Warm Up Problem

Mary was reading an old book. She noticed that several sheets were missing from the book. When she opened the book at this place, the number of the page on the left was 14 and the number of the page on the right was 19. How many sheets of paper fell out of the book in this place. (*Hint:* Remember that there are 2 pages on each sheet of paper: one on the front and one on the back).

Early Elementary
Fall 2015 Meeting 8
## Flipping Triangles, Counting Triangles, and Other Fun Problems

1. Below are 5 triangles facing upward. Your goal is to flip all triangles to face downward, but you can only flip 3 triangles at a time. (No more, no fewer.) A *flip* turns a triangle facing up into a triangle facing down and a triangle facing down into a triangle facing up. Draw all the steps in your solution.
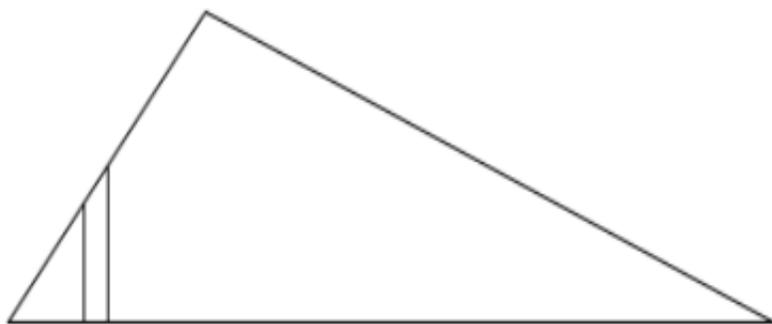
2. What if you have 6 triangles facing upward and you can only flip 4 at a time? (No more, no fewer). Can you still flip all of them downward?
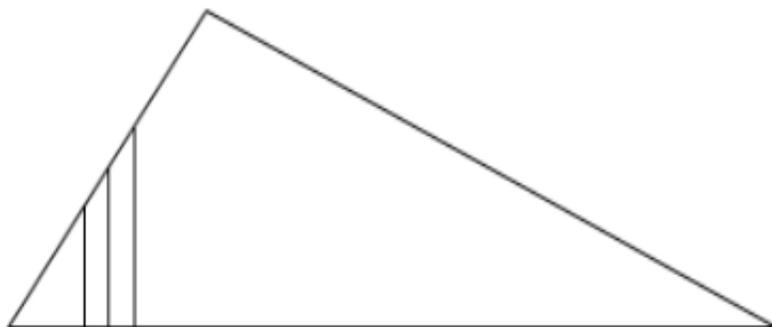
3. How many triangles are there on the picture below? Draw them in the space provided.
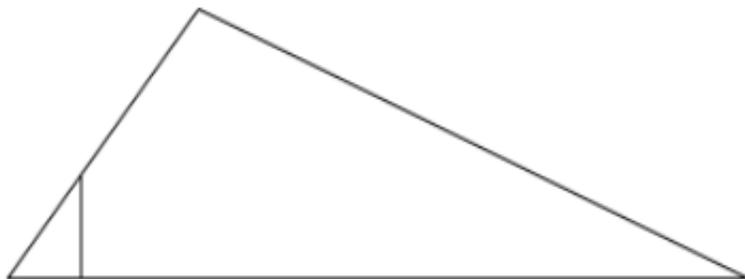
4. How may triangles are there on the picture below? Draw them in the space provided.

5. How many triangles are there on the picture below?

6. Let's use the function machine to come up with a rule for the number of triangles we can have. Fill in the table below with your answers from Problems #4-6. The first row has been done for you.
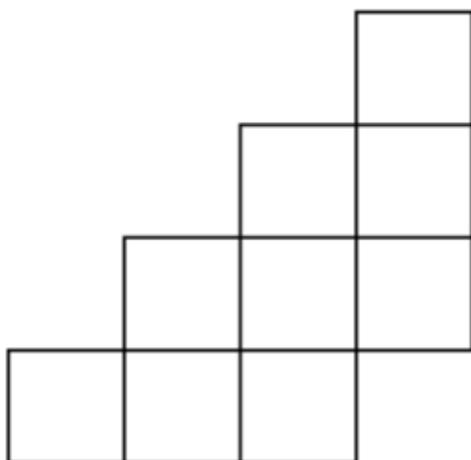
Number of straight vertical lines (Input x)	Number of triangles (Output y)
1	2
3	

What is the rule of the function? Write it in the form of "y = ..."

7. How many triangles are there on the picture below? There are a total of 99 lines connecting two of the triangle's sides. (Hint: Use the function that you found in Problem #7).

