 nth term of an arithmetic sequence

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

Activity 1 – using graphing software.

1. Students to construct the first $5$ terms of an arithmetic sequence by defining a first term, $a$, and common difference $d$.

Example: Let $a=2$ and $d=3$, then the sequence is $2, 5, 8, 11, 14…$

| n | 1 | 2 | 3 | 4 | 5 |
| --- | --- | --- | --- | --- | --- |
| $$T\_{n}$$ | 2 | 5 | 8 | 11 | 14 |

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

Example: Using Desmos:



1. Students to find the equation of the line through the points to express the relationship between $T\_{n}$ and $n$.

Example: $y = 3x – 1$ -> $T\_{n}=3n-1$

1. Students to describe the relationship in terms of the shape of the graph.
2. Students to work in pairs to write a rule for $T\_{n}$ in terms of $n$, $a$ and $d$. Students will need to look at the relationship between $a$, $d$ and the $y$-intercept.

$$T\_{n}=dn+a-d$$

$$T\_{n}=a+dn-d$$

$$T\_{n}=a+(n-1)d$$

Activity 2 – using a spreadsheet.

1. Open the file: nth-term-arithmetic-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 $d$.
2. Student use the definition of $Tn=Tn-1+d$ 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 $a$, $d$ and $n$ and without referencing the previous term. Write a formula to check the values in column D.