Name_____   Date_____

Sequences in Excel

Algebra I

<u>Review</u>:

Fill in the next three terms

3, 5, 7, 9, 11, _____, _____, _____   1, 3, 9, 27, 81, _____, _____, _____

What kind of pattern is this?   What kind of pattern is this?

Adding or Multiplying?   Adding or Multiplying?

By how much?_____   By how much?_____

What is the first term?_____   What is the first term?_____

<u>Formulas & Definitions</u>:

Arithmetic→ a sequence in which each term after the first is found by adding a constant, called the *common difference (d)*, to the previous term.

Geometric→ a sequence in which each term after the first is found by multiplying a constant, called the *common ratio (r)*, to the previous term.

Explicit→ a formula that uses the position of a term (**n**) to give the value of that term in the sequence.

Recursive→ a formula that uses the previous term (a_{n-1}) to find the value of the next term. The value of the first term (a_1) must also be given.

Arithmetic explicit formula: $a_n = a_1 + d(n-1)$

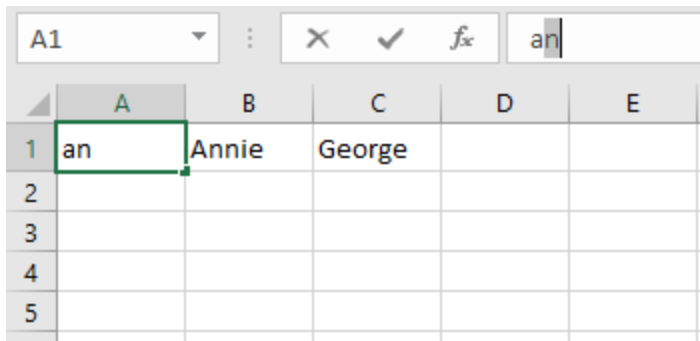Arithmetic recursive formula: $a_n = a_{n-1} + d$, $a_1 = \#$

Geometric explicit formula: $a_n = a_1 * r^{n-1}$

Geometric recursive formula: $a_n = a_{n-1} * r$, $a_1 = \#$

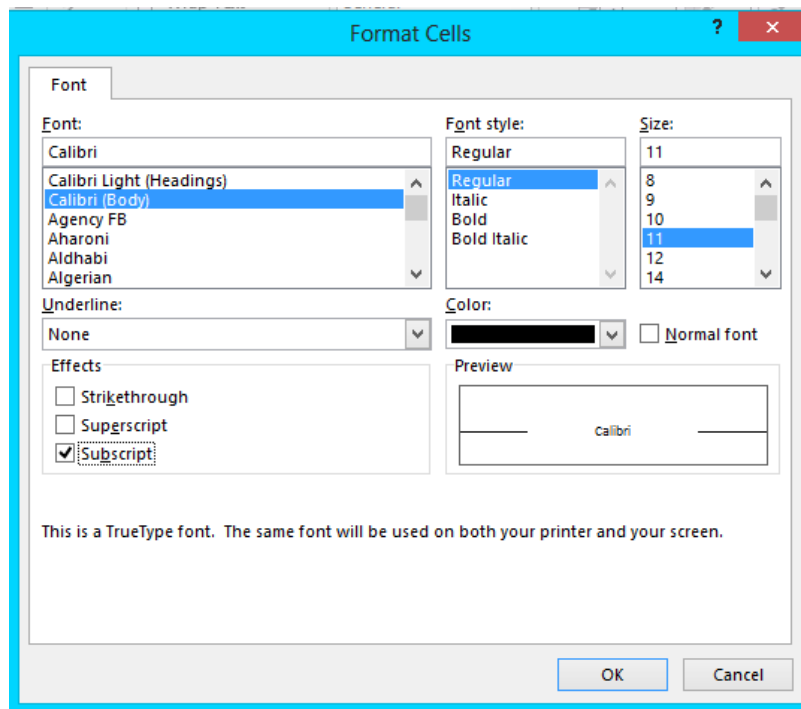<u>Today's Lesson</u>: Use the formula function in Excel to evaluate the following word problem.

Annie is saving money. She saved $8 in January and decided to add $15 to her savings each month. This sequence is _____. George also wants to save money. He started with 50 cents in January and decided to double the **total amount** he saved each month. This sequence is _____. How much did they each save after 6 months? A year? Two years?
Compare and contrast the two sequences.

Step 1: Set up the columns for the sequences you are comparing.

A1	▼	⋮	✕	✓	*fx*	an	

	A	B	C	D	E
1	an	Annie	George		
2					
3					
4					
5					

To make a subscript in Excel, highlight the characters in the Formula Bar then expand the Font settings (ctrl+shift+F) and check the subscript box. Click OK to close the dialog bog.

Format Cells   ?   ✕

Font

Font:
Calibri

Calibri Light (Headings)
Calibri (Body)
Agency FB
Aharoni
Aldhabi
Algerian

Font style:
Regular

Regular
Italic
Bold
Bold Italic

Size:
11

8
9
10
11
12
14

Underline:
None

Color:
☐ Normal font

Effects
☐ Strikethrough
☐ Superscript
☑ Subscript

Preview

Calibri

This is a TrueType font. The same font will be used on both your printer and your screen.

