



LESSON PLAN: ARTS COLLIDE

Title: The Dawning of the Diatom

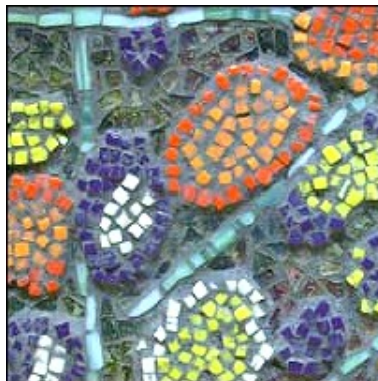
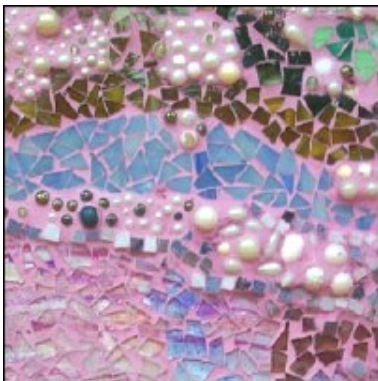
Grade Level: 9-12

Medium: Mixed Media

Author/Team: Arts Collide Educator, Thomine Wilson, with St. Madeleine Sophie's Center staff, Erin Perschbacher and Wendy Morris

Class Time and Subjects: 6 hours Art and 6 hours Science Photos courtesy of Sophie's Gallery of St. Madeleine Sophie's Center

Sample results:



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OVERVIEW OF ART AND SCIENCE TOPICS: *An excellent tactile art experience for youth and adults with developmental disabilities*

Mosaic is an ancient art form that has existed for thousands of years. It incorporates the aspects of decoration and design, and mosaic products can be displayed as ornamentation for the body, for home decor, as well as outside in gardens and landscapes. The mosaic technique also has cultural and spiritual significance as seen in churches and cathedral settings.

Small pieces of stone or glass known as *tesserae*, (diminutive *tessellae*), and other objects which are comprised of different composition and color are used to create a pattern or picture.

Beautiful art can be made as jewelry, or art for the home and garden using broken china, glittering glass jewels, shimmering mirrors, and smooth stones. Small pieces of tesserae are glued and grouted onto smooth surfaces such as wood, Styrofoam, garage sale bargains, and most any type of found object.

*****Mosaic objects for Art Meets Fashion can be seen in the photos in this lesson plan and include necklaces, a belt buckle, and diatom themed wall art.**

Diatoms exist in the world's oceans and are crucial to much of life on Earth. They are the foundation of the bountiful marine food web, produce half the world's oxygen, and absorb harmful carbon dioxide.

Diatoms are incredibly important in the global carbon cycle. During photosynthesis, diatoms turn carbon dioxide into organic carbon, and in the process generate oxygen. The ability to remove carbon dioxide from the atmosphere is affected by global climate change. Diatom communities are a popular tool for monitoring environmental conditions, past and present, and are commonly used in studies of water quality.

Diatoms are very unique and no two are alike. Their beauty is exquisite, and some scientists liken them to snowflakes, and describe them as having characteristics similar to costume jewelry and rhinestones. It is their beauty coupled with knowledge and creativity that makes this lesson in Art Meets Science one of great value in learning about our biosphere.

OBJECTIVE:

The objective of this lesson plan is to use an art and science curriculum to increase students' awareness of the importance of preserving our environment. This lesson will focus on nurturing creativity as well as nurturing the environment by using facts about our ever changing world. Mosaic art made to represent diatoms will be the final product.

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MATERIALS:

- Wheeled Glass Nippers
- Waterproof Mosaic Glue(Weldbond works best)
- Grouting Sponge
- Rubber Gloves
- Carbon Tracing Paper
- Safety Glasses
- Dust Masks
- Grout
- Grout Sealant
- Glass tiles materials (stained glass, marbles, vitreous mosaic tiles, broken vases/dishes, mirror)
- [Glass plate, platter, Hardibacker /or source item to mosaic](#) (recycled frame or framed mirror with glass intact – glass or mirror would be mosaiced surface; wearable base such as pendant or belt buckle) *Must be rigid

You will also need the following supplies:

- Pen
- Marker
- Acrylic paint
- Paper Towel or Soft Cloth
- Measuring Cup
- Tweezers
- Mixing Bowl and Spoon
- Rubber Spatula
- Newspaper
- For hanging, an empty picture frame glued on the back works well

TEACHER PREPARATION:

- As a preface to the mosaic art lesson, allow for a science lesson including review of the environmentally based references on diatoms in the webography below. Photos of diatoms, **'The Diatom Fact Sheet (the lesson plan addendum attached)**, and books about the ocean will be especially helpful for special needs students, along with the impact statements within each reference.
- Encourage students to review pictures of mosaic art in various settings. The mosaic books cited in the webography below feature a comprehensive guide to the art of making mosaics and reference theories of design, composition and color, and also provide information about the correct technical approach to working with a wide variety of materials, tools, techniques and surfaces.
- Recommend that students bring in their own found objects and designs to incorporate into their mosaics and suggest they donate found objects and magazines and design photos to their classmates in need

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PROCEDURES:

A. Prepare Design

- The object to mosaic should be clean and dry and have a smooth surface.
- Transfer design onto the project to mosaic by taping carbon transfer paper and your pattern in place and tracing over the pattern with a pen.
- Remove the pattern and carbon paper. Hard line the pattern onto the project by tracing over the carbon lines with a marker.

