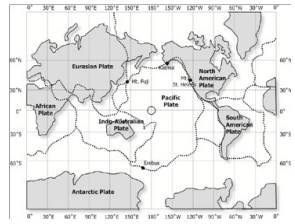
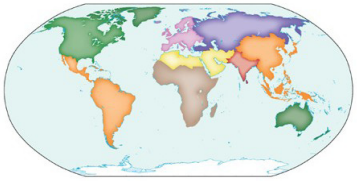
IR-10: Map Projections—Reading to Learn

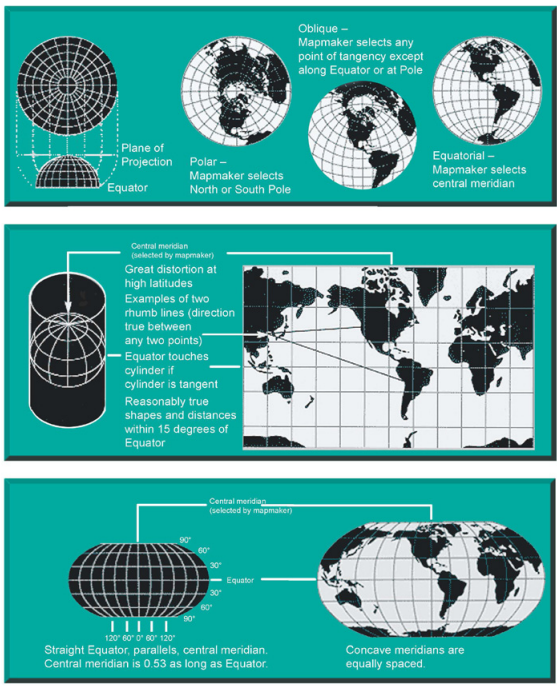
As you read IR-11, identify the Key Words that match the Memory Clues shown in the right column.
In your own words, add Information about each Key Word.

Key Word	Information	Memory Clue
		
		
		
Technologies: Describe each of the technologies listed below.		
GIS		
GPS		

Map Projections

It is impossible to take a round object, like a globe, and make it a flat map without some distortion. Any of the four **map properties** may be affected: size, shape, distance, or direction.

For example, Gerardus Mercator created a map in 1569 that sea captains used to help navigate the open seas during the Age of Exploration. Known simply as the **Mercator projection**, its properties were most accurate closest to the equator, where sailors traveled, and most distorted at the polar regions, where sailors almost never traveled. In fact, on the Mercator projection, the island of Greenland appears to be equivalent in size to the entire continent of South America!



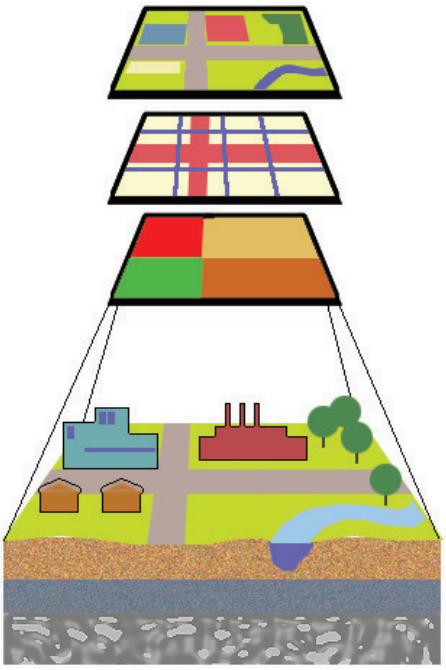
Based on your understanding of the different map projections, identify and describe the projection in each panel in the illustration above.

The **azimuthal map projection** focuses on using mathematics to convert the distances between places from the cylindrical shape of Earth to a flat piece of paper. At the center of the azimuthal projection, distance is most accurately measured, but the further away from the radial center of this projection, the greater the distortion of distance.

Finally, the most widely used map projection since 1988 is the **Robinson projection**. It is considered a compromise map because it uses the best characteristics of other map projections while minimizing the distortion. National Geographic Society, the world's largest map distributor, converted their maps to the Robinson projection. Most major governments in the world use this map projection, and most school textbooks use the Robinson projection.

Geographers use other tools in addition to maps. **Globes** are the most scaled model of Earth, which means they are true to Earth's size, shape, distance, and direction. There are no distortions of Earth on a globe. However, globes tend to be bulky and more difficult to transport than a map. Because a globe is a three-dimensional object, only one part of Earth's surface is visible at any given time. Globes do not show the same amount of detail seen on a map.

A **Geographic Information System (GIS)** is one of the most exciting technological applications to this field of study. GIS is software that allows the user to create new maps, analyze patterns and spatial relationships, and predict possible trends. Data stored in a GIS program can often be viewed in different layers. For example, political candidates can use GIS to identify demographic issues of a town on a campaign stop, including the average age of the residents, the per capita gross domestic product (GDP) of the region, and the average level of education of residents. With this information, the candidate could tailor his or her comments to each community.

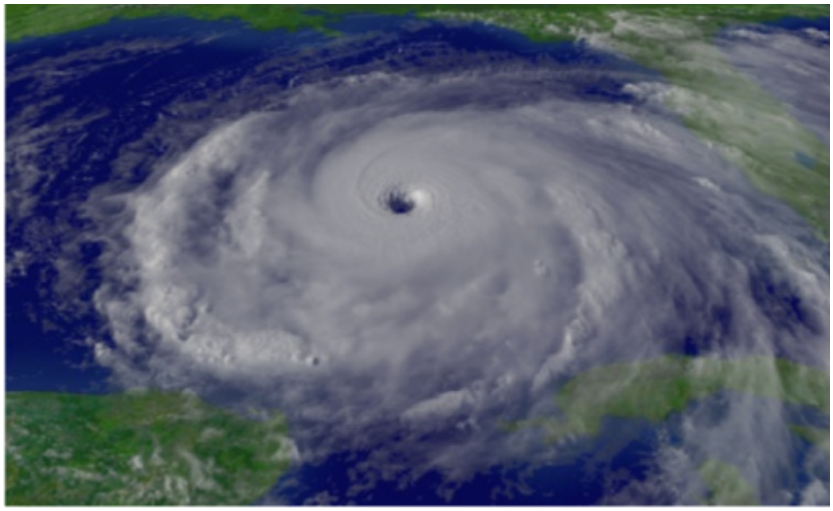


GIS allows for multiple layers of information to be categorized about a specific location.

A **Global Positioning System (GPS)** utilizes data beamed to Earth from satellites. Latitude, longitude, elevation and time are communicated via a device that receives data directly from the satellites. Originally created for use by the military, GPS devices are used by hikers, sailors, and even drivers.

Combining technology like GIS and GPS data assists geographers in identifying and mapping specific spatial relationships. Consider the role these technologies played in the Columbia space shuttle incident in February 2003. The spacecraft broke apart as it reentered Earth's atmosphere. Space shuttle debris scattered across East Texas was located and recovered using this technology.

Geographers also use satellite images as useful tools. The images can be relayed to Earth from satellites, or astronauts could take them from the International Space Station.



How has technology, like weather satellites, helped human beings minimize disastrous encounters with natural disasters?

These images allow human beings to monitor patterns and processes such as tracking hurricanes. Photographs taken from space allow atmospheric scientists the opportunity to study hurricanes from above cloud masses or to assess flood damage from a river that has overflowed its banks.

Another example is the measurement of the decline of the Aral Sea by examining satellite images over a 60-year period, or the US Department of Defense use of satellite images to track troop movements in different regions around the world.