	A	B	C	D	E	F	G
=							
1	seq_num	value	difference	diff_diff			
2	1	12	5	2			
3	2	17	7	2			
4	3	24	9	2			
5	4	33	11				
6	5	44					
7							
8							
9							
10							
11							

B7

$\{12,17,24,33,44\}$

this sequence is NOT arithmetic nor geometric

this sequence can be written as a recursive pattern

The pattern changes after the second term to an arithmetic pattern

THE PATTERN

So we need to get a sequence to add 5 to its first term and then only and then after that only add 2 to each successive term

$a_1 = 12$ (this is always just stated in a recursive sequence)

$a_2 = 17 = 12 + [5 + \mathbf{0}(2)]$

$a_3 = 24 = 17 + [5 + \mathbf{1}(2)]$

$a_4 = 33 = 24 + [5 + \mathbf{2}(2)]$

$a_5 = 44 = 33 + [5 + \mathbf{3}(2)]$

$a_1 = 12$ (this is always just stated in a recursive sequence)

notice that the highlighted counters are off by 2

$$a_2 = 17 = 12 + [5 + \mathbf{0}(2)]$$

$$a_3 = 24 = 17 + [5 + \mathbf{1}(2)]$$

$$a_4 = 33 = 24 + [5 + \mathbf{2}(2)]$$

$$a_5 = 44 = 33 + [5 + \mathbf{3}(2)]$$

$a_1 = 12$ (this is always just stated in a recursive sequence)

Since the highlighted counters are off by 2,

lets make that adjustment by subtracting 2 from sequence number, n.

$$a_2 = 17 = 12 + [5 + (n-2)(2)]$$

$$a_3 = 24 = 17 + [5 + (n-2)(2)]$$

$$a_4 = 33 = 24 + [5 + (n-2)(2)]$$

$$a_5 = 44 = 33 + [5 + (n-2)(2)]$$

$a_1 = 12$ (this is always just stated in a recursive sequence)

Use the pattern to find the next two terms

$$a_2 = 17 = 12 + [5 + (2-2)(2)]$$

$$a_3 = 24 = 17 + [5 + (3-2)(2)]$$

$$a_4 = 33 = 24 + [5 + (4-2)(2)]$$

$$a_5 = 44 = 33 + [5 + (5-2)(2)]$$

$$a_6 = 57 = 44 + [5 + (6-2)(2)]$$

$$a_7 = 72 = 57 + [5 + (7-2)(2)]$$

So now we can write a rule for the sequence $\{12,17,24,33,44\}$

$$a_1 = 12$$

$$a_n = a_{n-1} + [5 + (n-2)(2)]$$

Now the second part of the rule has an EXPLICIT formula that all versions of this rule must eventually become

$$a_n = a_{n-1} + 2 \cdot n + 1$$

$$\left\{1024,128,16,2,\frac{1}{4},\frac{1}{32},\frac{1}{256},\frac{1}{2048},\frac{1}{16384}\right\}$$

Writing a sequence from the first couple of terms

Step 1) What type of sequence is given?

Look at how the terms change from each term

Can you show it has a common difference?

OR

Can you show it has a common ratio?

OR

Do you need to use the previous term to reach the next term?

When given geometric sequence terms

Step 2) You already know a_1 Find r $=\dfrac{a_{n+1}}{a_n}$

Step 3) Write the geometric sequence using a_1 and r

	A	B
=		
1	given_term1	1024
2	term_in_seq1	1
3	given_term2	128
4	term_in_seq2	2
5		
6		
7		
8		
9		
10		
11		

B4 2

So we know $a_1=1024$ and $a_2=128$ and we also can show that this is an geometric sequence so all terms must follow $a_n=a_1(r)^{n-1}$

	A	B
=		=seq_1
1		1024
2		128
3		16
4		2
5		1/4
6		1/32
7		1/256
8		1/2048
9		1/16384
10		
11		

A1

We were given $a_1 = 1024$

r=a_2/a_1 implies $128/1024 = \frac{1}{8}$

so our geometric sequence is $a_n = 1024\left(\frac{1}{8}\right)^{(n-1)}$

and our finite sequence is $\left\{1024, 128, 16, 2, \frac{1}{4}, \frac{1}{32}, \frac{1}{256}, \frac{1}{2048}, \frac{1}{16384}\right\}$

$$\left\{\frac{2}{9},\frac{-2}{81},\frac{2}{729},\frac{-2}{6561},\frac{2}{59049},\frac{-2}{531441},\frac{2}{4782969},\frac{-2}{43046721},\frac{2}{387420489}\right\}$$

Writing a sequence from the first couple of terms

Step 1) What type of sequence is given?

Look at how the terms change from each term

Can you show it has a common difference?

OR

Can you show it has a common ratio?

OR

Do you need to use the previous term to reach the next term?

