Honors Geometry Spheres - 1 Name:

**Answer the questions below as completely as possible. Use complete sentences and add sketches as needed. Work with a model before you try to answer the questions.**



1. A bug is walking on a large ball. (Or a human is walking on the earth…).

a) From an *extrinsic* perspective, describe the three distinct paths traced by the bug if she walks due north, east, or northeast. Do the shapes of the paths differ?

b) Discuss the three paths from an *intrinsic* perspective, that is, from the bug’s perspective.

c) Try to think of any experiments the bug might perform to determine in which direction she is walking. (The bug has no compass, and cannot leave the surface of the ball.)Are there any experiments that would determine whether the ball is in fact flat instead of round?

2. Can a line on a sphere intersect itself? Is it infinitely long?

3. Can two different lines intersect more than once?

4. (Line Postulate) Do two points determine exactly one line?

Assume A and B are *not* polar points.



5. Same as number 4, but now assume A and B

 *are* polar points.



6. (Parallel Postulate) Are there parallel lines on a sphere?

Given any line and a point not on the line, does there always exist exactly one parallel line through that point?