What's Going On?

Checking In

Minds on Yesterday's Final Question

Action! Finding Patterns

Consolidation The Fibonacci Sequence

Learning Goal - I will be able to recognize patterns in sequences that are not strictly arithmetic or geometric.

Minds on

LGL

The 4th term of a geometric sequence is 54 and the 9th term is 13,122.

a. Determine the general term.

Find r

$\frac{13122}{54} = 243$

we multiplied by 243 over 5 equal steps

$r \times r \times r \times r \times r = 243$

$\sqrt[5]{r^5} = \sqrt[5]{243}$

$r = 3$

Find a

4th term is 54

$a = 54 \div 3^3$ $a = 54 \times 3^{-3}$

$a = 2$

$t_n = 2 \times 3^{n-1}$

Minds on

LGL

The 4th term of a geometric sequence is 54 and the 9th term is 13,122.

b. Determine the 12th term.

Using General Term

$t_{12} = 2 \times 3^{12-1}$

$t_{12} = 2 \times 3^{11}$

$t_{12} = 354,294$

Using Fourth Term

$t_{12} = 54 \times 3^{8}$

$t_{12} = 354,294$

Using 9th Term

$t_{12} = 13122 \times 3^{3}$

Action!

Finding Patterns

Not all patterns are arithmetic or geometric.

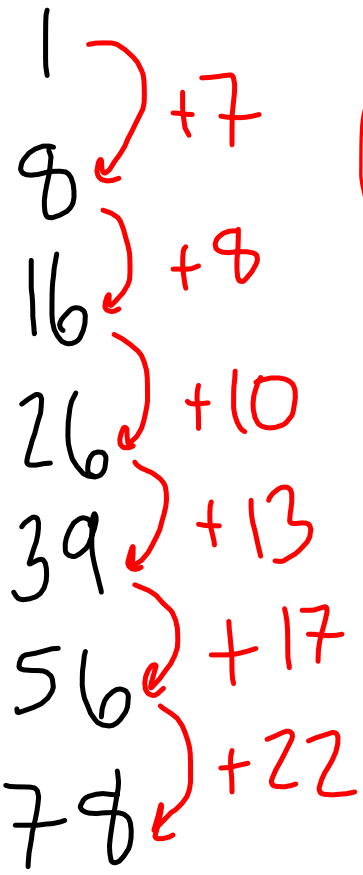
Some are a bit of a combination of both, some follow their own set of rules all together (see Fibonacci's sequence)

We can't always find the general term, but we should be able to create a recursive formula.

Action!

Finding Patterns

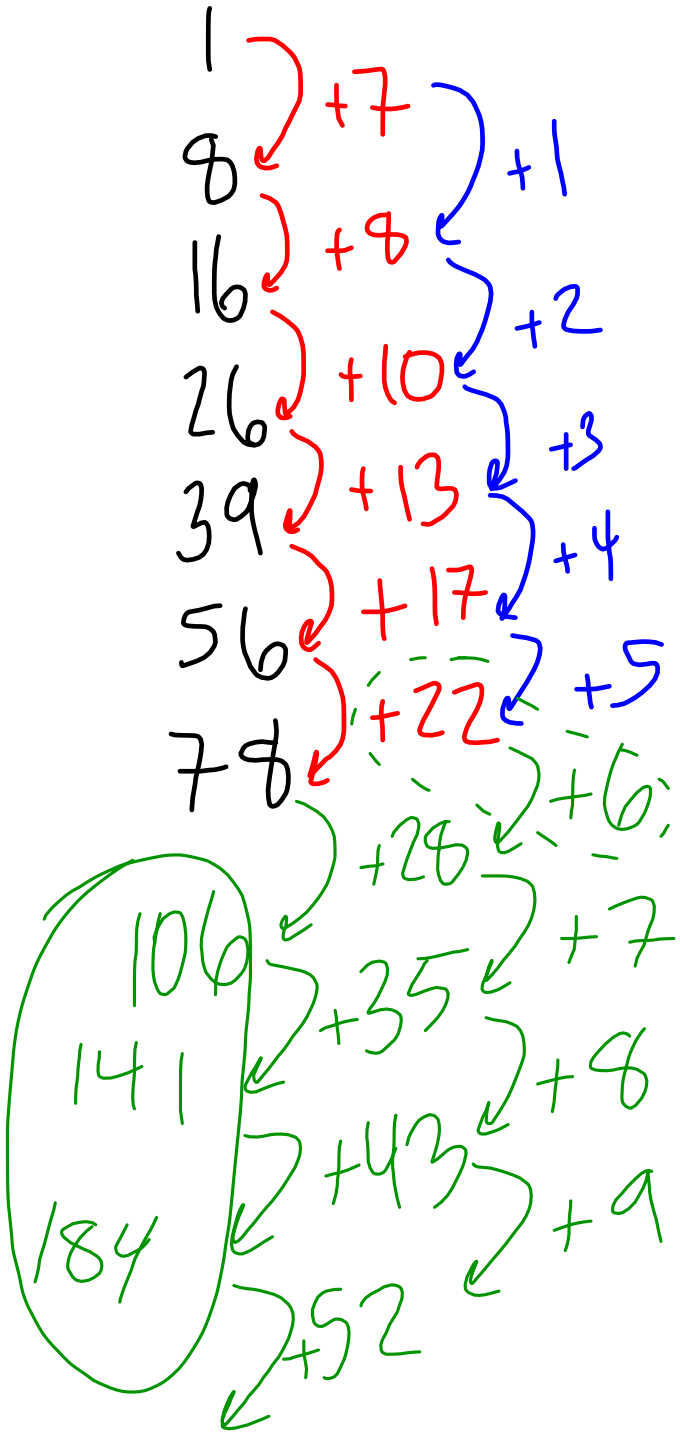
Determine the **next three terms** in the sequence 1, 8, 16, 26, 39, 56, 78 ...



