



Sierpinski's Pyramid

Developed with funding from the MathScience Innovation Center

Challenge

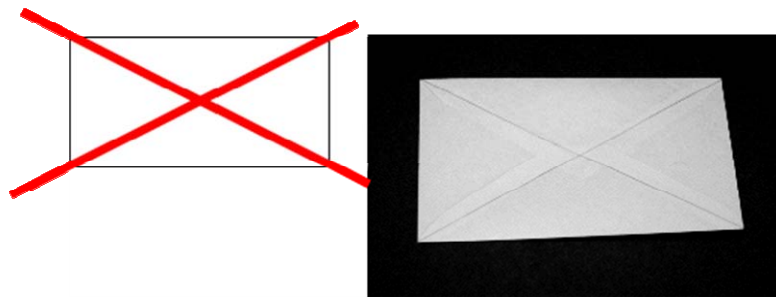
Build Sierpinski's Pyramid through Stage 3 and discover the pattern.

Materials

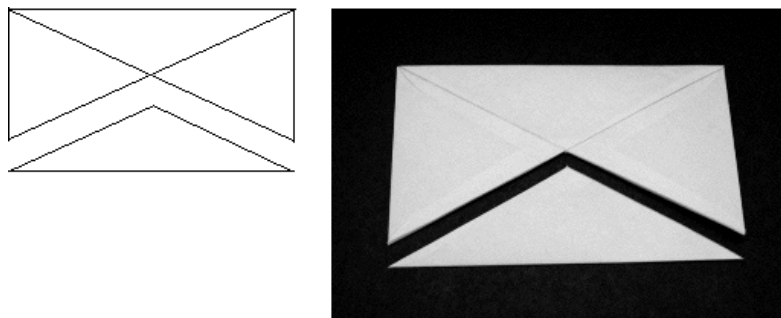
- 40 envelopes, about 3-5/8" x 6-1/2"
- Scissors
- 12-inch ruler
- Pencil
- Transparent tape

Directions

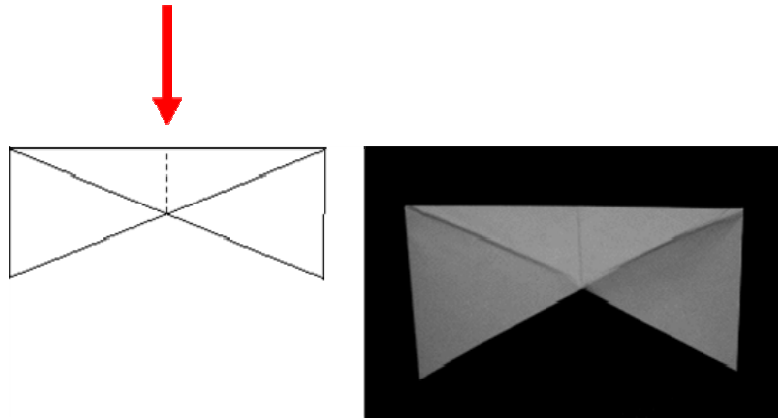
1. Use a ruler to draw diagonal lines on the front of the envelope.



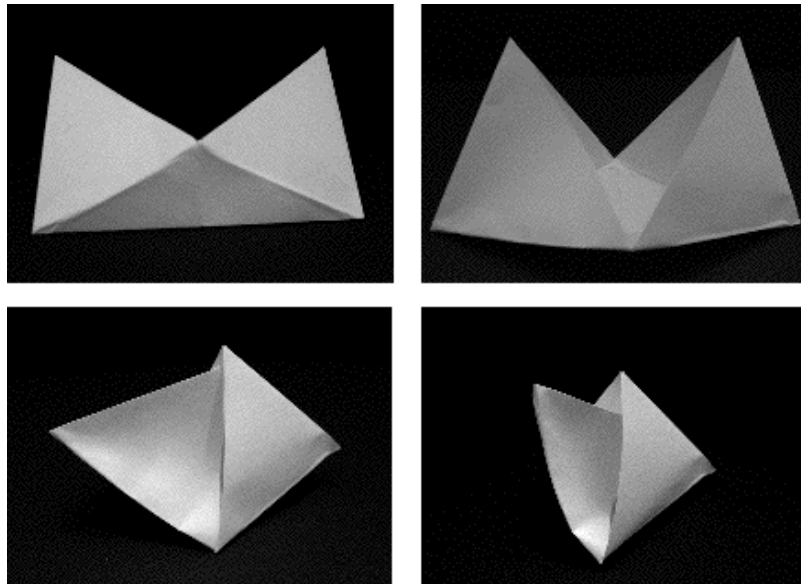
2. Cut off the section that includes the flap. Cut along the diagonals you drew. Do this so you have what looks like the picture below.



