

**Lesson Summary:** Students learn about mapping including old-style cultural mapping as well as new digital techniques.

**Grade Level:** Elementary–Middle (4<sup>th</sup>–7<sup>th</sup> Grade, but is easily adapted for older students)

**Time Allotted:** 1-5 hours

## Performance Objectives

*References are to the Next Generation Sunshine State Standards.*

### Social Studies

- SS.4.G.1.1 Identify physical features of Florida.
- SS.4.G.1.2 Locate and label cultural features on a Florida map.
- SS.4.G.1.4 Interpret political and physical maps using map elements (title, compass rose, cardinal directions, intermediate directions, symbols, legend, scale, longitude, latitude).
- SS.5.G.1.1 Interpret current and historical information using a variety of geographic tools.
- SS.5.G.1.4 Construct maps, charts, and graphs to display geographic information.
- SS.6.G.1.2 Analyze the purposes of map projections (political, physical, special purpose) and explain the applications of various types of maps.
- SS.6.G.1.4 Utilize tools geographers use to study the world.
- SS.6.G.1.5 Use scale, cardinal, and intermediate directions, and estimation of distances between places on current and ancient maps of the world.
- SS.7.G.5.1 Use a choropleth or other map to geographically represent current information about issues of conservation or ecology in the local community.

### Science

- SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- SC.4.N.1.3 Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
- SC.4.N.1.6 Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

- SC.4.E.6.5 Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.
- SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment.
- Math**
- MA.4.A.6.6 Estimate and describe reasonableness of estimates; determine the appropriateness of an estimate versus an exact answer.

## Prior Knowledge

Students will need a basic familiarity with their school and neighborhood, as well as some computer experience.

## Topic Overview

This activity introduces students to various ways of mapping familiar areas, natural or built. It provides experience with the idea that science isn't simply lab experiments, but can be done creatively in a variety of locales. It also ties science and social studies together, stressing the importance of careful observation and distinguishing inference from observation to both disciplines.

## Key Vocabulary

### Cardinal directions

North (0°), south (180°), east (90°) and west (270°).

### Compass rose

A figure on a map that is used to display the orientation of the cardinal directions (sometimes only north), often with a 360° grid as well.

### Endemic

unique to a defined geographic location – for example, the Florida scrub jay is only found in central Florida.

### Equator

An imaginary line that bisects the earth into northern and southern hemispheres; each point on the equator is equidistant from the North and South Poles.

### Longitude

An angular measurement that represents the east-west distance of a point from the Prime Meridian. (See illustration below.)

### Latitude

An angular measurement that represents the north-south distance of a point from the Equator. (See illustration below.)

# Orange County Water Atlas Learning Kit

## Mapping Old & New Lesson Plan

Students learn about mapping methods and map scales.

Water Atlas Curriculum Lesson 05

### Prime Meridian

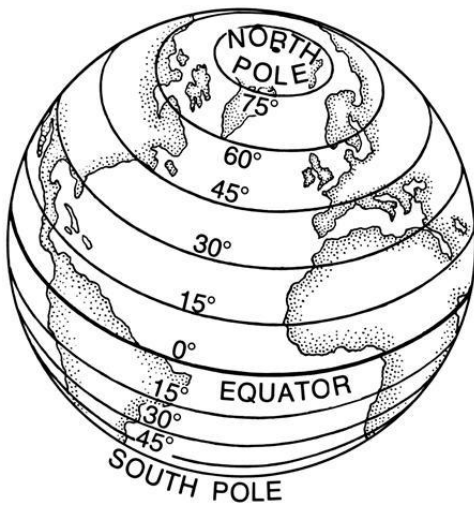
Also called the Greenwich Meridian (because it passes through a point in Greenwich, England), this is an imaginary line that encircles the Earth and passes through both the north and south poles, dividing the earth into eastern and western hemispheres.

### Scale

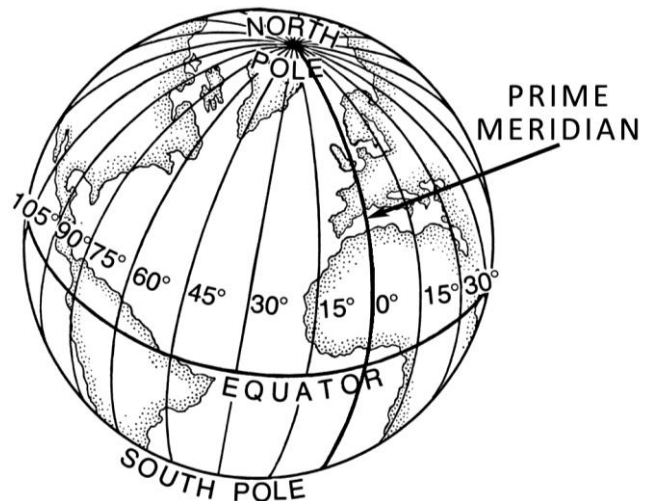
The ratio of size in a map, model, or drawing.