Action!

Finding Patterns

Determine the **next three terms** in the sequence 1, 8, 16, 26, 39, 56, 78 ...



Action!

Finding Patterns

Determine the **recursive formula** of the sequence

5, 14, 41, 122, 365, 1094, 3281 ...

5 +9
14 +27
41 +81
122 +243
365 +729
1094 +2187
3281

$t_1 = 5$,

any term = the previous term with stuff done to it

$t_n = 3t_{n-1} - 1$

$t_n = 3 \times t_{n-1} - 1$

To get the next term, multiply the previous term by 3, then subtract 1.

Action!

Finding Patterns

Determine the **general term** of the sequence

$$3, 5, 7, 9, 11, 13, 15, \_\_, \_\_, \_\_, \_\_, \_\_, \_\_, \ldots$$

$$4, 9, 16, 25, 36, 49, 64, \ldots$$

$t_n =$ ____

Break up each term into its numerator and denominator.

Action!

Finding Patterns

Determine the **general term** of the sequence

$$\frac{3}{4}, \frac{5}{9}, \frac{7}{16}, \frac{9}{25}, \frac{11}{36}, \frac{13}{49}, \frac{15}{64} \ldots$$

Top Part

1	2	3	4	5	6	7
3	5	7	9	11	13	15

Arithmetic Sequence

$a = 3$

$d = 2$

$t_n = 3 + (n-1)2$

$= 3 + 2n - 2$

$= 2n + 1$

Action!

Finding Patterns

Determine the **general term** of the sequence

$$\frac{3}{4}, \frac{5}{9}, \frac{7}{16}, \frac{9}{25}, \frac{11}{36}, \frac{13}{49}, \frac{15}{64} \ldots$$

Bottom Part

1 2 3 4 5 6 7

4 9 16 25 36 49 64

2^2 3^2 4^2 5^2 6^2 7^2 9^2

$$(n+1)^2$$

Action!

Finding Patterns

Determine the **general term** of the sequence

$$\frac{3}{4}, \frac{5}{9}, \frac{7}{16}, \frac{9}{25}, \frac{11}{36}, \frac{13}{49}, \frac{15}{64} \cdots$$

$$t_n = \frac{2n+1}{(n+1)^2}$$

$$t_7 = \frac{2(7)+1}{(7+1)^2}$$

$$= \frac{15}{64}$$

Consolidation

The Fibonacci Sequence

The Fibonacci Sequence is the series of numbers:

0, 1, 1, 2, 3, 5, 8 ...

a. Determine the next 3 terms in the Fibonacci Sequence.

b. Determine the recursive formula for the Fibonacci Sequence.