OK   Cancel

Step 2: We will set up our a_n (_____) column quickly by typing in the 1 and 2, then dragging down the green square in the bottom right corner until we have cells set up for the **first** _____ **terms**.

A2				f_x	1

	A	B	C	D
1	a_n	Annie	George	
2		1		
3		2		
4				
5				

A2				f_x	1

	A	B	C	D
1	a_n	Annie	George	
2	1			
3	2			
4	3			
5	4			
6	5			
7	6			
8				
9				

In this context, a_n represents _____.

Step 3: Set up the formula for the first sequence (Annie).
Type in the value of the first term (a_1).
Type the recursive formula for this sequence: $a_n = a_{n-1} + d$ → =B2+15
Drag down the bottom right corner to copy the formula to the other terms.

B2				f_x	=B2+15

	A	B	C	D	E
1	a_n	Annie	George		
2		1	8		
3		2	=B2+15		
4		3			
5		4			
6		5			
7		6			

	A	B	C
1	a_n	Annie	George
2	1	8	
3	2	23	
4	3	38	
5	4	53	
6	5	68	
7	6	83	
8			
9			

B5				f_x	=B4+15

	A	B	C	D
1	a_n	Annie	George	
2	1	8		
3	2	23		
4	3	38		
5	4	53		
6	5	68		
7	6	83		

Notice how the **previous term** in the formula bar changes from cell to cell.

This is because it is a **variable** in this equation.

Step 4: Repeat the process in Step 3 for the second sequence (George).

    **Remember that this sequence is geometric.

Step 5: Find the values for 12 months and 24 months using the **explicit** formulas.

SUM		▾	⋮	✕	✓	*fx*	=$B$2+15*(A8-1)

	A	B	C	D	E
1	a_n	Annie	George		
2	1	8	0.50		
3	2	23	1		
4	3	38	2		
5	4	53	4		
6	5	68	8		
7	6	83	16		
8		12 =$B$2+15*(A8-1)			

Type the explicit formula in the cell.

**Notice how we do not need every term between 6 and 12 to solve this equation.

Excel note: to use a **constant value from a cell, put dollar signs before the letter and number.

B9		▾	⋮	✕	✓	*fx*	=$B$2+15*(A9-1)

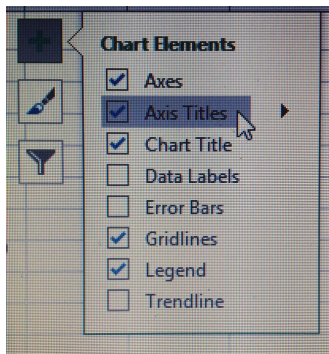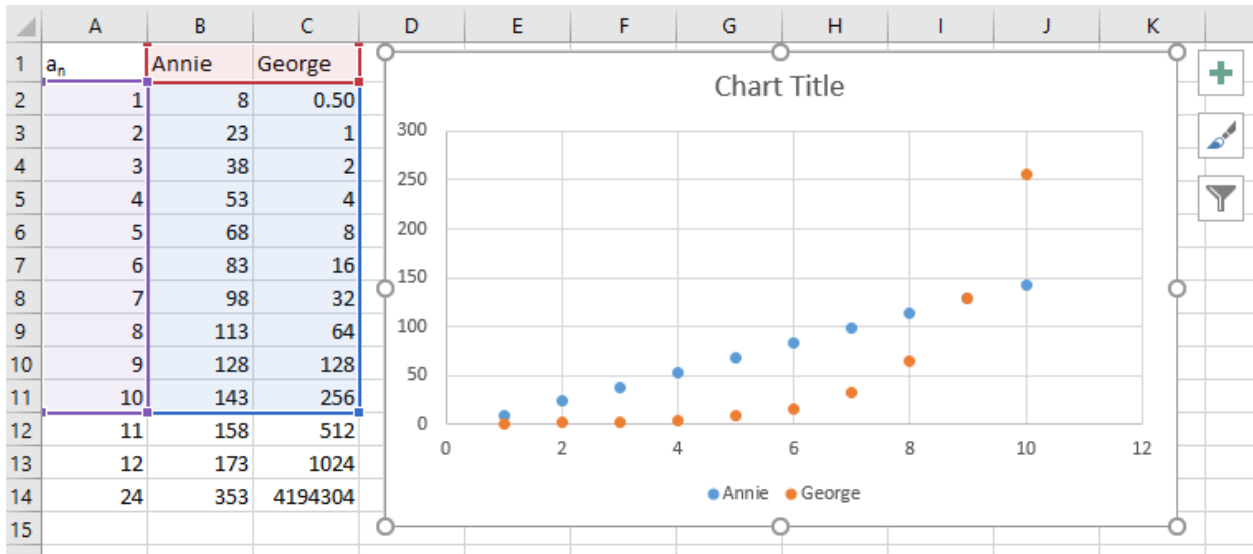|	A	B	C	D	E
1	a_n	Annie	George		
2	1	8	0.50		
3	2	23	1		
4	3	38	2		
5	4	53	4		
6	5	68	8		
7	6	83	16		
8	12	173			
9	24	353			

Drag down the bottom right corner.

