Phinizy Swamp Nature Park
Teacher Field Trip Preparation Guide

Program: Swamp Math

Objectives: To make students aware that math is very much a part of science and is invaluable when collecting and analyzing data, and can be fun.

The following academic standards are covered on this field trip:
<u>GPS6</u>: CS1, CS2, CS3, CS4b, CS4c, CS5, CS7c, CS7d, CS9c, E3a, E3b, E5j, M6M1, M6A1, M6A2a, M6A2b, M6D1, M6D2a, M6D2b, M6D2c, M6P1a, M6P1c, M6P3, M6P4c, M6P5c
<u>GPS7</u>: CS1, CS2, CS3, CS4b, CS4c, CS5, CS9c, L4c, L4d, L4e, M7A3b, M7A3c, M7D1, M7P1a, M7P1c, M7P3, M7P4c, M7P5c
<u>GPS8</u>: CS1, CS2, CS3, CS4b, CS4c, CS5, CS9c, P1e, M8D3a, M8D4a, M8P1a, M8P1c, M8P3, M8P4c, M8P5c
<u>S.C. Science</u>: 6-2.1, 3.2, 3.4, 3.5, 3.6, 4.7; 7-4.1, 4.3, 4.4, 4.5, 4.6; 8-2.1, 2.7, 3.9
<u>S.C. Math</u>: 6-1.1, 1.6, 1.7, 5.4, 5.7, 6-6; 7-1.1, 1.6, 1.7, 2.1, 3.6, 3.7, 5.1, 6.1, 6.5, 6.6, 6.7; 8-1.1, 1.2, 1.5, 1.6, 1.7, 2.7, 6.3, 6.5, 6.6

Vocabulary:
Circumference: The perimeter of a circle.
Compass: A device for determining direction by means of a magnetic needle swinging freely and pointing to magnetic north.
Contour lines: The lines on a topographic map, which show how the land is shaped at a variety of elevations.
Contour interval: The spacing between contour lines, which shows how steep or flat the terrain, is.
DBH: Diameter at breast height, measured at 4.5 feet.
Density: The quality of being dense or crowded, the quality of something per unit volume, unit area, or unit length.
Diameter: A straight line passing through the center of a body or figure dividing it in half (circumference ÷by π).
Diversity: The condition of being diverse or composed of many forms.
Estimate: To give or form an approximate calculation (as of value, size, or cost).
Linear: Of, related to, resembling, or having a graph that is a straight line.
Marsh: A wetland characterized by grassy vegetation.
Orienteering: An activity in which the participants use a map to find markers that have been placed at easily recognizable features. Can be done with compass and pacing or by simply following a map.
Pace: A step in walking measured by the distant it takes to step with the right foot and the left foot.
Population: A group of individuals or items from which samples are taken for statistical measurement.
Sampling: A representative piece or set of individuals that shows the quality or nature of the whole from which it was taken.
Scale: Something divided into regular spaces as a help in drawing or measuring.

Swamp: A wetland characterized by trees.
Topography: The outline of the form of a place showing its relief and the position of features.
Volume: Space occupied as measured by cubic units; the three-dimensional magnitude of an object expressed in cubic units.
Watershed: the land area from which all water drains into a particular water body.
Wetland: An area characterized by water at or near the surface, low-oxygen soil, and special wetland plant species.
π: 3.1416.

Teacher Background Information:
About Compass and Pacing
What exactly is pacing?
- Pacing is ancient. The Romans used it to measure and spread their civilization. It is used to measure linear distance.
- Pace is a measure of stride. One pace is the distance it takes to step once with the right foot and once with the left foot. Everyone's pace may be different.
- Pace can be measured in feet, yards, meters, chains and other linear distances. Once you know how many paces you have in 50 feet, you can calculate how many paces for 75, 250, or 25 feet.

How do you use a compass with pacing?
- A compass always points to magnetic north. By setting the compass to the quadrant or degree that you plan to travel in (for example N 30 E, 120°) and orientating the compass to north, you can easily focus on your direction of travel.
- A compass can be used to find an exact location, get from one place to another, turn angles, survey boundary lines, as well as a number of other things.

About Diameter, Height, and Volume
What is diameter and why is it important?
- Diameter is the straight line that passes through the center of a circular body and divides the object in half.
- Diameter is twice the radius and is used in calculating the volume of a cylindrical object (such as a tree) as well as the area with in the circumference (πR^2).
- The diameter of a tree is usually measured at DBH (diameter breast height or 4.5 feet). To calculate the diameter, measure the circumference and divide by π (3.1416) or use a special diameter tape (D-tape).

How can height be measured and why is it important?
- The height of an object can be measured by standing a fixed distance from the object and using a height measuring instrument such as a clinometer to read the height.
- The height can be calculated by triangulation.
- Height as well as diameter is used when calculating the volume of a cylinder object.

How is volume calculated?
- Volume is a cubic measurement of the space that a three-dimensional object takes up.
- The volume of a cylinder object is calculated by multiplying the circumference area (πR^2) by the height as long as they are in the same units.

