 nth term of an geometric sequence

The activities below lead students to discover the relationship between the nth term, $T\_{n}$, the first term, $a$, and the common ratio, $r$.

Activity 1 – using graphing software.

1. Students to construct the first 5 terms of a geometric sequence by defining a first term, $a$, and a common ratio $r$.

Example: Let $a=2$ and $r=3$, then the sequence is 2, 6, 18, 54, 162…

| n | 1 | 2 | 3 | 4 | 5 |
| --- | --- | --- | --- | --- | --- |
| $$T\_{n}$$ | 2 | 6 | 18 | 54 | 162 |

1. Student to use graphing software to graph the 5 points represented by $T\_{n}$ verse $n$.

Example: Using Desmos:



1. Students to describe the relationship in terms of the shape of the graph.
2. Students to input a curve through the points to express the relationship between $T\_{n}$ and $n$.
y1~m\*n^(x1-1)

Example:



1. Students to note the values of $m$ and $p$ and record the equation:

Example: $m = 2, p = 3$

$$y = 2×3^{x-1}$$

1. Student to re-write this rule in terms of $T\_{n}$, n, a and r.

Example: y = $T\_{n}$, $n=x$, $r=3=p$, $a=2=m$

$$T\_{n} = ar^{n-1}$$

Activity 2 – using a spreadsheet.

1. Open the file: nth-term-geometric-sequence.XLSX

Students have two options,

* With formulas and graph (skip steps 3 and 4)
* Without formula and graph
1. Students set a value for $a$ and $r$.
2. Student use the definition of $Tn=rTn-1$ to complete the table of values for the first $10$ terms.
3. Students are to graph the relationship between $Tn$ and $n$.
4. Students to describe the relationship in terms of the shape of the graph.
5. Students to come up with a new formula for $Tn$ using $a$, $r$ and $n$ without referencing the previous term. Write a formula to check the values in column D.