

## GEOMETRIC SEQUENCES

- A SEQUENCE IS A LIST OF NUMBERS THAT HAS A PATTERN IN IT.
  - AN ALTERNATE SEQUENCE IS ONE WHERE THE NEXT TERM IN A SEQUENCE IS ACQUIRED BY ADDING SOME NUMBER. THIS NUMBER IS CALLED COMMON DIFFERENCE.
- THE 685, 681, 677, 673, ... THE FIRST TERM IS 685 AND THE COMMON DIFFERENCE IS -4.

- A GEOMETRIC SEQUENCE IN ONE WHERE THE NEXT TERM IN THE SEQUENCE IS OBTAINED BY MULTIPLYING SOME NUMBER. THIS NUMBER IS CALLED COMMON RATIO.

IE 2, 6, 18, 54, ... 1<sup>ST</sup> TERM IS 2  
COMMON RATIO IS 3

- EACH TERM IN A GEOMETRIC SEQUENCE CAN BE

EXPRESSED USING THE FORMULA  $t_n = ar^{n-1}$

$t_n$  = LAST TERM,  $a$  = FIRST TERM,  $r$  = COMMON RATIO  
 $n$  = # OF TERMS

THE GIVEN 16, 8, 4, 2, ... Find  $T_{10}$

$$T_{10} = 16 \left(\frac{1}{2}\right)^{10-1}$$

$$T_{10} = 16 \left(\frac{1}{2}\right)^9$$

$$T_{10} = \frac{1}{32}$$

THE GIVEN 2, 6, 18, ..., 118098 Find  $n$

$$T_n = ar^{n-1}$$

$$\frac{118098}{2} = 2 \left(\frac{3}{2}\right)^{n-1}$$

$$59049 = 3^{n-1}$$

$$\frac{\log 59049}{\log 3} = (n-1) \frac{\log 3}{\log 3}$$

$$10 = n-1$$

$$11 = n$$

DE

$$t_3 = 9$$

$$t_{13} = 531441$$

FIND  $a$  AND  $r$

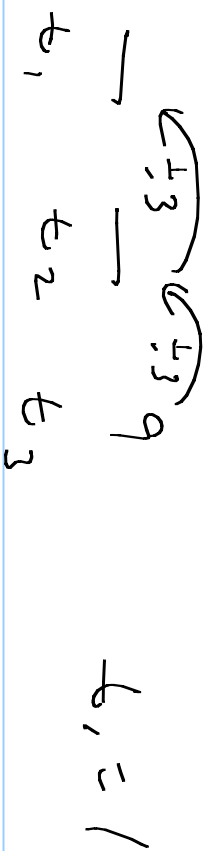
$$t_n = ar^{n-1}$$

$$531441 = ar^{11-1}$$

$$\frac{531441}{9} = ar^{10}$$

$$\sqrt[10]{59049} = \sqrt[10]{ar^{10}}$$

$$3 = r$$



IB  
 A BALL IS DROPPED FROM 250 cm IT LOSES 12% OF ITS HEIGHT AFTER EACH BOUNCE. DETERMINE

A) MAXIMUM HEIGHT AFTER THE 6<sup>th</sup> BOUNCE

B) # OF BOUNCES UNTIL ITS HEIGHT IS EXACTLY

13.21421803 cm

A)  $t_n = ar^{n-1}$

$t_n = 250(.88)^{n-1}$

$$E_7 = 2500 (.4644)$$

$$E_7 = 116.101 \text{ cm}$$

$$7) \quad \frac{13.21421803}{250} = \frac{250}{250} (.88)^{n-1}$$

$$\frac{\log .05286}{\log .88} = (n-1) \frac{\log .88}{\log .88}$$

$$23 = n-1$$
$$+1$$

$$24 = n$$

2 ← 6 ← 18

DE  $x-4$ ,  $x+2$ ,  $2x-4$  ARE CONSECUTIVE

TERM OF A GEOMETRIC SEQUENCE, DETERMINE

THE VALUE OF  $x$

$$\begin{aligned} (x+2)(x-4) &= (x+2)(x-4) \\ \frac{x+2}{x-4} &= \frac{2x-4}{x+2} \end{aligned}$$

$$(x+2)(2x+2) = (2x-4)(x-4)$$

$$\begin{aligned} x^2 + 4x + 4 &= 2x^2 - 12x + 16 \\ -x^2 - 4x - 4 &= 2x^2 - 12x + 16 \end{aligned}$$

$$0 = x^2 - 16x + 12$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1$$

$$b = -16$$

$$c = 12$$

$$x = \frac{-16 \pm \sqrt{(-16)^2 - 4(1)(12)}}{2(1)}$$

$$x = \frac{16 \pm \sqrt{256 - 48}}{2}$$

$$x = \frac{16 \pm \sqrt{208}}{2}$$

$$x = \frac{16 \pm \sqrt{16 \sqrt{13}}}{2}$$



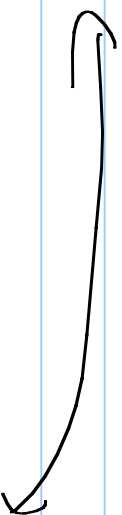
$$x = \frac{16 \pm 4\sqrt{13}}{2}$$

$$x = 8 \pm 2\sqrt{13}$$

IF  $L_1 + L_2 = 3$        $L_3 + L_4 = 6$

WHAT IS THE COMMON RATIO?

$$a + ar = 3$$



$$ar^2 + ar^3 = 6 \implies r^2(a + ar) = 6$$

$$r^2(3) = 6$$

$$r^2 = 2$$

$$r = \pm\sqrt{2}$$

Rc 115 # 1, 2 A, C, E...

# 3, 4, 10

Rc 141 # 1-3, 7