### Waterbody

Any significant accumulation of water, including oceans, lakes, rivers, ponds, canals and wetlands.



Latitude



Longitude

### Materials

- Computer with internet access
- Google Earth software (free download: <http://www.google.com/earth/index.html>)
- Paper
- Colored pencils
- Rulers, assorted shapes (optional)
- Graph paper, meter sticks (optional for Extension 1)
- Handheld GPS unit(s) (optional for Extension 2)

### References

The following references are available on the Orange County Water Atlas:

[The Florida Scrub Jay, a Threatened Species](#). 2005. Sarasota County Public Works.

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[Florida Scrub Jay](#) (Excerpt from Field Guide to the Rare Animals of Florida). 2004. Florida Natural Areas Inventory.

[Scrub – Natural Community Description](#). 2010. Excerpt from Guide to the Natural Communities of Florida: 2010 Edition, Florida Natural Areas Inventory.

*Other references:*

[Climate Change and Florida Scrub Jays](#). Website accessed July 2011. LandScope America.

[Geocaching](#). Website accessed July 2011. Groundspeak Inc.

[Google Maps](#). Website accessed 2011. Google, Inc. (*Free source of online maps, photography, terrain*)

Latitude & Longitude (National Atlas.gov)

[http://www.nationalatlas.gov/articles/mapping/a\\_latlong.html](http://www.nationalatlas.gov/articles/mapping/a_latlong.html)

Sobel, D. (1998). *Mapmaking with children: Sense of place education for the early years*. New York: Heinemann. An excellent optional resource if you are interested in mapping or place-based educational pedagogies.

[Stellarium](#). Website accessed July 2011. (Free, open-source planetarium software for multiple platforms.)

[The Florida Scrub](#). Website accessed July 2011. 2004. Floridata.com LC.

Stevenson, Robert Louis. 1883. *Treasure Island*. (*Numerous editions are in print.*)

## Procedure

### Engage/Elicit

First ask students what they think of when they hear the word “map”, which you may write on the board or projector. Do NOT provide any images or examples however, as the terms your students come up with will be instructive. While treasure maps or road maps might come to your mind, students may be more familiar with GPS or phone instructions than paper maps.

A variation of this activity that can be used in writing class is to have each student write down five words that come to mind when they think of a map, and then write a brief paragraph or two about one of the words. This would also help provide individual insight into their background and prior knowledge without influence from other students calling out answers.

### Explore

Stand in the class where you teach – now face North. Ask students which direction the sun rises, and where it sets. Open a window, go outside, look at shadows (remember shadows will point north at noon in the northern hemisphere). Have students think about these directions from their own houses.

Ask if anyone in the class knows what latitude they live at. Note that latitude is relatively easy to ascertain – the North Star is about the same number of degrees above the horizon as your latitude, and many cultures discovered this. This is something they can easily check at home, or at school during after-hours activities, if you show them how to find the North Star (**Stellarium** and **Google Sky** are both excellent free computer resources to find stars). Longitude is much more difficult to calculate (but easy with modern maps and GPS).

Create a cultural water map of your area. Begin by asking students what their favorite waterbody is – you may get some creative answers including pools, bathtubs, fishing spots, swimming holes, theme parks etc. Have each student write a few paragraphs describing the body of water and why they like it. Using a large piece of paper, draw a rough map outline of local watersheds and have the students draw and label their favorite spots on it. (Refer to the **Orange County Water Atlas** for the relative sizes, shapes, and locations of watersheds.) Be sure north is at the top of your map, but you do not need to point this out to students yet.

Depending on their familiarity with computers, the **Orange County Water Atlas** mapping tools may be a bit awkward for younger students without guided practice, but allow them computer time to explore that, or the area on **Google Maps** or **Google Earth**. Be sure that the water layer is turned on in Google Earth and/or the Water Atlas. This will help them find “their” watery spot, and locate it in relation to others.

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It helps if you can add a couple key water bodies for examples. For instance, Lake Apopka is large and notable, as is the Wekiva River. The water atlas contains more features and background information to browse.

