Review of Geometries by Dr. Sarah
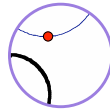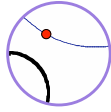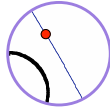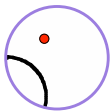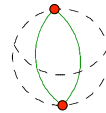
Playfairs

Given a straight line in the space and a point off of that line, is there a <u>unique</u> parallel that we can construct?

Euclidean yes

Spherical no - there are 0 parallels as any 2 great circles intersect in 2 places

Hyperbolic no - there are infinitely many parallels to this line through this point
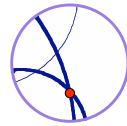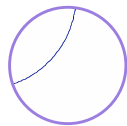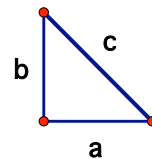
Sum of the Angles in a Triangle

Euclidean 180 ° or π

Spherical 180 ° < sum < 540 °   (note 540 ° = 3 π)

Hyperbolic 0 ° < sum < 180 °

The Pythagorean Theorem

In a right triangle, is $a^2 + b^2 = c^2$?

Euclidean yes

Spherical no $a^2 + b^2 > c^2$

Hyperbolic no $a^2 + b^2 < c^2$

As triangles get smaller in spherical and hyperbolic geometry, they become more and more flat and so $a^2 + b^2$ gets closer to c^2.