

12-4 Geometric Sequences.....page #

**GOAL:**  
Recognize and extend geometric sequences.

Feb 17-12:59 PM

The table shows the heights of a bungee jumper's bounces.

Bounce	1	2	3
Height (ft)	200	80	32

$x.4 \quad \frac{80}{200} = \frac{32}{80} \times .4$

The height of the bounces shown in the table above form a *geometric sequence*. In a **geometric sequence**, the ratio of successive terms is the same number  $r$  called the **common ratio**.

Feb 17-3:06 PM

How do you find  $d$ ?  $r$ ?

**Determine whether the sequence could be geometric or arithmetic. If possible, find the common ratio or difference.**

1. **100, 93, 86, 79, ...**  $d = -7$   
Arith.

$\underbrace{100, 93, 86, 79}$   
 $\underbrace{-7 \quad -7 \quad -7}$

100, 93, 86, 79  
Differences  $-7 \quad -7 \quad -7$   
Ratios  $\frac{93}{100} \quad \frac{86}{93} \quad \frac{79}{86}$

It could be arithmetic, with  $d = -7$ .

Feb 17-3:08 PM

**Determine whether the sequence could be geometric or arithmetic. If possible, find the common ratio or difference.**

Arithmetic  
 $d =$

2. **5, 1, 0.2, 0.04, ...**

Geo.  $\frac{1}{5} \quad \frac{1}{5} \quad \frac{0.2}{1} \quad \frac{0.04}{0.2}$   $r = .2$

Geometric  
 $r =$

3. **-50, -32, -18, -8, ...**

$\frac{-32}{-50} \quad \frac{-18}{-32} \quad \frac{-8}{-18}$  Neither

Feb 19-11:04 AM

**General Rule for Geometric Sequences**

The  $n$ th term  $a_n$  of a geometric sequence is  
 $a_n = a_1 r^{n-1}$ ,  
where  $a_1$  is the first term and  $r$  is the common ratio.

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

Feb 26-9:13 AM

**Find the 7th term of the geometric sequence**  
**3, 12, 48, 192, ...**  $a_n = a_1 (r)^{n-1}$

$\underbrace{3} \times 4 \quad \underbrace{12} \times 4 \quad \underbrace{48} \times 4 \quad \underbrace{192}$   $a_7 = 3(4)^6 = 12,288$

**Step 1** Find the common ratio.  $r = \frac{a_2}{a_1} = \frac{12}{3} = 4$

**Step 2** Write a rule, and evaluate for  $n = 7$ .

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

$a_7 = 3(4)^{7-1}$

$= 3(4096) = 12,288$

The 7th term is 12,288.

Feb 26-9:18 AM

Find the 9th term of the geometric sequence.

**0.001, 0.01, 0.1, 1, 10, . . .**

$\times 10 \quad \times 10 \quad \times 10 \quad \times 10$

$$a_9 = 0.001(10)^8$$

$$a_9 = 100,000$$

Feb 26-2:04 PM

## Review

1. Determine whether the sequence could be geometric or arithmetic. If possible, find the common ratio or difference.

$\frac{1}{3}, 2, 12, 72, \dots$     Geo     $r = 6$   
 $\times 6 \quad \times 6 \quad \times 6$

2. Find the 8th term of the geometric sequence  
 $1, -2, 4, -8, \dots$

$\div 2 \quad \div 2 \quad \div 2$      $a_8 = 1(-2)^7$

Feb 27-8:32 AM

## ASSIGNMENT:

pages 895-898

problems: 2-7, 19-25, 59

Enjoy Spring Break !!!!

Feb 27-8:38 AM