About Population Sampling
Why is population sampling important?

- Population sampling is used to determine the parameters of individuals living in a given area.
- Population sampling can be used to determine the competition for food or nutrients, the exact species present, the density of individuals, the amount of diversity present, as well as a number of other factors controlling populations.

Why is population density important?
- Any given area can only support a given number of individuals. After the maximum number is reached, individuals must compete for nutrients. Some individuals may become weak, some may leave the area, and others may die.
- Density can be used to determine a growing population, a sustained population, or an under population.
- Density can be used as an inventory of a population.

Why is diversity important?
- Diversity can be used to determine the health of a given area. Generally the more diversity among the individuals the healthier the habitat.
- A stream is said to be healthy if there is much diversity in the macroinvertabrates as opposed to a stream with many individuals of a few species, which may be pollution tolerant.

About Watersheds
What is a watershed?
- The land area from which all water drains into a particular body of water.
- It includes the body of water and the "uphill" land surrounding it.
- The water draining into the body of water is called surface runoff.

How big are watersheds?
- Watersheds can be as small as your backyard and as large as the drainage basin for the Mississippi River.
- Large watersheds can contain many smaller watersheds within them.

What affects do humans have on watersheds?
- Humans often alter the flow of water bodies such as when they create a dam, or when they build a channel to connect two water bodies.
- Humans add many types of pollution to the land and directly into water.
- Humans remove vegetation from the landscape and add cement and asphalt, which cause water to flow more quickly into water bodies and have less opportunity to infiltrate into the soil. This also causes more flooding of streams and rivers.

On Wetlands
What is a wetland?
A wetland is just that, wet land. A wetland is an area that has all three of the following characteristics:
- Low-oxygen (anaerobic), hydric (water-saturated) soil
- Special hydrophytic (water tolerant) plants that can survive in low-oxygen conditions

- A hydrologic regime where water is frequently at, just below, or just above the ground's surface, creating saturated conditions that lead to the development of hydric soils and the presence of hydrophytic plants (the level of water often fluctuates and is far from constant)

Where are wetlands located?
- All over the world and in every state in the U.S
- They can be freshwater or saltwater
- They can be along a body of water or independent from another water source
- They are often transitional areas located between dry land and deeper aquatic systems such as rivers and lakes
- They can be forested or not forested
- 5% of U.S. wetlands are coastal wetlands, while 95% are inland wetlands

What are some examples of wetlands?
- <u>Marshes:</u> dominated by herbaceous vegetation, with water levels from 3 feet to 6 inches or less. Includes salt marshes, fresh water marshes, and brackish marshes
- <u>Swamps</u>: dominated by woody trees or shrubs
- Wet meadows: a type of marsh dominated by grasses or sedges, with water levels at 6 inches or less
- <u>Prairie Potholes</u>: water-filled glacial depressions located primarily in the mid-west. An important site for waterfowl
- <u>Bogs and Fens</u>: wetlands with peat for soil due to low decomposition rates
- <u>Vernal Pools</u>: Temporary pockets of water that fill depressions in wooded areas, meadows, and river floodplains
- <u>Carolina Bays</u>: Unique wetlands found primarily in the coastal plain of North Carolina, South Carolina, and Georgia which are typically shallow, oval depressions

What wetlands exist at Phinizy Swamp Nature Park?
- Floodplain swamp (a swamp that exists near a stream or river)
- Constructed wetland marshes (human-made grassy wetlands)
- Oxbow Lakes and River Scars (remnants of where a river used to flow)

Why is it important to protect wetlands (values of wetlands)?
- They improve water quality by intercepting surface runoff and removing nutrients, waste and sediment from water
- They slow water down and prevent erosion
- They soak up floodwaters thus preventing downstream floods
- They provide areas of recreation and beauty
- They provide essential habitat for many diverse and often endangered species. Up to 45% of threatened or endangered species rely on wetlands for their survival
- They furnish natural products such as food, timber, fur to humans
- Some help to recharge groundwater supplies
- They provide areas for education and research
- Some wetlands support downstream aquatic systems
- The U.S. has lost over 50% of our wetlands to agricultural conversion, mining, and urban development

Suggested Activities for before or after the field trip:

Consider calling us for one of our loan boxes that matches with each field trip - they contain many fun activities for you and your students!

1. Using a football field, have the students stand along the zero yard line facing the field. Students should then walk to the 50-yard line and count every time their right foot hits the ground (one pace). At the 50-yard line, make a note at the number of paces and turn around and walk back to the zero yard line counting paces again. Each student should then take the average of the two counts. Once they know their pace for 50-yards, have them calculate their pace for other distances. Then convert these distances to miles and meters.

2. Take a count of the students in your classroom and use them as a sample population of all the students in the school. Determine the percent your sample is to the whole school population. How many of your class have blonde hair, dark hair, red hair? Based on your sample popular, determine the number of blonde hair, red hair, and dark hair students in the school.