first 12 terms of this geometric series: 20480 + -10240 + 5120 + -2560 + ...

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

$$9_1 = 20460$$

$$V = -.5$$

$$N = 12$$

$$S_{12} = \frac{20480(1-(-5))}{1--5}$$

$$S_{12} = \frac{13,650}{1}$$

Evaluate this first 14 terms of this series:

$$S_{n} = \frac{a_{1}(1 - r^{n})}{1 - r}$$

$$Q_{1} = 4$$

$$V = 3$$

$$N = 14$$

$$S_{14} = \frac{4(1 - 3^{14})}{1 - 3}$$

$$S_{14} = 9565,936$$

Evaluate this series: 6 + 12 + 24 + 48 +...+ 1536

$$S_{n} = \frac{a_{1}(1 - r^{n})}{1 - r}$$

$$Q_{1} = \zeta$$

$$C = \zeta$$

$$R = 9$$

$$S_{2} = \frac{6(1 - z^{q})}{1 - z}$$

$$S_{3} = \frac{3066}{1 - z^{q}}$$

$$a_{n} = a_{1} \cdot r^{n-1}$$

$$1536 - 6(2)^{n-1}$$

$$256 - 2^{n-1}$$

$$109 \cdot 256 - n - 1$$

$$109 \cdot 256 - n - 1$$

$$109 \cdot 256 - n - 1$$

$$8 - n - 1$$

Find the number of terms:

## Every finite series has a sum.

## What about an infinite series?

Which of the following infinite series will have a sum, if any?

3. 1.28+ 1.60+ 2+ 2.5+ ...

Our Textbook states that if an infinite geometric series has |r|<1, then the series will CONVERGE, and it will have a sum.

If an infinite geometric series has |r|>1, then it will DIVERGE, and will not have a sum.

Infinite Series:

The only infinite series that have a sum are

Geometric Series when |r|<1

To find the sum of an infinite geometric series if |r|<1, use the following formula:

$$S = \frac{a_1}{1 - r}$$

S =the sum of all infinite terms

 $a_1$  = the first term

r =the common ratio

How did this formula become this formula?

Sum of a finite geometric series.

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

Sum of an infinite geometric series, |r|<1

$$S = \frac{a_1}{1 - r}$$

Since r is less than one and it is being raised to a very large power ( $\infty$ ) it becomes so small that it essentially become zero. Therefore, (1-r<sup>n</sup>) becomes (1-0) and  $a_1(1-0) = a_1(1) = a_1$