

Parabola      Paraboloid      Hyperbola

Line

# 18

## Shortest Paths on the Sphere

Hyperboloid

Ellipse

Hyperbolic paraboloid

Sphere

[www.magicmathworks.org/geomlab18](http://www.magicmathworks.org/geomlab18)

**A)** Find the perspex sphere with a bead at the centre.

Line pair

Stretch the rubber band between two points on it. Set your eye at a point where the path appears as a curve. Now move your eye until it becomes a straight line. At this point the band eclipses the bead.

Sine curve

This shows that the shortest path on a sphere lies on a great circle.

Tractrix

If you don't use a mechanical analogue, you can argue that the shortest path must be a great circle by symmetry. But this assumes there is *a* shortest path.

Exponential curve

**B)** Set the inflatable globe in the path of the OHP-&-slit to confirm that the great circle route from Manchester to Vancouver passes over Reykjavik.

Catenary

Catenoid

Helix

Equiangular spiral

Helicoid

Archimedean spiral

Plane

Tiling

Polygon

Polyhedron

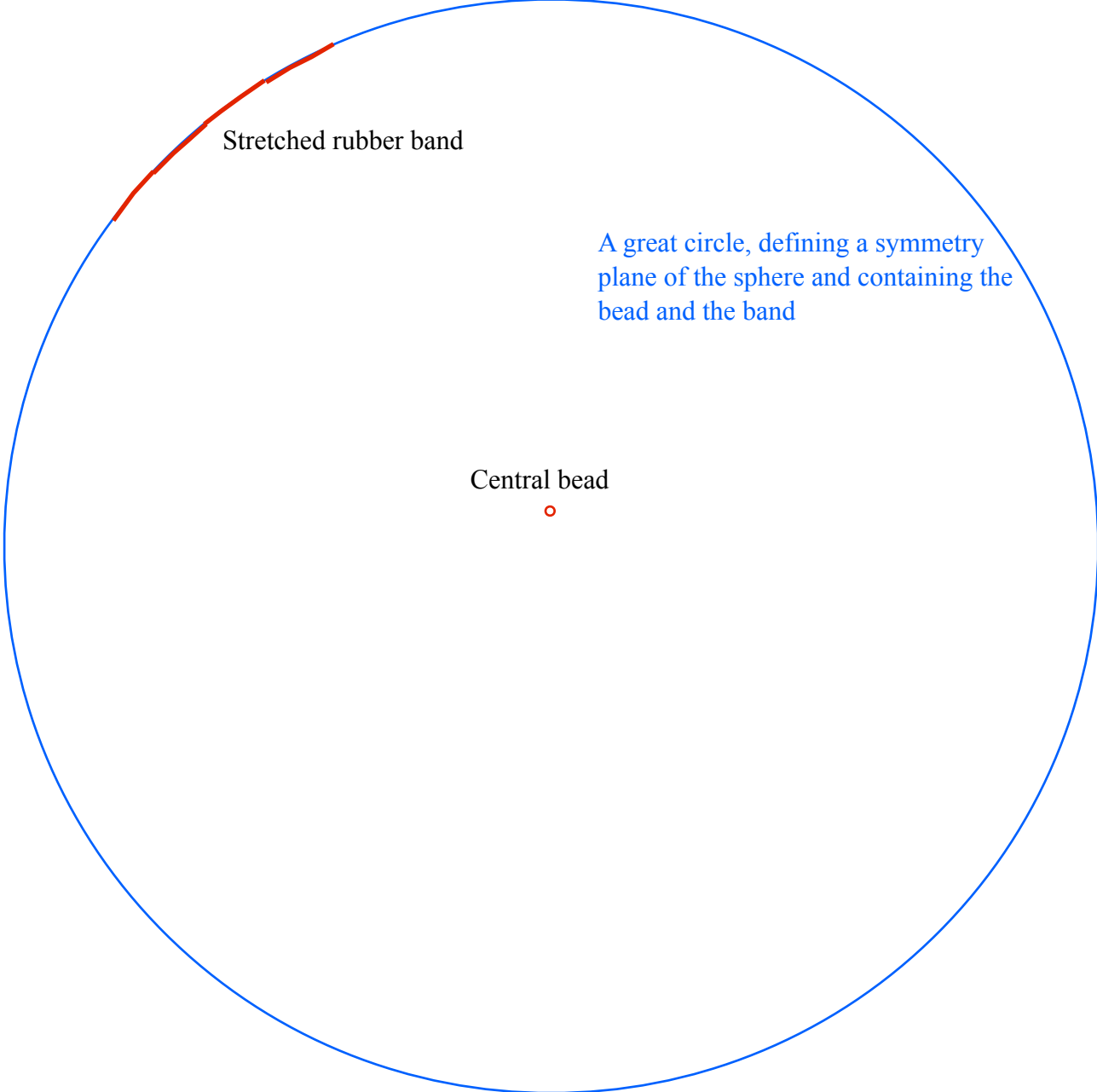
Cone

Cylinder

Circle

Line family

Loxodrome



Stretched rubber band

A great circle, defining a symmetry plane of the sphere and containing the bead and the band

Central bead

