

## How do you make a 2D map out of a 3D globe?

### Investigation Brief

The planet earth is basically a spherical shape and while a globe is quite an accurate representation, a flat map is more practical in many cases. How is it possible to “peel and flatten” the skin of the globe and how does this action impact on the representation?

Start with a spherical object with a thin skin that can be peeled - a large orange or a ball dipped in melted wax that has hardened. Draw landforms on the surface of the object, like continents or islands. Make an initial cut half way around (as if you are cutting from pole to pole) and then carefully try to peel the skin as a whole. Look at the hollow sphere and think about how you could flatten it to make a 2D “map”. Will you need to make more cuts?

Try another one and this time draw a set of latitude and longitude lines. As you make cuts to flatten your map how do you decide where to make these? What happens to the representation of the poles and the equator?

Transfer your 2D model onto graph paper by tracing around the outline edges and then transferring the information about your landforms as accurately as you can. This is your map. What impact does making this “peeling” into a simple rectangle (like most maps of the world) have on your original model? What did you fill in the empty spaces with?

Investigate different representations (these are called projections) of the world map. How have these cartographers dealt with the issue of moving between 3D and 2D?

Projections you could search for include: Mercator Projection, Peters Projection, Robinson Projection, Plane Projection, Interrupted Map Projection, Conical Projection, and the Polar or Azimuth Projection.

### Resources

- oranges
- vivid pens
- knife or ball
- melted wax
- graph paper

### Prompts and Suggestions

Is the world map in your classroom or library distorting any features of the globe?

What would a map look like if the world were shaped like a rugby ball? Or a teardrop? Or a torpedo?

What are the advantages and disadvantages of each type of projection?

Try making a cut all the way around the circumference of your model so you have 2 semi-spheres to flatten.

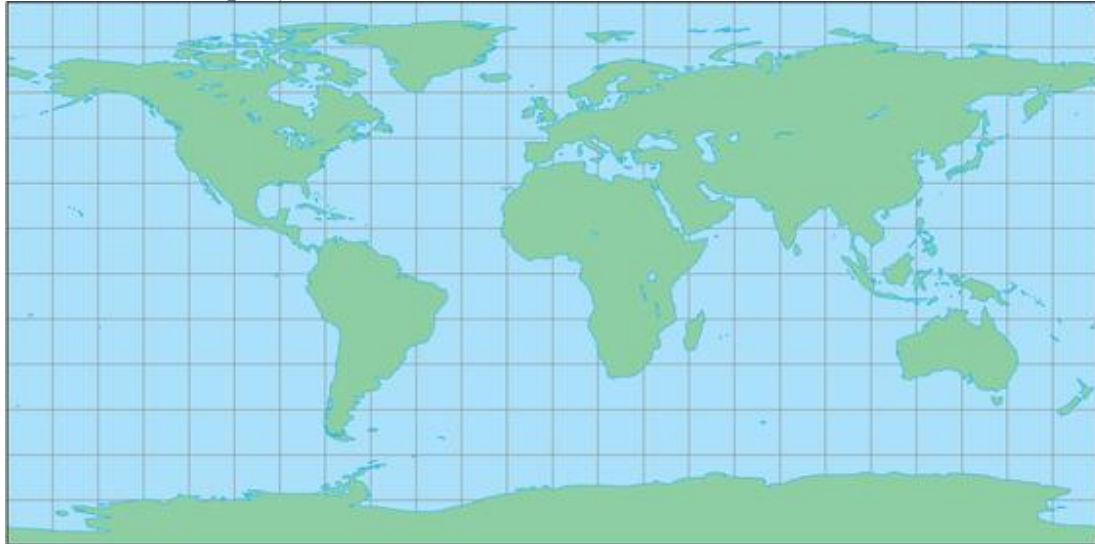
If you get stuck, take a look at some of the images for the different projections. These may give you ideas about how to flatten your “globe”.

## Images and Links

This link is to a video exploring how cartographers at National Geographic make decisions about what projection to use.

<http://education.nationalgeographic.com/education/media/selecting-map-projection/?ar a=1>

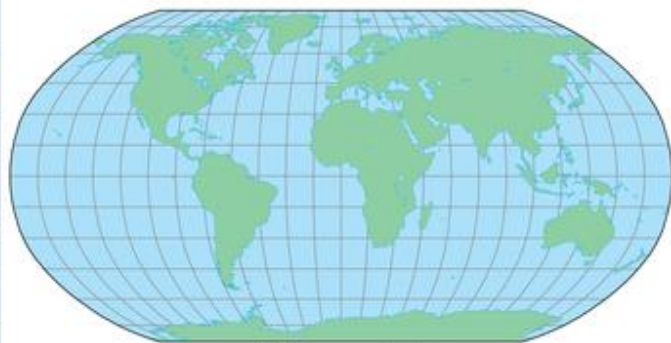
## Some common projections



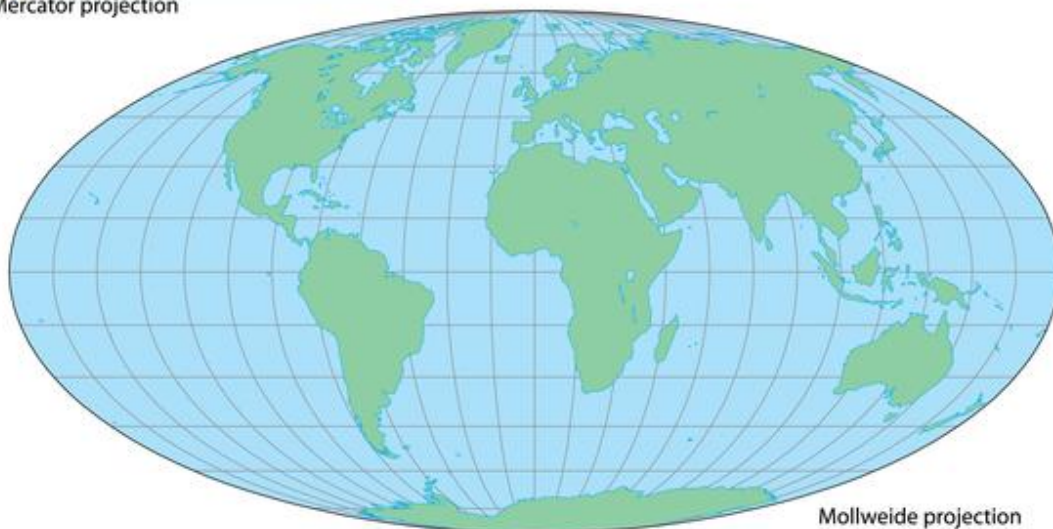
Platte projection



Mercator projection



Robinson projection



Mollweide projection