When given geometric sequence terms

Step 2) You already know a_1 Find r $=\dfrac{a_{n+1}}{a_n}$

Step 3) Write the geometric sequence using a_1 and r

	A	B
=		
1	given_term1	2/9
2	term_in_seq1	1
3	given_term2	-2/81
4	term_in_seq2	2
5		
6		
7		
8		
9		
10		
11		

B4 2

So we know $a_1 = \frac{2}{9}$ and $a_2 = \frac{-2}{81}$ and we also can show that this is an geometric sequence

so all terms must follow $a_n = a_1(r)^{n-1}$

	A	B
=		=seq_1
1		2/9
2		-2/81
3		2/729
4		-2/6561
5		2/59049
6		-2/5314...
7		2/47829...
8		-2/4304...
9		2/38742...
10		
11		

A1

We were given $a_1 = \frac{2}{9}$

r=a_2/a_1 implies $\frac{^-2}{81} / \frac{2}{9} = \frac{^-1}{9}$

so our geometric sequence is $a_n = \frac{2}{9}(\frac{^-1}{9})^{(n-1)}$

and our finite sequence is

$$\left\{\frac{2}{9}, \frac{^-2}{81}, \frac{2}{729}, \frac{^-2}{6561}, \frac{2}{59049}, \frac{^-2}{531441}, \frac{2}{4782969}, \frac{^-2}{43046721}, \frac{2}{387420489}\right\}$$

$\{70,59,48,37,26,15,4\}$

Writing a sequence from the first couple of terms

Step 1) What type of sequence is given?

Look at how the terms change from each term

Can you show it has a common difference?

OR

Can you show it has a common ratio?

OR

Do you need to use the previous term to reach the next term?

When given arithmetic sequence terms

Step 2) You already know a_1 Find d =

$a_{n-1}-a_n$

Step 3) Write the arithmetic sequence using a_1 and d

	A	B	C
=			
1	given_term1	70	
2	term_in_seq1	1	
3	given_term2	59	
4	term_in_seq2	2	
5			
6			
7			
8			
9			
10			
11			

B4 2

So we know a_1=**given_1** and a_2= **given_2** and we can show that this is an arithmetic sequence, by proving that there is a common difference so all terms must follow $a_n=a_1+(n-1)d$,

	A	B
=		=seq_1
1	a_1	70
2	a_2	59
3	a_3	48
4	a_4	37
5	a_5	26
6	a_6	15
7	a_7	4
8		
9		
10		
11		

A1 a_1

We actually know $a_1 = 70$

d=$a_2 - a_1$ implies $59 - 70 = {}^-11$

so our arithmetic sequence is $a_n = 70 + (n-1)({}^-11)$

$= 70 + 11 - 11 \cdot n$

$a_n = 81 - 11 \cdot n$

and our finite sequence is seq_1

To find a_{100}**, simply replace n = 10 into sequence**

$a_{100} = 70 + (10-1)({}^-11)$

$= a\_1 + (9)({}^-11)$

$= a\_1 + {}^-99$

$= {}^-29$

	A	B	C	D	E	F	G
=							
1	seq_num	value	ratio	diff_ratio			
2	1	50	4	1			
3	2	200	5	1			
4	3	1000	6	1			
5	4	6000	7				
6	5	42000					
7							
8							
9							
10							
11							

B7

$$\{50,200,1000,6000,42000\}$$

this sequence is NOT arithmetic nor geometric

this sequence can be written as a recursive pattern

The pattern changes after the second term to an arithmetic pattern

THE PATTERN

So we need to get a sequence to multiply by 4 to its first term and then only and then after that multiply by 1 more than the previous term to each successive term

$a_1=50$ (this is always just stated in a recursive sequence)

$$a_2=200=50[4+0(1)]$$

$$a_3=1000=200[4+1(1)]$$

$$a_4=6000=1000[4+2(1)]$$

$$a_5=42000=6000[4+3(1)]$$

$a_1 = 50$ (this is always just stated in a recursive sequence)

notice that the highlighted counters are off by 2

$$a_2 = 200 = 50[4 + 0(1)]$$

$$a_3 = 1000 = 200[4 + 1(1)]$$

$$a_4 = 6000 = 1000[4 + 2(1)]$$

$$a_5 = 42000 = 6000[4 + 3(1)]$$

$a_1 = 50$ (this is always just stated in a recursive sequence)

Since the highlighted counters are off by 2,

lets make that adjustment by subtracting 2 from sequence number, n.

$$a_2 = 200 = 50[4 + (n-2)(1)]$$

$$a_3 = 1000 = 200[4 + (n-2)(1)]$$

$$a_4 = 6000 = 1000[4 + (n-2)(1)]$$

$$a_5 = 42000 = 6000[4 + (n-2)(1)]$$

$a_1 = 50$ (this is always just stated in a recursive sequence)

Use the pattern to find the next two terms

$$a_2 = 200 = 50 + [4 + (2-2)(1)]$$

$$a_3 = 1000 = 200 + [4 + (3-2)(1)]$$

$$a_4 = 6000 = 1000 + [4 + (4-2)(1)]$$

$$a_5 = 42000 = 6000 + [4 + (5-2)(1)]$$

$$a_6 = 336000 = 42000 + [4 + (6-2)(1)]$$

$$a_7 = 3024000 = 336000 + [4 + (7-2)(1)]$$

So now we can write a rule for the sequence

$\{50, 200, 1000, 6000, 42000\}$

$$a_1 = 50$$

$$a_n = a_{n-1}[4 + (n-2)(1)]$$

Now the second part of the rule has an EXPLICIT formula that all versions of this rule must eventually become

$$a_n = a_{n-1}[n+2]$$