**Geometric Sequence** – a sequence is geometric if there is a number *r*such that $\frac{a\_{2}}{a\_{1}}=\frac{a\_{3}}{a\_{2}}=\cdots =r$

* *r* is known as the common ratio

Find the common ratio for each geometric sequence

 Ex. $3, 9, 27, 81, 243, … $

 Ex. $10, 20, 40, 80, 160, … $

 Ex. $\frac{-1}{4}, \frac{1}{16}, \frac{-1}{64}, \frac{1}{256}$, …

**The nth Term of a Geometric Sequence**

 $a\_{n}=a\_{1}∙r^{n-1}$ where $a\_{1}=first term and r=common ratio$

Geometric Sequence: $a\_{1}, a\_{1}∙r^{1}, a\_{1}∙r^{2}, a\_{1}∙r^{3}, …$

**Recursive Formula for a Geometric Sequence**

 $\left\{\begin{matrix}a\_{1}= \\a\_{n}=r∙a\_{n-1}\end{matrix}\right.$

Ex. Find the first 5 terms of the geometric sequence whose first term is $a\_{1}=2$ and the common ratio = 4

Ex. Find the 9th term of the geometric sequence whose first term is 4 and whose common ratio is $\frac{1}{2}$

Ex. Find the 10th term of the geometric sequence $6, -2, \frac{2}{3}, …$

Ex. The 2nd term of a geometric sequence is $-18$ and the 5th term is $\frac{2}{3}$. Find the 6th term.

**The Sum of a Finite Geometric Sequence**

 $a\_{1}+a\_{2}+a\_{3}+…+a\_{n}$ = $S\_{n}=a\_{1}(\frac{1-r^{n}}{1-r})$ where $a\_{1}=first term $

 $r=common ratio$

 $n=number of terms$

Ex. Find the sum:

$$\sum\_{n=1}^{7}2^{n-1}$$

Ex. Find the sum of the first 5 terms of the geometric series $80 + 60 + 45 + …$

Ex. Write the geometric series using sigma (Σ) notation.

 $5+10+20+40+\cdots +10240$

**The Sum of an Infinite Geometric Series**

 $S=\frac{a\_{1}}{1-r}$ as long as $\left|r\right|<1$

Ex. Find the sum:

$$\sum\_{n=0}^{\infty }5\left(\frac{1}{2}\right)^{n}$$

Ex. Find the sum $5 + 0.5 + 0.05 + 0.005 + …$

**Application**

 A deposit of $100 is made on the first day of a month in a savings account paying 6% interest compounded monthly. Find the balance of this annuity after 4 years.

 Compound Interest Formula: $A=P(1+\frac{r}{n})^{nt}$