Profile a Lake *Teacher's Guide*

Students practice for the FCAT while studying lake depth, area, volume and water clarity.

Water Atlas Curriculum Lesson 33

Grade Level: *Middle School*

Subject Area/Course: Reading, Writing (Language Arts) and Math

Performance Objectives:

References are to the Next Generation Sunshine State Standards (2007).

Language Arts

LA.6.1.7.2	The student will analyze the author's purpose (e.g., to persuade, inform, entertain, or explain) and perspective in a variety of texts and understand how they affect meaning.
LA.6.1.7.3	The student will determine the main idea or essential message in grade-level text through inferring, paraphrasing, summarizing, and identifying relevant details.
LA.6.4.3.1	The student will write persuasive text (e.g., advertisement, speech, essay, public service announcement) that establishes and develops a controlling idea, using appropriate supporting arguments and detailed evidence.

Math

MA.3.G.5.1	Select appropriate units, strategies and tools to solve problems involving perimeter.
MA.6.G.4.1	Understand the concept of pi, know common estimates of pi and use these values to estimate and calculate the circumference and the area of circles.
MA.6.S.6.2	Select and analyze the measures of central tendency or variability to represent, describe, analyze and/or summarize a data set for the purposes of answering questions appropriately.
MA.7.G.2	Develop an understanding of and use formulas to determine surface areas and volumes of three-dimensional shapes.
MA.8.A.6.1	Use exponents and scientific notation to write large and small numbers and vice versa and to solve problems.
MA.7.A.1.2	Solve percent problems, including problems involving discounts, simple interest, taxes, tips and percents of increase or decrease.

Academic Outcomes/Lesson Objectives:

- Students will select a lake for which a contour map is available to examine for this lesson.
- Students will draw (free-hand) the outline of the lake and approximate the contours from the Watershed Atlas Web Site.
- Students will translate, key and color the maps using prior knowledge of colored physical maps.

- Students will respond to FCAT-type questions or prompts in Reading, Writing and Math.

Duration:
One Instructional period for Website exploration and one for the FCAT Activities

Teacher Background Information:
The Seminole County Water Atlas provides information about lake size, depth, volume, clarity, and more. Even using this data, it is sometimes difficult to visualize a lake's size because many people aren't sure about the actual size of an acre. By comparing acres to something commonly understood (i.e. the size of a football field), the data on lake surface area becomes easier to understand and use. Similar comparisons for water depth and lake volume are also provided in the article.

Teacher Web Resources:
- Sunshine State Standards can be found at http://www.fldoe.org/bii/curriculum/sss/
- Information about FCAT can be found at http://fcat.fldoe.org/

Materials Needed:
Internet access with www.Seminole.WaterAtlas.org book-marked, student pages for "Profile a Lake"

Safety: N/A

Vocabulary:
aquatic
Pertaining to water or water resources.

clarity
The degree to which light can travel through water.

nitrogen
A biologically important nutrient essential to plant growth, which exists in solid, gaseous, and liquid states.

phosphorous
An essential chemical food element that can contribute to the eutrophication of lakes and other water bodies by fostering the growth of plant life.

profile
A representation of something that gives an overview of its most important or interesting characteristics.

Secchi disk
A device for measuring the clarity of water. It consists of a large black-and-white disk that is attached to a tether and lowered into a waterbody. The depth at which it can no longer be seen is referred to as the waterbody's "Secchi depth."

tannic acid
An organic acid that leaches from leaves and other organic material, giving water a tea or coffee color. Tannic water is not polluted but in its natural condition and generally has a low pH.

volume
The quantity of three-dimensional space occupied by a solid, liquid, or gas.

Key:

READING

1. c. LA.6.1.7.5, Bloom's Taxonomy Level One
2. b. LA.6.1.7.2, Bloom's Taxonomy Level Two
3. b. LA.6.1.7.5, Bloom's Taxonomy Level One
4. Use the rubric for Extended Response Reading Questions – 4 points
   LA.6.1.7.2, Bloom's Taxonomy Level One

Example of a Top-Score Response:
Three pieces of information found on the website might help new homebuyers choose a good lakeside home: lake size, lake volume, and water clarity. The size of the lake is important to homebuyers because a larger lake may have more lakefront houses available and more recreational opportunities for swimming, boating, fishing and water skiing. Lake volume is important because it affects water level. Knowing how much the water level has changed in the past can help homeowners find the best location for a dock. Water clarity is an important component of the environmental, visual, and recreational value of a lake. If the water clarity is low, property values might go down.

WRITING

For All – Use the rubric for Florida Writes! – 6 points

1. LA.B.2.3.3
2. LA.B.2.3.3
3. LA.B.2.3.3
4. LA.B.2.3.3

MATH

1. Use the rubric for Extended Response Math Questions – 4 points
   MA.B.3.3.1

   Example of a Top-Score Response:

   circumference = 1,170 feet

radius = circumference / 2π = 1,170 / (2 x 3.14) = 186.3 feet

area = π x radius2 = 3.14 x (186.3) 2 = 108,985.5 square feet

acres = 108,985.5 square feet / 43,560 square feet per acre = 2.5 acres

2. b. MA.E.1.3.3
3. d. MA.B.3.3.1
4. d. MA.A.2.3.1
5. b. MA.A.3.3.3

Procedure:

1. Preview this FCAT-Friendly activity. Print copies for your students.
2. Preview the Seminole Water Atlas.
   a. Go to www.Seminole.WaterAtlas.org
   b. Find your school's watershed: On the opening page click The Data & Mapping Tab > Advanced Mapping Tool. On the right of the map, under Search For, click on the button for "an address" and click in the text box. Type your school's address (no city). The map that comes up will show the address location and the watershed. (If you want to see more of the map, click on the Zoom Out tool.)
   c. Type the name of the watershed in the "Search" text box at the top right and press Enter.
   d. Under Find a Specific Water Body click on List of All Water Bodies in the Watershed. Make note of some nearby lakes, then click on a nearby lake. If the lake doesn't have information, click the back arrow and select another lake.
   e. Look over the General Info web page for information on surface area, maximum depth, approximate volume, Trophic State Index, and water clarity.
   f. Click on the Water Levels & Flows Tab and scroll down to Bathymetric Maps (contour map, a depth map of the lake bottom). Read about Bathymetric maps then click on View Contour Map of Lake. If your lake does not have a contour map, select another lake in your watershed.
   g. Look for the deepest and shallowest areas of the lake. Are they in the center of the lake or dispersed throughout the lakebed? How can the distribution of deep spots affect wildlife and people?
   h. Most of our lakes are sinkhole lakes. Can you find evidence of a sinkhole, or a cluster of sinkholes?
   i. Select other lake contour maps and compare the depths and distribution of deep areas.
   j. Use the contour maps to find each lake's maximum depth. Check the answers by reading the maximum depth information on the lake's general information page.

3. Using the lakes you have located, guide your students on a virtual tour of nearby lakes, or print number 2 a-j above as a guide for independent or small group investigation.
4. Have your students estimate the surface area, height/depth, and volume of various items in the schoolyard or in their neighborhoods. Compare these estimates with actual measurements they collect and calculate.
5. Do the FCAT practice activities.
6. Using the information learned in the FCAT practice and the Water Atlas, brainstorm real-life situations when estimation is required because actual measurement is impossible or unreasonably difficult. For example, the lake volumes provided on the website are approximate. Due to natural variation in topography and changing water levels, it would be difficult to get an exact lake volume.

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