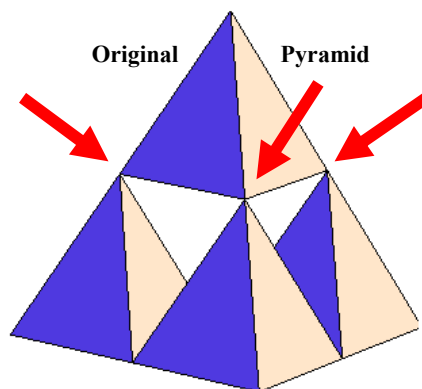
3. Fold the envelope in half by bringing the short sides together.



4. Open the envelope. Fold one side into the other. Push the side in until you have a pyramid. Use tape to secure the pyramid. You just did Stage 0 of Sierpinski's Pyramid.



5. To make Stage 1 of Sierpinski's Pyramid, you will need to put a pyramid at each point or vertice on the base.



How many pyramids will you need? Enter this information in your table. Follow Steps 1 to 4 to make the pyramids. Then attach the new pyramids to the base with tape.

6. Make Stage 2 of Sierpinski's Pyramid by adding pyramids to each of the vertices at the base of Stage 1.

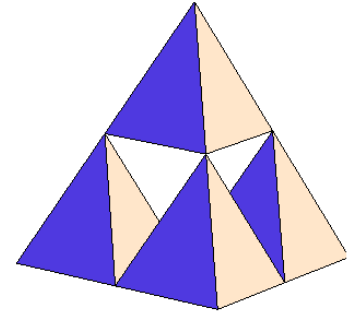
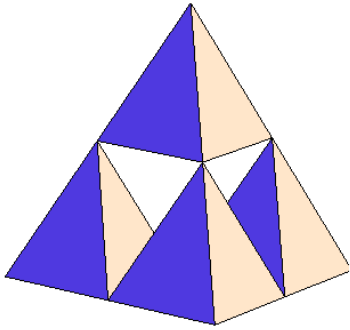
How many pyramids will you need? Enter the information in the table.

7. Make Stage 3. How many pyramids will you need? Enter the information in your table?
8. Look at the pattern. How many pyramids would you add in Stage 4? Stage 5? Describe the pattern.

Further Investigation:

More information about Sierpinski and fractals available at: www.fractalkeys.info.

Exploring the Pyramid Pattern



Stage	Number of Pyramids Added	Total Number of Pyramids
0	--	1
1	3	4
2	9	
3		
4		
5		

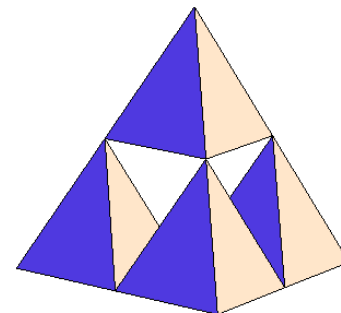
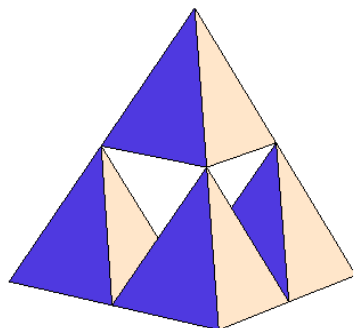
Questions:

1. How do you find the next number in the “Number of Pyramids Added” column if you only know the previous number of pyramids added?

2. How do you find the next number in the “Total Number of Pyramids” column if I only know the previous number and the number of pyramids added?

ANSWERS

Exploring the Pyramid Pattern



Stage	Number of Pyramids Added	Total Number of Pyramids
0	--	1
1	3	4
2	9	13
3	27	40
4	81	121
5	243	364

Questions:

1. How do you find the next number in the “Number of Pyramids Added” column if you only know the previous number of pyramids added?

_____ **Multiply the previous number by 3.** _____

2. How do you find the next number in the “Total Number of Pyramids” column if I only know the previous number and the number of pyramids added?

_____ **Add the previous number and the “number of triangles added” together.** _____
