Spreadsheets, Rules, and Formulas

Name: _____

Date: _____ Grade: _____ Period: _____

1. Consider the sequence 13, 17, 21, 25,...What number is next?

2. What is the 29th number in the sequence? Create a table in your spreadsheet.

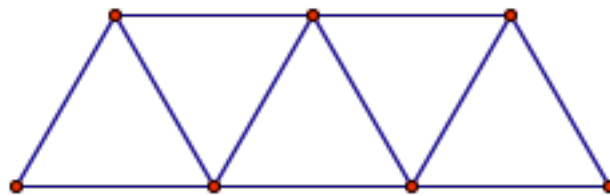| ◇	A	B
1	1	13
2	2	17
3	3	21
4	4	25
5		
6		
7		
8		

3. What is the 72nd term?

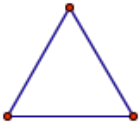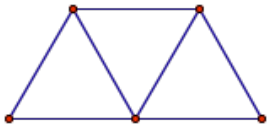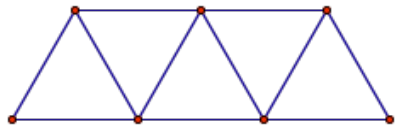4. Can you find a rule that can help you find any number in this sequence without having to find all the previous numbers in it?

Name: _____

Date: _____ Grade: _____ Period: _____

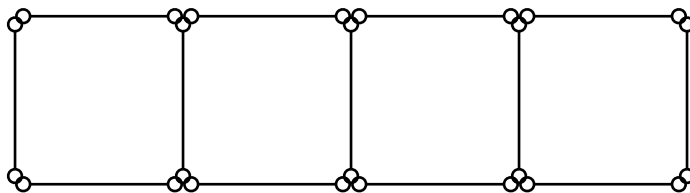1. A structure is built with beams such as the following:

We will say that this is a beam of length 3. As you can see, this beam is made of 11 rods. How many rods would a beam of length 1 need? And one of length 2? We can organize this information in the following table:

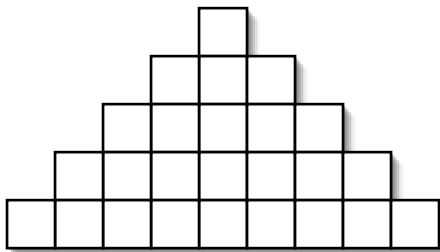|	Length of beam	Number of rods
	1	
	2	
	3	
	4	

(a) How many rods would you need for a beam of length 4? Of length 12?

(b) How many rods would you need for a beam of length 56?

(c) Find a rule that counts the rods for a beam of any given length.

(d) Will this rule work for all cases?

(e) How does the rule work?

(f) Now that you've found a rule, how do the numbers (parameters) in the formula relate to the beams?

2. The following structure is made with rods:

(a) How many rods do you need to make one square? Two squares? Three squares?

(b) How many rods do you need to make 23 squares?

(c) How many rods do you need to make 189 squares?

(d) Find a rule that counts how many rods you need for any given number of squares.

(e) Will this rule work for all cases?

(f) How does the rule work?

(g) Now that you've found a rule, how do the numbers (parameters) in the formula relate to the rods and the structure?

3. There are five rows in the following tower.

(a) How many bricks are there in the 5th row?

(b) If I want to build a tower that has 25 rows using the same design, how many bricks do I need for the 25th row?

(c) I saw a tower with a longest row of 299 bricks, how many rows of bricks did the tower have?

(d) Find a rule that tells you how many bricks are in the longest row of any given tower. Find a rule that tells you how many rows are there in a tower that has any given number of bricks in the longest row?

(e) Will these rules work for all cases?

(f) How do the rules work?

(g) Now that you've found these rules, how do the numbers (parameters) in the formula relate to the tower and the number of bricks?
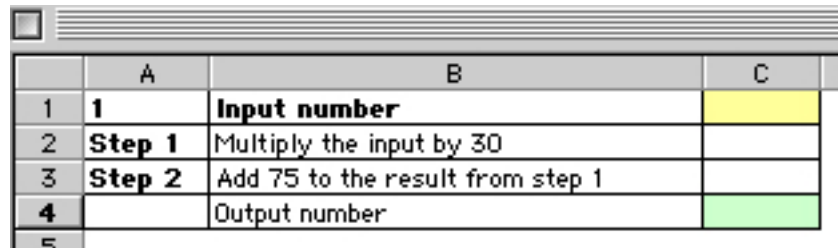
Name: _____

Date: _____ Grade: _____ Period: _____

Number Shifters

A *number shifter* will be a rule or set of rules that performs certain calculation. It takes an input number, and after a certain sequence of steps, returns an output number.

First, we'll create a number shifter that calculates long-distance charges. The rate is 30 cents per minute, plus 75 cents per call. So, this number shifter will take an input number (the number of minutes), multiply it by 30, and add 75 to the result.

	A	B	C
1	1	**Input number**	
2	**Step 1**	Multiply the input by 30	
3	**Step 2**	Add 75 to the result from step 1	
4		Output number	

We need to write in cell C2 the formula that will multiply the number in cell C1 by 30, and in cell C3 we will write a formula that adds 75 to the result in cell C2. Once we've done this, we can change at will the input number to get different outputs.

Now we will experiment with other number shifters, e.g. what happens if we invert the order of the operations, what happens if we make longer rules (with more steps). To do this, click on the tab labeled "1" on the file `examples.xls`. We can see the formulas in the worksheet labeled "1 (formulas)".

Now we will try to find what input number is needed to get a given output, following given rules. Click on the tab labeled "2." For each problem, find the input that gives the desired output.

Mystery Number Shifters

Click on the tab labeled "3." In these number shifters the steps are not described (don't peek at the formulas!).

1. In problems 1–3, find the rule for each step.

2. In problems 4–6, the result from a step is concealed, but not the formula. Find the rules for the rest of the steps.

3. In problems 7–9, the result and the formula for a step are not known. Find the rule.

Explore what happens to different input numbers. The empty templates above the problems can be used to try different solutions (or use pencil and paper).

	F	G	H	I	P	Q	R	S	T	U
16										
17		# 3			# 6			# 7		
18		Input Number	0		Input Number	5		Input Number	20	
19		Step 1	10		Step 1	10		Step 1	10	
20		Step 2	40		Step 2	=Q19+40		Step 2		
21		Step 3	28		Step 3	300		Step 3	15	
22		Step 4	14		Step 4	350		Step 4	115	
23		Step 5			Step 5			Step 5		
24		Step 6			Step 6			Step 6		
		Output Number	14		Output Number	350		Output Number	115	
25										

In the worksheet labeled "4," the number shifters are *condensed*, the rules are not separated in steps. Try to find the rule for the first three. Invent one or two condensed number shifters, and ask a partner to find the rule. Now trade places, and try to find the rule invented by your partner (don't make it too difficult!)

	A	B
1	1	
2	Input number	5
3	Output number	15
4		
5		
6	4	
7	Input number	
8	Output number	
9		