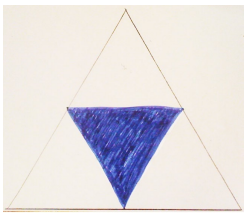 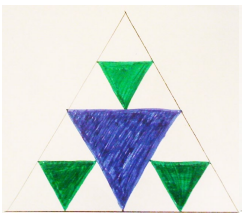 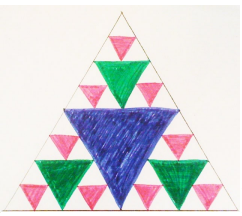

Name: _____

Fractal Triangles

1. Write one sentence that describes what a fractal is.

2. What are four types of fractal patterns that you learned about?

a) b) c) d)

3. Draw an example of three types of fractal patterns.

a) b) c)

4. What type of fractal pattern is a triangle?

5. What does "tri" stand for?

6. Start filling in the table below using the triangle on the next page. How many times have you made a pattern in your triangle at this point? None? How many triangles do you have? Fill that in the middle column of your table.

Number of times you've drawn the triangle pattern	Number of triangles that are not colored in	Math notation (fill in the blank)
0		3^0
1		$3^1 = 3 \times$ _____
2		$3^2 = 3 \times$ _____
3		$3^3 = 3 \times$ _____
4		$3^4 = 3 \times$ _____

Next, make a dot in the middle (or midpoint) of each line and connect your three dots. Color in that triangle. Now fill in the second line of your table and write in the math notation.

Do this over and over again until you are done with the activity, filling in the table as you go.

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Fractal Triangle Template Instructions

Before doing anything to your triangle, fill in the table with the number of right-side-up triangles you have with zero iterations of the process.

Connect the three dots that are in the middle of each line. This is called the midpoint. Color in this upside-down triangle.

Now how many right-side-up triangles do you have? Fill in your table for one iteration. Find the midpoints of the three sides of these three triangles and connect these midpoints to make three smaller upside-down triangles.

