PROJECTIONS AND COORDINATES EXPLORED THROUGH GOOGLE EARTH EXERCISE

Name:

Date:

Period:

PROJECTIONS

1. Here are some Mercator projections of the world. A Mercator projection is like when someone puts a can around the earth and then rolls the earth onto the inside of the can and lays it out flat as a map. The projection is GOOD for keeping angles and shapes correct, but large shapes and size are distorted.
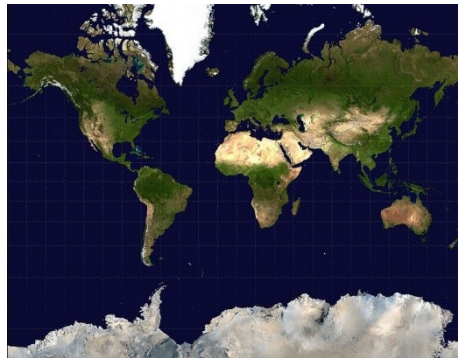

Figure 1. Mercator projection of the world. Public Domain. Both found in Wikimedia Commons as they were originally obtained from NASA's "Blue Marble" series. http://commons.wikimedia.org/wiki/File:Mercator-projection.jpg

Figure 2. The continental US (left) and Alaska (right) in Mercator projection under the same scale. Details of Figure 1.

In the figures, how big is Alaska compared to the US, 10%, 20%, 50%, or 90%? (Circle One)

Is Alaska bigger, smaller, or the right size for what it should be? (Circle one)

Why is Alaska distorted in the projection and why is it OK for us to distort it?

2. What is shown below is a Robinson projection. It was created so that it doesn't completely preserve angles, shapes, or size but it is a good approximation to a globe.
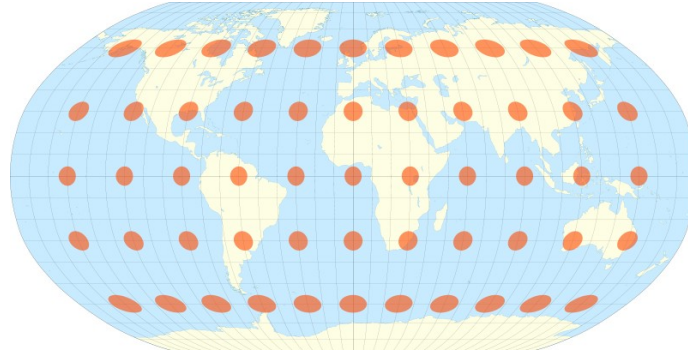

Figure 3. Robinson projection of the earth. From public domain on Wikimedia Commons at http://en.wikipedia.org/wiki/File:Tissot_indicatrix_world_map_Robinson_proj.svg. Created by Eric Gaba.

How is the Robinson projection (Figure 3) different from the Mercator projection (Figure 1)?

The longitude (up and down) lines on the Robinson projection are allowed to curve while the latitude lines (right to left) remain straight. (1) Do you think this stretches the map more up and down (vertical) or left and right (horizontal)? (Hint: Consider the distance between the longitude and latitude lines. Which distances change more on different parts of the map?) (2) Which part of the map is the least distorted? (Two questions to answer)

COORDINATE SYSTEMS

Open Google Earth on your computer. Then look to the left side of the screen. You should see an area of the window called "Places". Below that are some different layers. There are two that you will be using. They are called

- Earth Point Grid: UTM/UPS

- Earth Point Grid: Degrees Minutes Seconds (DMS)

Make sure that you can click in the check box next to each one to turn it on and off. As you turn it on, you should see some yellow gridlines appear over the earth model that is shown in the main viewing

window. Once you have confirmed that you can do that, then turn on the UTM layer. Type in "725 Little York Rd, Houston, Harris, Texas 77037." This will take you to Fonville Middle School.

Zoom in to the school until you see some pink gridlines appear. It may take a minute for them to load. These lines are UTM 100-meter grid lines. Between every two dots are 100 meters. Using these lines, please find the following. Note that if you mouse over a grid, it will light up and give you the coordinates of that one square in UTM coordinates. Note also that if you go down to the Layers window on the left side of the screen that you can turn the roads layer on and off if you need it.

(A) The UTM coordinates for the right (east) half of Fonville Middle School _____

_____

(B) The distance from Nordling to Van Ness St along the front of the school. Guess it from the UTM pink grid_____METERS. Now give convert that estimate of distance to FEET (if you don't know the conversion, look it up on the internet)_____FEET.

(C) Click on the "Show Ruler" tool on the top of Google Earth . Use it to find the distance in MILES from the top to the bottom of the track._____MILES

(D) Now turn OFF the UTM/UPS grid and turn ON the DMS grid in the Places window on the left. Mouse over the grid that is now there and write down the coordinates of the school in DEGREES(˚), MINUTES('), and SECONDS(") for Latitude and Longitude. The symbols in parentheses that you just read will tell you which numbers are degrees, minutes, and seconds

_____.

(E) Turn the UTM/UPS grid back on. You will see two pink sets of grids appear. They do not match exactly. Is the distance between two points in each grid the same? Which one has larger grids, UTM/UPS or DMS? (Circle one) Use the "Show Ruler" tool to measure if you are having trouble.

(F) Why are the two coordinate systems different?

(G) Will both coordinates get you to Fonville Middle School? Why or why not?

Now we will leave Fonville. Type in the following Latitude-Longitude coordinates into Google Earth.

58 35 46.77 N 49 39 47.27 E

Once you get there, you may need to zoom out a little bit if it is blurry. Congratulations, you have just arrived a Kirov, Russia, the birthplace of your teacher!

Make sure that the Wikipedia layer and Geographic Web are turned on in the Layers window at that the UTM/UPS layer is turned on and DMS turned off in the Places window. Also note that in the lower part

of the main viewer, you will see latitude and longitude coordinates displayed where you put the cursor. Move the cursor around to watch them change. Click on the white square W link to open a Wikipedia article about the city. Note all of the information that is there. Also remember that you can use the ruler tool at the top of the screen to measure distances easily in any unit. You can also get a picture of any blue dot on the screen if you click on it. Now find the following.

(A) The approximate coordinates of Kiov in UTM/UPS (use the grid) _____
_____

(B) The population of Kiov in 2002 (remember all of the information is right there on the map)
_____

(C) The distance that Kiov is from Moscow in KILOMETERS_____and MILES (use a web conversion if necessary)_____

(D) Find the Bridge over the Viatka River on the Northeast part of the city. Find the length of the bridge in SMOOTS_____

(E) The color of the Gertsen Library (you'll find it, keep looking)_____
_____

Now we're going somewhere different. Enter the decimal latitude-longitude coordinates and make sure that the UTM/UPS grid is turned on.

-89.944793 -16.893496

You should recognize this place with a little looking. You can move around a little bit if you aren't sure where you are. Just enter the coordinates in again if you get too far off. This place uses a different coordinate system (Universal Polar Stereographic or UPS) than the rest of the other because it is so different. Zoom out a little bit, and you will see a big yellow circle around this area in the UTM grid. Now please give the following.

(A) The UTM/UPS coordinate near here (should be an orange grid)_____
_____

(B) The diameter of the yellow circle that surrounds this area (use the ruler tool) in MILES___
_____

(C) What is the name of this place?_____

Lastly, go to these last lat-long coordinates. 71°40'22.60"S 2°50'20.95"W

What is this place?_____
_____
_____
_____
_____