

Name: \_\_\_\_\_

### Fractal Tetrahedrons

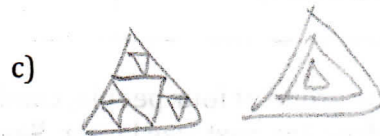
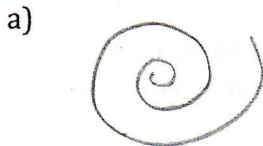
1. What is a fractal?

Include some of the following: a repeated or neverending pattern; simple pattern that, when repeated over and over, makes something complex; gets bigger/smaller

2. What are four types of fractal patterns?

- a) spiral      b) branching      c) geometric/shapes      d) algebraic

3. Draw three types of fractal patterns.



need a computer to make these

4. The pictures at the top of this page are tetrahedrons. What type of fractal pattern is a tetrahedron?

geometric

5. What does "tetra" stand for? Why is it named this?

4 - the tetrahedron has 4 sides to it. tetra = Greek quad = Latin

both = 4

6. Make your basic tetrahedron.

7. Measure the angles of all the different sides of your tetrahedron.

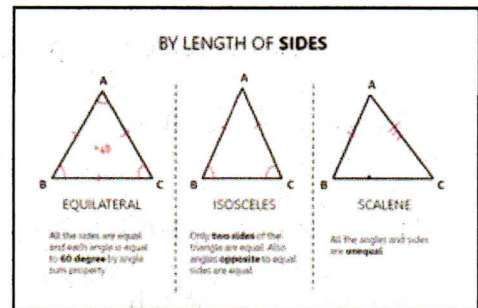
a) What are they?  $\sim 60^\circ$

b) Are your angles about the same or really different?

same

c) What type of triangle is your tetrahedron?

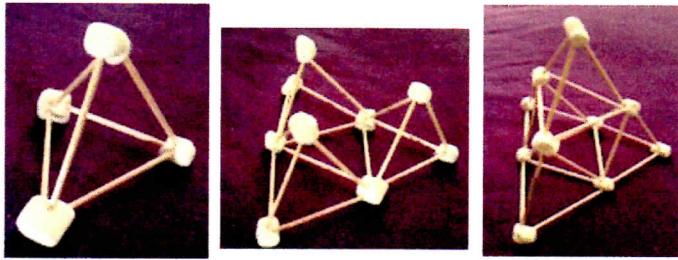
equilateral



Fractals are SMART: Science, Math & Art!

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### Fractal Tetrahedrons

8. Now let's see what patterns we can find when we build our tetrahedrons. How big can we build one?

NOTE: As you move from first to second order, second to third order, etc, **save the marshmallows you take off** - they will help you see the patterns!

	# Toothpicks	# Marshmallows	Length (cm)
First order tetrahedron	6	4	7cm
Second order tetrahedron	24	10	14cm
Third order tetrahedron	96	34	28cm
Fourth order tetrahedron	384	130	56cm

9. a. How do you get from your own tetrahedron to the next step up? What do you do to build it?

put 4 together

b. What is the mathematical expression for how many toothpicks you have in your own versus the next size up?

4 times (4x)

c. What is the mathematical expression for how many marshmallows you have in your own versus the next size up? Hint - you are doing two mathematical procedures

4 times minus 6 (4x - 6)

d. What is happening to the length each time you make a bigger tetrahedron?

multiplying by 2 (2x)

10. Use the mathematical expressions to predict how many marshmallows and toothpicks you have in the next two sizes up and build those!