

Poincaré, Non-Euclidean Geometries

1. (p 103) What do most mathematicians think of Lobachevsky's geometry? What does Poincaré think about it?
2. (p 103) Write out Poincaré's short argument for the conclusion that the geometrical axioms are not synthetic a priori judgments.
3. (p 104) What arguments does Poincaré give against the claim that the axioms of geometry are experimental truths?
4. (p 104) What kinds of considerations does Poincaré suggest are relevant for deciding which geometry to adopt? (Which kinds of considerations are *not* relevant?) Which such considerations weigh in favor of Euclidean geometry?
5. (p 104) What evidence might one try to use to decide between Euclidean, spherical, and hyperbolic geometry? Why does Poincaré think that this evidence is not actually helpful?
6. (p 105) What does Poincaré think would happen if human beings were transported to a world whose native creatures used a non-euclidean geometry? (For further reflection: relate this to the discussion of the two notions of space on pp 119-120.)
7. (p 106, for deeper reflection, maybe a paper topic) Poincaré presents an example and concludes that “these beings would adopt Lobachevskian geometry”. How does this claim sit with his earlier claim that we are *free* to choose a geometry?

Poincaré, On the Foundations of Geometry

1. (p 117) Where does Poincaré think that our notion of space comes from? (Which philosophical movement does this align him with?)
2. (p 119, 120) What two different notions of space does Poincaré distinguish? Say a few words about the differences between these two notions of space.
3. (p 120) What would Poincaré say to Kant's claim that Euclidean geometry is a “form of our sensibility”?
4. (p 124, for reflection) What, according to Poincaré, is the relation between “nature” and the laws we use to describe it? How does this claim sit with his earlier claim that we are absolutely free, within the bounds of consistency, to choose whichever geometry we want? (Compare also with p 145: “Our choice is therefore not imposed by experience. It is simply guided by experience.”)
5. What role does “convenience” play in Poincaré's philosophy of geometry?

6. Does Poincaré think that there are *objective* considerations in favor of choosing one geometry over another? (What does he say about simplicity?)