project ARTiculate

Fairbanks North Star Borough School District
Art Center Art Activity Kit©

Diatoms: Microscopic Jewels

GRADE: 5 and up **TIME: 1-2 sessions**

Developed by Karen Stomberg, FNSBSD Art Speciaiist

KIT INCLUDES:

- lesson plan
- lesson boards:
  - --van Leeuwenhoek bio & microscope info
  - --diatom photos(2)
  - --lesson procedure
  - --vocabulary
  - --color wheel
  - --lesson examples
- class set diatom handouts
- circle templates (2)

MATERIALS:

- construction paper:
  for circle format: 8" x 8" white and 9" x 9" black
  for rectangle format: 7" x 10" white and 9" x 12" blk
- circle template
- black crayon
- glue, scissors
- diatom handout
- watercolor paint set
- water cup, brush, paper towel

LESSON DESCRIPTION:

Students are introduced to the 17th century Dutch scientist Antonie van Leeuwenhoek, the microscope he developed, his discoveries and his methods of recording those discoveries. They create a colorful microscopic view of diatoms using watercolors and black crayon 'resist'.

VOCABULARY:

analogous color
shape
pattern
symmetry
van Leeuwenhoek
optical microscope
diatom
resist

ART ELEMENTS:

___Line
_√_Shape/Form
_√_Color
___Value
___Texture
___Space/Perspective

ART PRINCIPLES:

_√_Pattern
___Rhythm/movement
___Proportion/Scale
_√_Balance
_√_Unity
_√_Emphasis

CONTENT CONNECTIONS:

science--
•van Leeuwenhoek
•history of microscope
•cells

THEMES:

Beauty in nature

OBJECTIVES AND ASSESSMENT CRITERIA: Students will:

1. be introduced to the early microscopic discoveries of Dutch scientist Antonie van Leeuwenhoek
2. discuss the role of art and technology in recording scientific discovery
3. look at and discuss the structure and beauty of single-celled diatoms from photos of the microscopic plants
4. create a microscopic view of diatoms, incorporating: cell walls, a nucleus, patterns and symmetry
5. learn wet-on-wet watercolor technique using analogous colors

PREPARE:

1. Read lesson plan
2. Familiarize yourself with the life and work of van Leeuwenhoek .
3. Gather materials and make a sample
4. Trace the circle template onto 9" X 9" white papers for students ahead of time *NOTE: two laminated circles are included in the kit. If you don't have the kit, use the attached pattern for an 81/4" circle, copy and cut out to trace.*

ENGAGE AND EXPLORE:

I. Introduce students to van Leeuwenhoek (*Lay-wen-hook*) and his microscopes.

Put up the 3 paneled bio/information board.

A. Read biographical information to students. Point out each van Leeuwenhoek picture to students and read captions.

Make sure to emphasize these points about van Leeuwenhoek:

1. He had artists make accurate drawings to record his discoveries.
2. He is credited with discovering red blood cells and bacteria.
3. He is known as the father of microbiology

B. Discuss van Leeuwenhoek's microscope and point out features. If your class has used microscopes, ask students to talk about similarities and differences in the devices. What shape is the view under the microscope? What shape is a glass microscope slide?

C. Read the humorous poem *The Microscope* by Maxine Kumin. *(attached to lesson plan)*

II. Observe and Discuss Diatoms.

A. *Display the photo boards showing multiple diatoms.*

1. A diatom is a single-celled organism that lives as an individual or in a group or colony. They exist in all waters of the Earth, both salt and fresh. These organisms are members of a phylum of algae that scientists estimate have 600,000 to 6,000,000 different species!

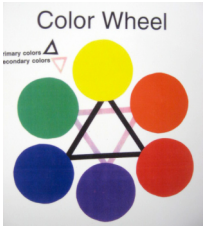
   Diatoms form shells made out of silica, which they extract from the water. These microscopic shells are very intricate and beautiful. Diatoms are abundant and provide food for many aquatic animals and have industrial uses.

