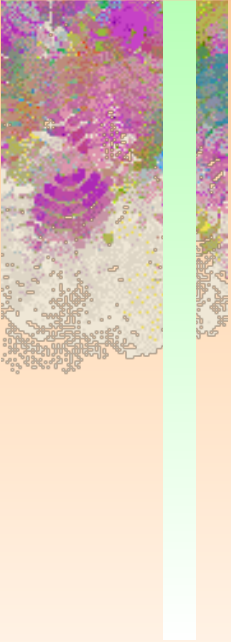
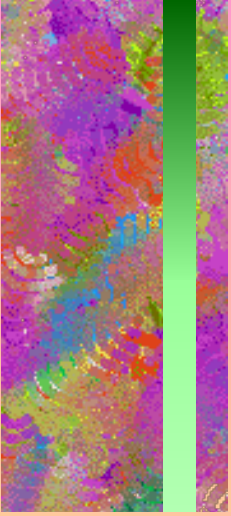


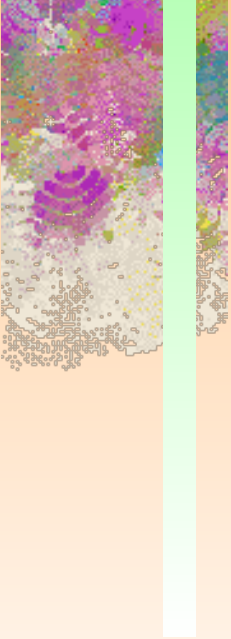
# Chapter 11

- 
- **Investigating Sequences and Series**
  - **(continued)**



# Section 11-3

---

- 
- **Geometric**
  - **Sequences**

# GeometricSequence

- What if your pay check started at \$100 a week and doubled every week. What would your salary be after four weeks?

# GeometricSequence

- Starting \$100.
- After one week -
- After two weeks -
- After three weeks -
- After four weeks -
- These values form a geometric sequence.



# Geometric Sequence

- *Geometric Sequence*: a sequence in which each term after the first is found by multiplying the previous term by a constant value called the common ratio.

# Geometric Sequence

- Find the first five terms of the geometric sequence with  $a_1 = -3$  and common ratio ( $r$ ) of 5.

# Geometric Sequence

- Find the common ratio of the sequence  $2, -4, 8, -16, 32, \dots$
- To find the common ratio, divide any term by the previous term.
- $r =$

# Geometric Sequence

- Just like arithmetic sequences, there is a formula for finding any given term in a geometric sequence.



# Examples

- Thus our formula for finding any term of a geometric sequence is  $a_n = a_1 \cdot r^{n-1}$

# Geometric Sequence

- Find the 10th term of the geometric sequence with  $a_1 = 2000$  and a common ratio of  $1/2$ .

# Examples

- Find the first five terms in a sequence if  $a_1 = -64$  and  $r = -1/4$

# Geometric Means

- Just like with arithmetic sequences, the missing terms between two nonconsecutive terms in a geometric sequence are called geometric means.

# Geometric Means

- Looking at the geometric sequence 3, 12, 48, 192, 768 the geometric means between 3 and 768 are \_\_\_\_\_, \_\_\_\_\_, & \_\_\_\_\_.

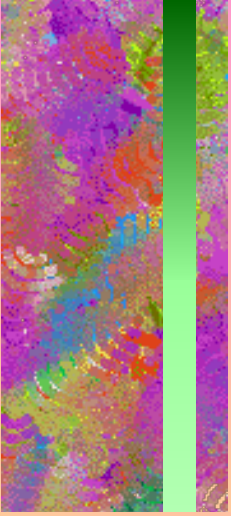
# Geometric Means

- Find two geometric means between -5 and 625.
- -5, \_\_, \_\_, 625



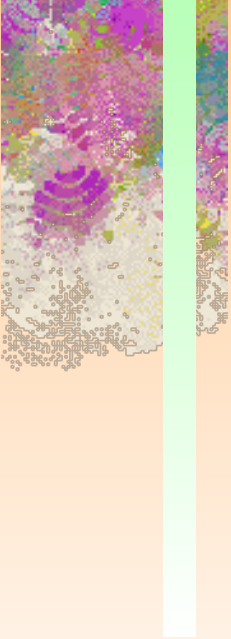
# Solve these problems dealing with terms of geometric sequences

1. Find the 1<sup>st</sup> 5 terms of the sequence where  $a_1 = \frac{1}{2}$ ,  $r = \frac{2}{3}$
2. Find the 12<sup>th</sup> term of the geometric sequence  
3, 12, 48, ...
3. Find the missing terms of the geometric sequence  
2.5, \_\_\_\_\_, \_\_\_\_\_, 20.



# Section 11-4

---

- 
- **Geometric**
  - **Series**



# Geometric Series

- Geometric Series - the sum of the terms of a geometric sequence.
- Geo. Sequence: 1, 3, 9, 27, 81
- Geo. Series:  $1 + 3 + 9 + 27 + 81$
- What is the sum of the geometric series?

# Geometric Series

- The formula for the sum  $S_n$  of the first  $n$  terms of a geometric series is given by

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

# Geometric Series

- Find  $\sum_{n=1}^4 -3(2)^{n-1}$
- You can actually do it two ways. Let's use the old way.

# Geometric Series

- The other method is to use the sum of geometric series formula.
- $a_1 = \underline{\hspace{2cm}}, r = \underline{\hspace{2cm}}, n = \underline{\hspace{2cm}}$

# Geometric Series

$$\sum_{n=1}^4 3(2)^{n-1}$$

# Solve these problems dealing with geometric series

1. Find the sum of the 1<sup>st</sup> 8 terms of the series  
 $2 + 6 + 18 + \dots + 4374$

2. Find the sum of the 200<sup>th</sup> term of the series  
 $81, 27, 9, 3, \dots$

3. Evaluate

$$\sum_{n=4}^{12} \left( \frac{1}{2} \right)^n$$

# Worksheet

On the worksheets, work only the problems that are checked. Use your notes.

Answers will be put on this screen in this order: 13-2, 13-3, 13-4, 13-5

# Answers 13-2

Use arithmetic formula for terms

1. 27

3. -17

5.  $26^{\text{th}}$

7. 81

8. -73

9.  $103/3$

10.  $17/3$

11.  $26/3$

$43/3$

13.  $37/3$

$59/3$



# Answers 13-3

Use formula for Sum of  
Arithmetic series

1. 741
2. -987
9. 105
10. 105
11. 93
12. -15
15. 325

# Answers 13-4

Use Formula for  
Geometric Terms

1.  $-6, 4, -8\sqrt{3}, 16/9$
2.  $2, 2\sqrt{3}, 6, 6\sqrt{3}$
3.  $-2.5, -5, -10, -20$
4.  $\sqrt{2}, \sqrt{6}, 3\sqrt{2}, 3\sqrt{6}$
5. 135
7. 128
- 11.48, 72, 108

# Answers 13-5

Use Geometric Sum formula

1. 315
2.  $215/64$
9.  $65/3$
12. 549