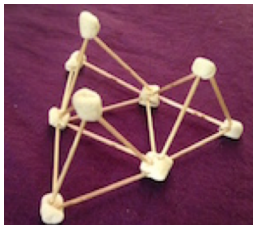
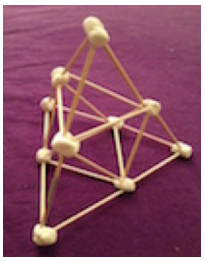




Name: _____

Fractal Tetrahedrons

1. What is a fractal?

2. What are four types of fractal patterns?

a) b) c) d)

3. Draw three types of fractal patterns.

a) b) c)

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

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

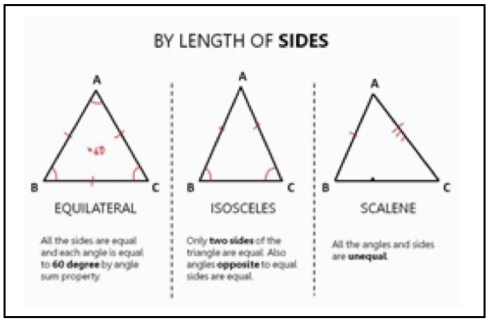
6. Make your basic tetrahedron.

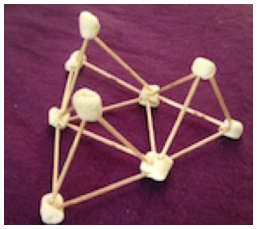
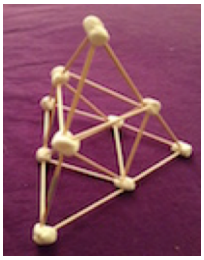
7. Measure the angles of all the different sides of your tetrahedron.

a) What are they?

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

c) What type of triangle is your tetrahedron?



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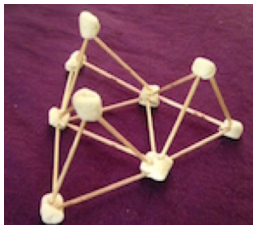
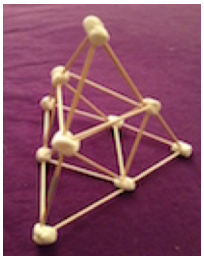
Fractal Tetrahedrons

8. Now we're going to count and measure. Fill in row A below.

	Tetrahedron	# Toothpicks	# Marshmallows	Length (cm)
A.	Your own (first order)			
9. Now, have four people combine their basic tetrahedrons together to make a tetrahedron the next size larger. **Save the marshmallows you take off** – they will help you with the next step! Fill in row B.				
B.	First group of four (second order)			
10. What math did you do to get from the first one you built to the larger one?				
11. Now make a prediction for the next larger size tetrahedron. How many toothpicks and marshmallows will you have if you combine four of these? And what happens to the length of each side? Fill in row C and then let's build it!				
C.	Second group of four (third order)			

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Fractal Tetrahedrons

Adaptations to different grades

- 3rd and up: measure volume and area
- 4th and up: create fractions/ratios based on proportions and discuss which ones are bigger/smaller
- 5th and up: graph each step (first, second, third order vs # marshmallows and # toothpicks) and see what kind of line data create
- 6th and up: create equations (make an equation that shows that relationship), ratios and proportions, graph numbers each iteration – type of line, area and volume, do statistics on measurements – discuss samples and spread; graph distribution and standard deviation, discuss accuracy in angles and lengths of toothpicks in making a design that is truly symmetrical and stable
- 7th and up: measure surface area and volume
- 8th and up: model relationships with quantities, model chemical compounds, molecular structure – engineering (also bridge building), modeling (Next Generation Science Standards)

Where have you seen other tetrahedron shapes or fractals around you? What ideas do you have of where tetrahedrons can be used?
Model to a bigger size with straws and clay, PVC pipe, metal, etc.