

Patterns Activity #3:

Recall an arithmetic sequence is a sequence of numbers with a common difference. Looking at the differences:

$$2 \quad 6 \quad 18 \quad \dots$$

$\underbrace{\quad\quad}_{\text{diff of 4}} \quad \underbrace{\quad\quad}_{\text{diff of 12}}$

The differences between neighbor terms are changing, so NOT arithmetic

Recall a geometric sequence is a sequence of numbers with a common multiplier between terms. We look at these:

$$2 \quad 6 \quad 18 \quad 54$$

$\underbrace{\quad\quad}_{\text{mult by 3}} \quad \underbrace{\quad\quad}_{\text{mult by 3}} \quad \underbrace{\quad\quad}_{\text{mult by 3}}$

This fits?

The common ratio is 3 and is a geometric seq.

Finding the 20th number:

sequence	2	6	18	54	162	...
placement	1	2	3	4	5	... 20

we want to find at what this number is?

The pattern is easier to see if we write the sequence as a product of #'s:

sequence	2	2×3	$2 \times 3 \times 3$	$2 \times 3 \times 3 \times 3$	$2 \times 3 \times 3 \times 3 \times 3$
placement	1	2	3	4	5

$\underbrace{\quad\quad}_{(2 \text{ times})} \quad \underbrace{\quad\quad}_{(3 \text{ times})} \quad \underbrace{\quad\quad}_{4 \text{ times}}$

The 20th place will be $2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$
 or 2324522934

19 times.
this is a good place for a calculator