Which value changed from the B8 cell formula to the B9 cell formula? _____

Why? _____

_____

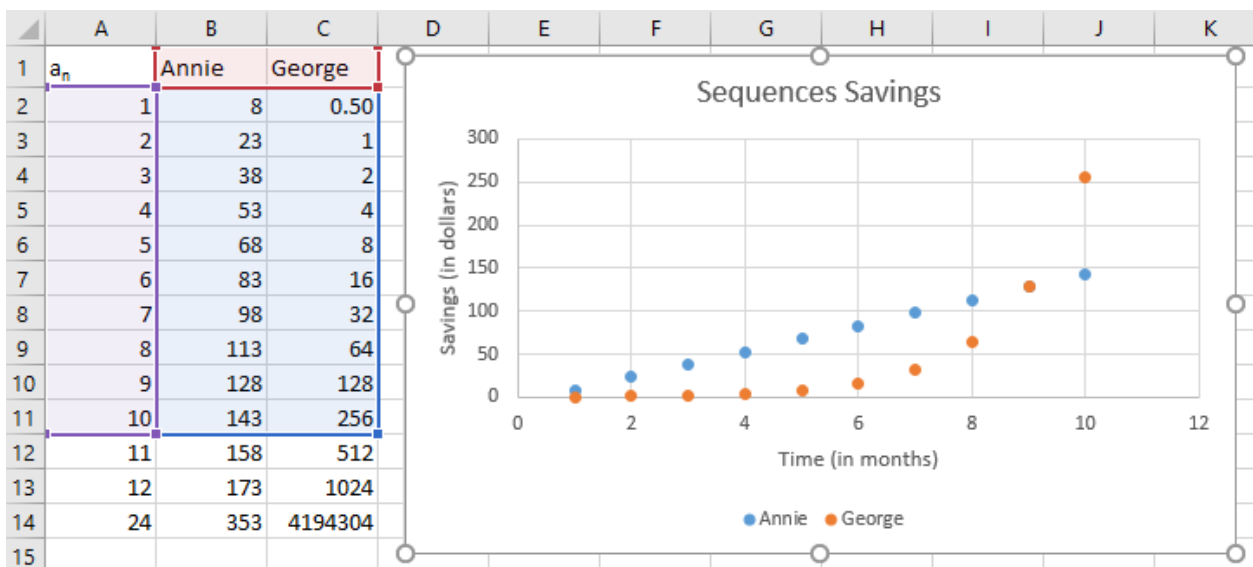Step 6: Repeat the process in Step 5 for the second sequence, using the correct explicit formula.

This is an effective way to find the values of any number term in these sequences. To compare and contrast these sequences, it might be easier to look at their graphs to draw conclusions.

Graphing: Find the values for every term you would like to graph. Select the data.
Click Insert, select the appropriate graph.

	A	B	C	D	E	F	G	H	I	J	K
1	a_n	Annie	George								
2	1	8	0.50								
3	2	23	1								
4	3	38	2								
5	4	53	4								
6	5	68	8								
7	6	83	16								
8	7	98	32								
9	8	113	64								
10	9	128	128								
11	10	143	256								
12	11	158	512								
13	12	173	1024								
14	24	353	4194304								
15											

Chart Title

To edit the graph, click the green plus sign to expand the
chart elements. Check off Axis Titles then **double click on
the titles on the graph** to edit them.

Chart Elements
- ✔ Axes
- ✔ Axis Titles
- ✔ Chart Title
- ☐ Data Labels
- ☐ Error Bars
- ✔ Gridlines
- ✔ Legend
- ☐ Trendline

Compare and contrast the graphs.

	A	B	C	D	E	F	G	H	I	J	K
1	a_n	Annie	George								
2	1	8	0.50								
3	2	23	1								
4	3	38	2								
5	4	53	4								
6	5	68	8								
7	6	83	16								
8	7	98	32								
9	8	113	64								
10	9	128	128								
11	10	143	256								
12	11	158	512								
13	12	173	1024								
14	24	353	4194304								
15											

Sequences Savings
Savings (in dollars)
Time (in months)
Annie George

<u>Additional Problems</u>:

Find the first 5 terms using the recursive formula: $a_1 = -2$, $d = 5$
Then find the 20th term (a_{20})of the sequence using the explicit formula.

Find the first 5 terms of the sequence using the recursive formula: $a_1 = 6$, $r = -4$
Then find the 10th term (a_{10}) of the sequence using the explicit formula.

<u>Challenge Problems</u>: (Hint: subtracting is just adding a negative number and dividing is multiplying by a fraction!)

Find the first 5 terms using the recursive formula: $a_1 = 36$, $d = -10$
Then find the 15th term (a_{15})of the sequence using the explicit formula.

Find the first 5 terms of the sequence using the recursive formula: $a_1 = 639$, $r = \frac{2}{3}$
Then find the 12th term (a_{12}) of the sequence using the explicit formula.

What do you notice about these sequences that were different from the others?

_____

_____