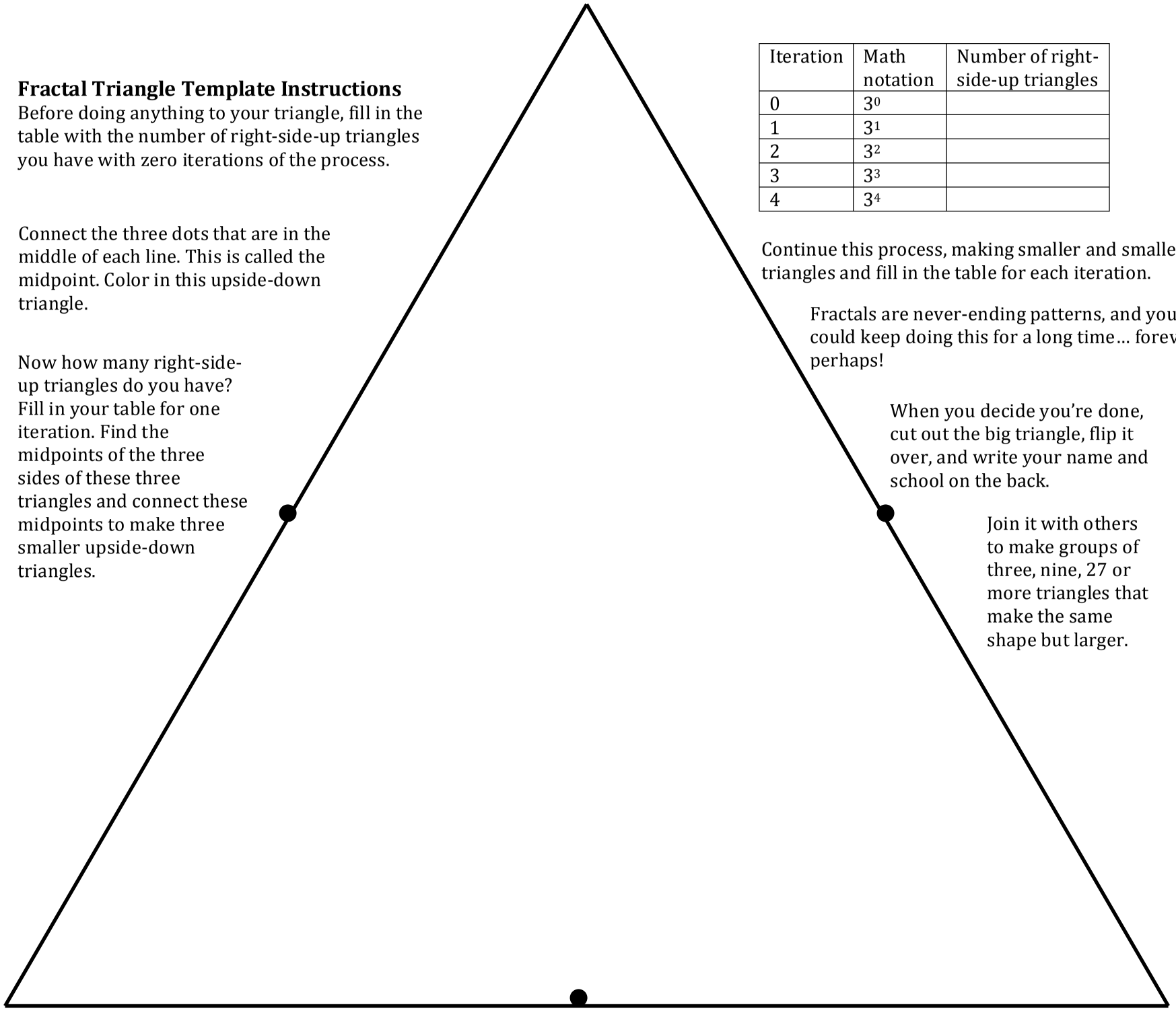
Iteration	Math notation	Number of right-side-up triangles
0	3^0	
1	3^1	
2	3^2	
3	3^3	
4	3^4	

Continue this process, making smaller and smaller triangles and fill in the table for each iteration.

Fractals are never-ending patterns, and you could keep doing this for a long time… forever, perhaps!

When you decide you're done, cut out the big triangle, flip it over, and write your name and school on the back.

Join it with others to make groups of three, nine, 27 or more triangles that make the same shape but larger.



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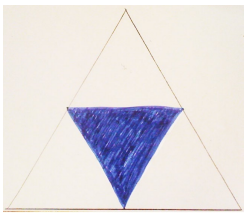 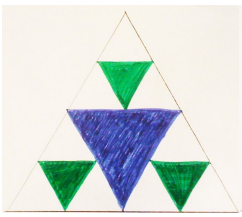 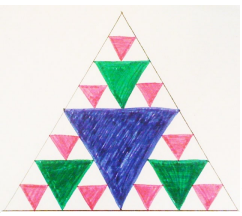 **Name: _____**

Fractal Triangles

Adaptations to different grades

- K-1st grade: basic shapes and fractions, nonstandard measurements - midpoint
- 2nd and up: measure lengths of different-sized triangles, create fractions to look at different sizes
- 3rd and up: determine area and perimeter of different-sized triangles (scaling), discuss shapes and partitions
- 4th and up: measure angles (protractor – use of proper tools), discuss types of triangles, point out lines of symmetry
- 5th and up: graph number of patterns and numbers of triangles not colored in – what type of line do you get?
- 6th and up: ratios and proportions- number of colored-in triangles and not-colored-in triangles, do statistics on measurements – discuss samples and spread; graph distribution and standard deviation; volume and surface area if were 3D
- 7th and up: model relationships with quantities – create a function for what type of growth (exponential); express relationship between area and perimeter for each iteration in a mathematical equation

Adaptations to life science, physics, computer science and other science classes, real-world applications

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