2. Ask students to name the diatom shapes they see.

B. *Display close-up photos of diatoms.*

1. Ask students: Can you find the cell walls in each diatom? The nucleus? Are they symmetrical? Where is the line of symmetry in each?
2. Discuss color. Each of these photographs uses a different color scheme. Which one is a cool color scheme and which one is warm? This color was added by computer and is not the natural diatom color.

III. Review color and introduce analogous color schemes.



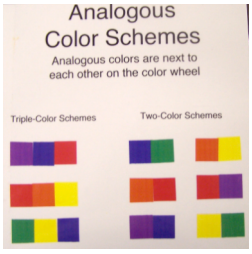
Display color boards.

A. Go over basic color theory. Point out and name with students:

1. primary colors: red, yellow, blue
2. secondary colors: orange, green, violet

B. Color schemes: warm and cool, analogous.

1. Ask students which colors are warm? Cool?
2. Analogous colors are neighbors, next to each other on the color wheel.

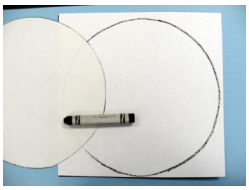


- Many analogous color schemes are just two colors.
  Ask students to name pairs of color 'neighbors'.
  RED/ORANGE, RED/VIOLET, VIOLET/BLUE, BLUE/GREEN, GREEN/YELLOW, YELLOW/ORANGE
- Any two primaries along with the secondary color they create when mixed make a three color analogous scheme. Point these out on the chart or ask students to try to figure them out and name them
  RED/YELLOW/ORANGE, BLUE/YELLOW/GREEN, RED/BLUE/VIOLET

CREATE:

Make a painting of diatoms in a drop of water. Use either a circular format, like looking into a microscope or a rectangular format like a slide.

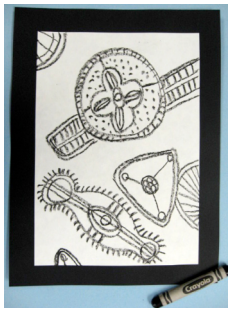
1. Glue white paper to black border.



For circle format: Trace a circle onto 8" x 8" white paper using a circle template *(included in kit or attached here to copy)*, cut out and glue to 9" x 9" black.

For rectangle format: Glue 7" x 10" rectangle to 9" x 12" black.

2. Draw Diatoms using DARK BLACK CRAYON LINES.
   Remind students to:
   - Give diatoms a cell wall and a nucleus.
   - Make diatoms symmetrical.
   - Add patterns.
   - Use lots of variety in shape, size and pattern.
   - Let some shapes overlap.
   - Let some diatoms go off the edge.



3. Paint watery background using wet-on-wet watercolor technique.
   - wet a portion of background by carefully 'painting' clean water around diatoms. It should be very wet but not puddly. The waxy black crayon will **resist** the water and paint, keeping diatoms dry.
   - add drops of two **analogous colors** letting them blend without stroking too much. Use plenty of color, letting it flow into water.
   - continue wetting portions of the background and adding color until it is complete.

4. Paint Diatoms
   - use regular painting technique. Paint on dry paper.
   - use contrast to help diatoms stand out. Use a different color scheme, or make them darker than the background.
   - wait until background is dry to paint diatoms BUT if the background is still wet, paint the insides of the diatoms first, then go back to the edges.

CLOSE:

ASSESSMENT: Create a gallery wall with the finished paintings. Ask students to identify the analogous color schemes used in a variety of paintings. Which ones have the most contrast between the watery background and the diatoms? (based on difference in the lightness or darkness, or difference in warm/cool color families used).

Make a graph of diatom shapes used by students in their paintings; title columns triangles, long rectangles, round, oval, other.