99
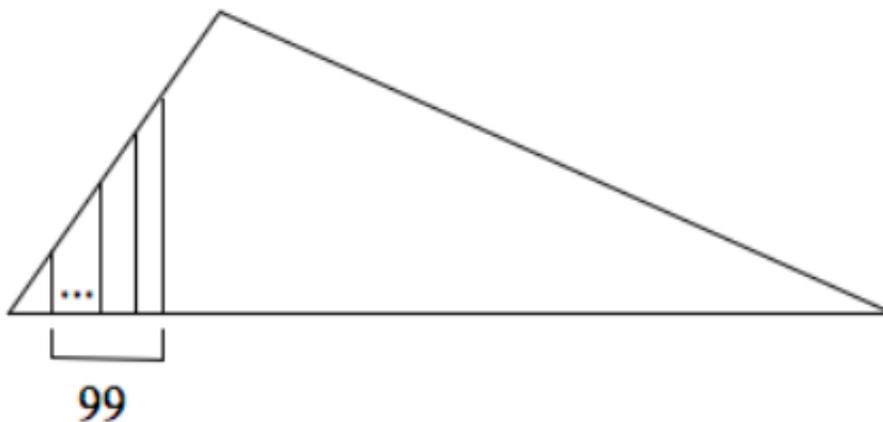
8. Cut the shape below into 3 equal parts:

9. Melinda's favorite number is 5 more than Ada's favorite number. If you add Lauren's favorite number to Ada's favorite number, you get Melinda's favorite number. If Ada's favorite number is 2, what is Lauren's favorite number?
What is Lauren's favorite number?

10. One bacteria was placed in a dish. Every second, each bacteria divides into 2. How many bacteria will there be in the dish after 4 seconds? (Hint: Draw a picture.)

11. Right now baby Max is 3 years old and his mother is 32 years old.
Max has an older sister who is 12.
When Max is exactly half the age of his sister, how old will his mother be?

12. Kate and Jan decided to meet on the train. They agreed to go to the 5th car of the train. Kate counted the 5th car from the front. Jan counted the 5th car from the back. They ended up in the same car. How many cars are there in this train?

13. The jogging path in the park is 100 meters long. There are lamp posts along the path. The first lamp post is at the beginning of the path. The last lamp post is at the end of the path. If the lamp posts are 10 meters apart, how many lamp posts are there in all?

14. A pencil and an eraser together cost the same as 3 pencils. An eraser costs 50 cents. How much does a pencil cost?

15. Jack and Jill are standing in line for the school bus at a field trip. Jill looks ahead and sees 10 students in front of her, and looks behind her and sees 8 students between her and Jack. How many students total went on the field trip? (Hint: draw a picture).

CHALLENGE PROBLEMS

1. Consider a triangle with lines on both ends, as shown below. How many triangles are there?
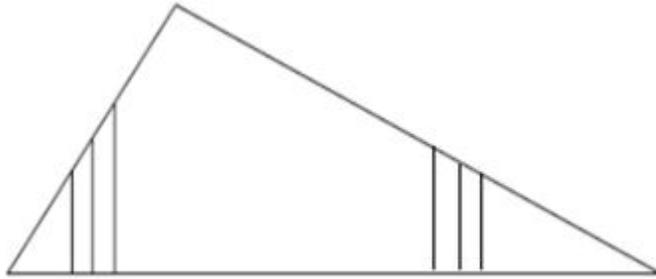
   (a) Write a function for this, using x as the input (i.e. the number of vertical lines drawn), and y as the output (i.e. the number of triangles we have).

2. Consider a triangle with the lines drawn like this. Can you still use the function that we found earlier? Why or why not? Explain clearly. (Hint: compare your answers for counting the triangle yourself versus using the function we found earlier.)
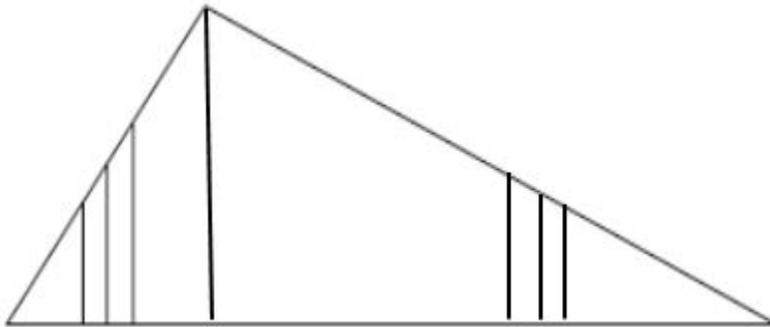
3. Recall the bacteria problem from before (Problem #11). Please write a function for this problem. Start by filling in the chart. The table has been partially filled out for you.

Seconds (input x)	Number of bacteria (output y)
0	1
1	
2	

(a) What function can be used for this problem? Write the function in the form of "y=...."

(b) After 20 seconds, how many bacteria are there in the dish?