### Explain

Go over the parts of a map with the students (see vocabulary). These should be covered using at least three examples – a paper map (such as a road map of your area), a computer map (projecting Google Earth for the class is a good way to do this), and a fanciful map. For the latter, a pirate’s treasure map would be a good example, such as the one from the first edition of *Treasure Island* (Stevenson, 1883) in resources. Others might include a map of Peter Pan’s *Neverland* (Barrie, 1911), Harry Potter’s *Hogwarts* (Rowling, 1997), or Frodo’s *Middle Earth* (Tolkein, 1955).

Cover distance by considering how far things are from the school – show students how to use the Ruler tool in Google Earth to calculate this (to avoid fractions, use metric, noting that a meter is a big step for you). Give them a list of 5-10 things to measure the distance between. This is a good time to introduce the concept of scale, and what is different about a map that is to scale (see Extension 1). It can be fun to create one of those signposts for your classroom that has directions and distances for various points in the county and the world.

To cover latitude and longitude, it is best to start with a good old fashioned globe – if you have access to one be sure to use it. A handheld GPS will also illustrate how latitude and longitude change as students move. Finally, software such as Google Earth, which shows the latitude and longitude of the cursor in the task bar, is quite helpful to clarify the concept. Brush up yourself on the National Atlas *Latitude and Longitude* resource.

### Extend

#### *Extension 1: Make a Scale Map*

Show examples of maps that say “Not to scale” and discuss what that means. Are things really as close as they appear on the map? Then show an example of a map that is to scale. Ask students how they would scale a map.

You can have students explore scale computer maps on the *Orange County Water Atlas* by guiding them through the following procedure.

1. Choose one of the watersheds from those listed on the Water Resources Search tab.
2. When the watershed page loads, have them click on “Map It!” to view the watershed using the Advanced Mapping Tool.
3. Allow them to experiment with the map viewing tools, especially “Zoom in” and “Zoom out”.

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4. Ask them to choose two different lakes that are visible within the watershed. Then have them use the Zoom in/out tools to create and print a map that shows just the portion of the watershed that contains all of the two selected lakes.
5. Point out the scale information on their printed map. Ask them to use it, and a ruler, to answer the following questions:
  - a. How far is it from the center of one lake to the center of the other? (They can approximate where each center is.)
  - b. What is the shortest distance from one lake to the other “as the crow flies”?
  - c. If you had to drive/bike/walk from one lake to the other on the roadways shown on the map, how far would you have to go?
6. Using meter sticks and graph paper, make a scale map of your classroom. Divide the students into teams and have each team measure key distances, rounding to the nearest meter. Draw the map yourself, preferably on a projector, so the students can all see the map as it is being built. Include key points like the main door, any other doors or emergency exits, your desk, the reading area, etc.

### ***Extension 2: Make a GPS Map of the School***

If you have access to one or more handheld GPS units, turn on the tracking/mapping feature and have student teams walk various parts of the school grounds, including the fence line, the parking lots, the sidewalks and so on. Use the tracks to create a scale map of your school grounds. Note that many areas (particularly near roads and/or parking lots) may require supervision. It can be quite effective to indicate these areas on the map using a in a “danger” color or symbol.

### ***Extension 3: Make and Use Treasure Maps***

Once students have some basic familiarity with mapping, treasure maps can be great fun for them to produce and use. You don’t need to bury anything in the schoolyard, although that could be lots of fun if you have an appropriate natural area. You can also hide things on school grounds or within the classroom, and produce treasure maps to locate them – this is a good activity to do from one class to another. For classrooms with access to GPS units, ***geocaching*** is a popular higher tech alternative.

### ***Extension 4: Scrub Jay Habitat Maps***

Biologists use maps to help them understand the distribution and ecology of plants and animals. One of Florida’s most unique and endangered habitats is the xeric, or dry, scrub – students can read about it in ***The Florida Scrub*** and ***Florida Natural Areas Inventory – Scrub*** resources, as well as its most famous resident, the endemic Florida scrub jay.

Using the land use cover layers of the ***Orange County Water Atlas*** mapping tool, have students consider where scrub jays might live in Orange County. After choosing some areas and adding them to a map, have them consider any possible effects of climate change on scrub jay populations. Two helpful resources include ***Florida Scrub Jay*** and ***Climate Change and Florida Scrub Jays***.

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### Exchange/Evaluate

You can evaluate their work on the various maps, as well as their progression understanding concepts like direction and scale (see vocabulary).

Using their experience with mapping the school and water bodies, have students create a cultural map of their neighborhood, including their house and some of the things they like. It does not have to be to scale, but encourage them to include the cardinal directions.

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