Teacher administered assessment tool

DN	O K	UP	Lesson_____ Teacher_____ Grade_____Date_____Number of Students_____
			Using the thumbs up, ok, and down technique, ask your students the following questions and record their answers. (K=knowledge, S=skills, C= creativity, A=attitude, E=engagement
			1. Can you show the nucleus, cell wall and symmetrical patterns on your diatoms? (K)
			2. Could you explain analogous colors and name an analogous color scheme? (K
			3. Did you use wet-on-wet watercolor to create a watery background?
			4. Did your crayon drawing RESIST the watercolor paint? (S)
			5. Did you create your own unique diatoms? (C)
			6. Did you listen carefully and follow directions?(A)
			7. Did you work hard and try to do your best?(E)

Teacher self-critique

8. My teaching of this lesson:

1 2 3 4 5 6 7 8 9 10

needed improvement was highly successful

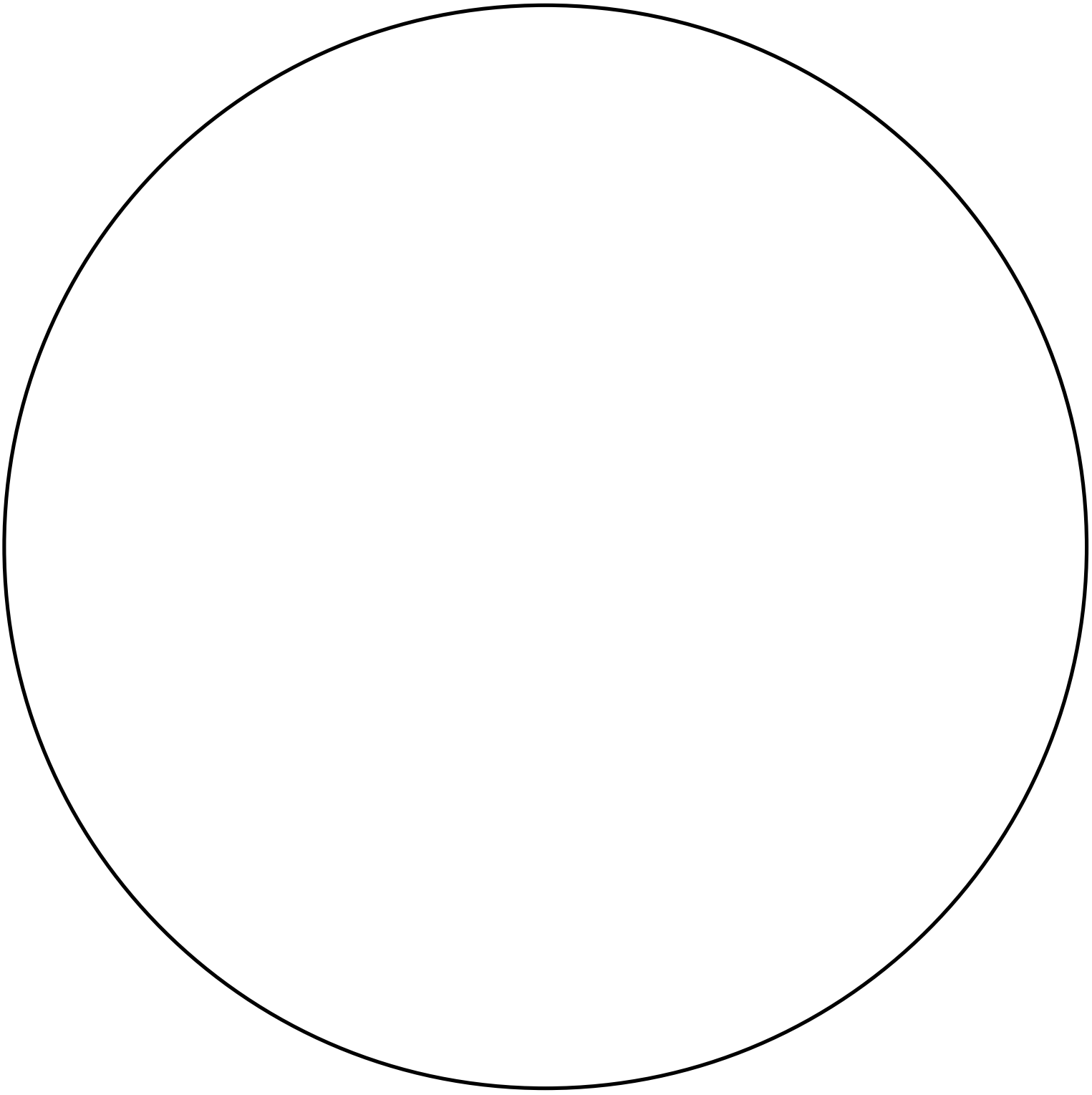
9. What would I do differently next time?