NOTE: To mosaic onto a clear object you do not need to transfer your pattern. Tape the pattern behind the object. Follow the pattern and glue pieces directly onto the glass object.

B. Glue Pieces

- Place your project to mosaic horizontally. If you must glue pieces vertically you can hold them in place with tape or use a silicone mosaic adhesive. Remove tape once the glue has set and before grouting. Following the pattern, glue mosaic pieces onto your project. Apply glue to a small section of your piece, such as starting with outlines or one area of your piece. Allow the glue to become more paste-like by waiting about 5 minutes before placing tiles in the glue. Or, place a small amount of glue on the backside of the piece and press it firmly onto the object. Place pieces slightly apart and in from the edge of the object to allow for grout.
 - Once the main subject is glued down, nip remaining pieces to fill in the background. **Always wear eye protection when nipping.**
- Mosaic Tip:** For very small pieces use tweezers to place pieces on object.
- Allow glue to set for 24 hours.

C. Grout

- Place object on newspaper and put on rubber gloves.
- Following the directions on the grout package, mix the grout. Grout is available pre-colored, or can be custom colored by adding colorants (or a small amount of acrylic paint) to white grout. **Wear a dust mask when mixing grout.**
- Work grout into spaces between the glass with your hands or a rubber spatula.
- Remove excess grout with your hands or a damp sponge. Grout should be flush with glass pieces and fill all spaces between the glass.
- Allow grout to dry 15-30 minutes, depending on the wetness of the mixture. A haze will appear on the mosaic pieces. Remove any excess grout and buff glass clean with a paper towel or a soft cloth.
- Allow the project to dry for an additional 24 hours. A grout sealant may be applied if desired. Apply as directed but remove all sealant from the mosaic glass pieces with a paper towel before sealant dries.

TEACHER TIPS: A field trip and walk by the ocean and a trip to a mosaic studio or landscaped area may be a great influence to the lesson

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Online sources for mosaic tools and supplies include:

[Tiny Pieces](#)

[Delphi Art Glass and Education](#)

[Wit's End Mosaic](#)

[Hakatai Glass Tiles](#)

VARIATION:

Have students explore the various genus and species of diatoms and work in pairs to create mosaic 'replicas' of the actual diatom.

CA Content Standards:

Artistic Perception: 1.5 Analyze the material used by a given artist and describe how its use influences the meaning of the work.

Creative Expression: 2.6 Create a two or three-dimensional work of art that addresses a social issue.

Historical and Cultural Content: 3.2 Identify and describe trends in the visual arts and discuss how the issues of time, place and cultural influence are reflected in selected works of art.

Aesthetic Valuing: 4.4 Articulate the process and rationale for refining and reworking one of their own works of art.

BIBLIOGRAPHY/WEBOGRAPHY:

Amazon and Google citations for Mosaic Art:

- [Found Art Mosaics](#) by Suzan Germond
- [Mosaic Art Home Décor for Beginners](#) by Diamond Tech International
- [Marvelous Mosaics with Unusual Materials/ Marvelous Mosaics for Home and Garden](#) by George W. Shannon and Pat Torlen
- [3 Encyclopedias of Mosaic Techniques](#) each by Emma Biggs, Elaine K. Goodwin, and Sarah Kelly
- [Google Mosaic Art Images](#)

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Google citations for Diatoms:

- See [Darlyne Murawski](#), a versatile nature photographer and writer who has traveled the world to showcase the lives and ecology of small critters - including glass-shelled diatoms. Darlyne holds a doctoral degree in Biology from the University of Texas and a Masters of Fine Arts from the School of the Art Institute of Chicago.
- [Plankton, Base of Ocean Food Web, in Big Decline](#)
- [Why Diatoms Could Help Stop Global Warming](#)
- [Our Mighty Diatoms](#)
- ['Milking' Microscopic Algae Could Yield Massive Amount of Oil](#)
- [Researchers Propose Milking Diatoms to Yield Massive Amounts of Oil or Bio-Hydrocarbon Fuels](#)
- [Art Meets Fashion](#)

DIATOMS

Our Tiny Friends in the Oceans and Fresh Water

- Diatoms are a type of algae that are a major component of plankton, free-floating microorganisms of marine or freshwater environments.
- There are over 100,000 species of diatoms.
- Diatoms are often regarded as the most beautiful of the algae. Each diatom has a cell wall made of glass that is very finely etched with a species-specific pattern of dots and lines. The patterns on the diatom cell walls are so precise that they were used for years to test the optics of new microscopes.
- Almost all diatoms live by photosynthesis, using sunlight to convert carbon dioxide and water into organic compounds and oxygen. Diatoms are the most abundant algae in the open ocean and responsible for about one-quarter of all the oxygen produced on the earth each year.
- Diatoms are the most important group of phytoplankton for removing carbon from the atmosphere by incorporating it into their cells. As diatoms die, they take their carbon to the bottom of the ocean. Higher ocean temperatures due to global warming disrupt this process, allowing the concentrated carbon to be released near the surface and back into the environment. Hence, the diatoms play an extremely important role in the vital balance of the biosphere.
- Scientists have reported the discovery of whole subsets of genes and proteins that govern how one species of diatoms builds its' shell. Scientists are interested in manipulating the genes responsible for silica production as a way of fabricating more efficient computer chips. This could vastly increase chip

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speed because diatoms are capable of producing lines much smaller than current technology allows.

- Understanding diatom biology has potential impacts from the nanoscale to the global scale.

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