Spherical geometry explorations/thought experiments: name_____

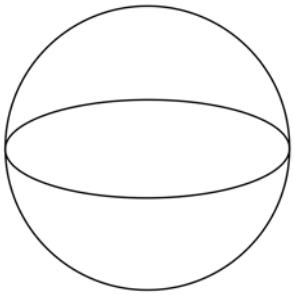
1. If you have a sphere, and there are 2 points on the sphere, how many great circles go through those two points?

a. If the two points are New York and Paris?

b. If the two points are the north pole and the south pole?

2. If a plane were flying from New York (latitude about 40.5°) to Madrid, Spain (latitude about 40.5°), would the plane want to fly along the latitude line at 40.5°? **Why or why not?** (You can probably google what planes actually do if you're not sure)

3. Pick 3 points: A, B, C on the sphere, where A is at the north pole, and B and C are both on the equator, and draw a triangle (using spherical lines) with those vertices. Let's name the angle $\angle BAC = \alpha$. What is the sum of the angles in the triangle?



4. Think about (sketch in, visualize, reason about, draw on an orange etc.) the 4 triangles: $\Delta AB_1C_1$, $\Delta AB_2C_2$, $\Delta AB_3C_3$ and $\Delta AB_4C_4$. I think I've drawn them in a way that it should be obvious that the area of $\Delta AB_1C_1$ is smaller than the area of $\Delta AB_2C_2$ which is smaller than etc. What can you say about the angles in the triangles? What can you say about the angle sums in the triangles? Explain your reasoning.