ALIGNMENT:

Alignment of Standards:	**Alignment of GLE's:**
Art: A1,2,3,4; B4; C2b,c,3,4,5;D6.	Reading: R2.6.
English:B,C	Math: M5.2.4
Math: B4.	Science: SA, SC1, SE3, SF
Science: C2,3.	
History: A	

CREDITS:

Project ARTiculate is supported by the Fairbanks North Star Borough School District, the Alaska Arts Education Consortium, and a U.S. Department of Education Development and Dissemination Grant

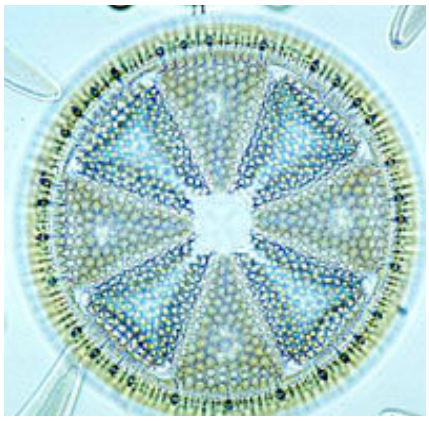


8” Circle (for circle format)
Copy and cut out. Trace onto white construction paper.

Science and Art: Observing, Discovering & Recording

Today in art class, we talked about the 17th century scientist van Leeuwenhoek who created a microscope that was powerful enough to see blood cells and bacteria for the first time. He hired artists to draw what he saw so there is a good record of his discoveries.

Modern scientists make photographs of their microscopic views. We looked at photos of diatoms taken through an optical microscope, then created our own microscopic view of these beautiful single celled organisms with watercolor paint.



Diatoms-Microscopic Jewels

A diatom is a single-celled organism that lives as an individual or in a group or colony. They exist in all waters of the Earth, both salt and fresh. These organisms are members of a phylum of algae that scientists estimate have 600,000 to 6,000,000 different species total!

Diatoms form shells made out of silica, which they extract from the water. These microscopic shells are very intricate and beautiful. They are abundant and provide food for many aquatic animals.

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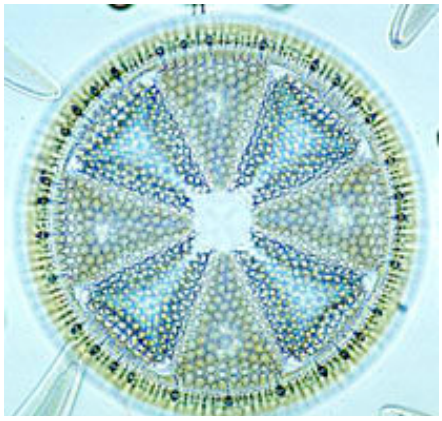

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The Microscope

by Maxine Kumin

Anton Leeuwenhoek was Dutch.
He sold pincushions, cloth, and such.
The waiting townsfolk fumed and fussed
As Anton's dry goods gathered dust.

He worked, instead of tending store,
At grinding special lenses for
A microscope. Some of the things
He looked at were: mosquitos' wings,
the hairs of sheep, the legs of lice,
the skin of people, dogs, and mice;
ox eyes, spiders' spinning gear,
fishes' scales, a little smear
of his own blood, and best of all,
the unknown, busy, very small
bugs that swim and bump and hop
inside a simple water drop.

Impossible! Most Dutchmen said.
This Anton's crazy in the head!
We ought to ship him off to Spain!
He says he's seen a housefly's brain!
He says the water that we drink
Is full of bugs! He's mad, we think!

They called him dumkopf, which means dope.

That's how we got the microscope.