

Mapping the Meander *Mapping the flow of Alabama rivers*

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Grade Level: 4-12

Enduring Understanding:

Visual imagery influences understanding of and responses to the world.

Essential Question:

How do objects, artifacts, and artworks collected, preserved, or presented, cultivate appreciation and understanding?

Specific to this lesson: How does knowing and using visual arts methods and vocabularies help us understand and interpret the natural world?



Arts Discipline Standards: Visual Arts

Alabama Anchor Standard 6: Convey meaning through the presentation of artistic work.

Alabama Anchor Standard 11: Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Non-Arts Discipline Standards: Science & Math

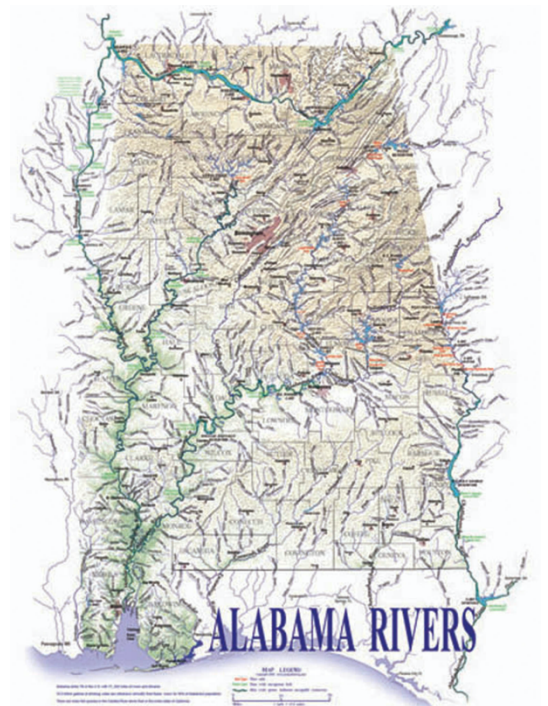
Science: Geography, water cycle, flow, erosion, ecosystems, energy, dynamics

Grade 2: Science

#9. Create models to identify physical features of Earth

Grades 9-12: Environmental Science:

- 1) Investigate and analyze the use of nonrenewable energy sources (e.g., fossil fuels, nuclear, natural gas) and renewable energy sources (e.g., solar, wind, hydroelectric, geothermal) and propose solutions for their impact on the environment.
- 11) Engage in argument from evidence to defend how coastal, marine, and freshwater sources (e.g., estuaries, marshes, tidal pools, wetlands, beaches, inlets, rivers, lakes, oceans, coral reefs) support biodiversity, economic stability, and human recreation.



Math: Fractals

Grades 9-12 Math:

3) Use the recursive process and difference equations to create fractals, population growth models, sequences, series, and compound interest models.

8) Solve problems from non-Euclidean geometry, including graph theory, networks, topology, and fractals

Requirements: Materials and Supplies:

- Maps of river systems of Alabama (see resource list)
- Pencil
- Eraser
- Watercolors
- Palette for mixing colors, or lid of watercolor set
- Watercolor paper (140 lb.) or heavy Bristol paper, 8" x 5"
- #4 round watercolor brush
- Pilot G-2 pen, black
- Cup of water
- Paper towel or napkin for blotting brush

Requirements: Prerequisite Knowledge – Arts:

Art Vocabulary: geometric, organic, horizontal, vertical, landscape, unity, composition, tint, shade, primary colors, secondary colors, complementary colors, wet-on-wet watercolor methods. Understanding of line and shape.

Requirements: Prerequisite Knowledge – Non-Arts:

Water cycle, dams, hydroelectric power, renewable resource

Procedures: Introductory Activity:

Begin by showing the historic map of the Mississippi Meander. Observe the curvilinear nature and movement of lines and colors in the map. Discuss the nature of meanders and show the video about meander formation (<https://www.britannica.com/science/meander-river-system-component>) so students understand the earth science part of river meanders. Next show a map of riverways in Alabama and tell students that they will draw their own imaginary "meander map" using watercolor. Observe that Alabama has its own meanders that form between hydroelectric dams that form "lakes" in the state. The large lakes in Alabama are all man-made and have had significant environmental impact on state natural resources.



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Procedures: Sequence of Activities:

1. Fold the 8" x 5" watercolor paper in half to make two 4" x 5" halves.
2. Use a pencil to draw two diagrams of rivers, lakes, and dams: one geometric (straight lines) and one organic (curved lines)
3. Prime or activate the watercolors by dropping with a paint brush one or two drops of water in each color.
4. Geometric diagram: Apply water in the incoming river and lake areas, then tilt the paper on the center fold so the water will run toward the lake section. Touch the wet river area with paint and see it flow into the lake.
5. Add other streams of various colors flowing into the river and the lake to demonstrate how water supplies are affected by whatever flows from the rivers to the lakes.
6. Organic diagram: Next, mix a pleasing, very diluted water-like color (add combinations of blue, green, yellow and red: experiment to make a new color, not available in the watercolor set) and paint in the organic river/lake image.
7. Paint in additional small streams flowing into the river and lake areas, too.
8. Use the black Pilot G-2 pen to delineate areas of streams and the flow of the water. Notice the difference of flow when drawing in wet vs. dry areas. Touch the ink with a wet brush to activate the flow of the ink.
9. Use your pen, pencil and paint to depict the fractal nature of river systems: each segment looks like the others in shape and form, just graduating to smaller and smaller sizes. This phenomenon is especially evident in the Mobile area of Southern Alabama.
10. Make a pleasing composition. Enjoy the flow. Let your mind meander!

Culminating Activity: Performance Task:

Create a new, larger piece that uses the flow of water to mix colors. Use watercolor to demonstrate watershed activity. Use different colors to show how pollution or healthy substances can be carried from mountains and hills into rivers and lakes.

Culminating Activity: Evaluation:

Questions to discuss and extensions to explore:

1. Choose a specific lake in Alabama. What would happen to upstream or downstream areas of Alabama if that lake's dam failed to release water or if it broke to release all the water in its respective lake.
2. How did the paint demonstrate watershed activity in your art?
3. Which colors might you choose differently to symbolize various substances that occur in runoff? (consider natural leaves, industrial waste, litter, marine life)
4. Turn your paper to imagine your fractal river forms are branches of a tree or underwater plant life or the flow of blood or structure of neurons or bronchial systems in mammals. Draw and paint additional elements (leaves, birds, fish) to support your imaginative artistic venture.
5. Return to or replicate (with your own changes) your original geometric diagram. Artistically develop that imagery in geometric terms, perhaps even using a ruler.

