

ARTS IMPACT LESSON PLAN

Visual Arts, Science, and Engineering Infused Lesson

Warm and Cool Sunshades

Author: Beverly Harding Buehler

Grade: Pre-kindergarten

Enduring Understanding

Sunshades can keep us cool from the sun. Radial structures can support circular forms. Using warm and cool colors next to each other can create visual excitement.

Lesson Description

Students explore how sunshades – tents, parasols, umbrellas – keep us cool from the sun. Next, students discover the radial structures hold umbrellas and parasols open. Exploring the art of umbrellas from several different cultures, students also learn to identify warm and cool colors and understand how using them together can create visual contrast. Students design and build their own model sunshades from translucent paper and cardboard, and paint them with warm and cool colors.

Learning Targets and Assessment Criteria

Target: Creates contrast with color.

Criteria: Uses warm colors (red/yellow/orange) and cool colors (blues/green/violet).

Target: Identifies and creates radial structure.

Criteria: Describes and builds a sunshade with equal length spokes that cross in the center.

Target: Solves artistic and engineering design problem.

Criteria: Tests a sunshade for strength, and reinforces if necessary.

Vocabulary	Materials	Learning Standards
<p><u>Arts Infused:</u> Circular Form Radial Structure</p> <p><u>Science:</u> Engineer</p> <p><u>Arts:</u> Cool colors Parasol Sunshade Umbrella Warm colors</p> <p><u>Social Studies:</u> Asante China Ghana Ijebo Japan Nigeria</p>	<p>Museum Artworks or Performance</p> <p>Seattle, WA Seattle Art Museum</p> <p>Tacoma, WA Children’s Museum of Tacoma Tacoma Art Museum</p> <p>Additional Resources A real umbrella or parasol A lamp with a lampshade (See photographs of umbrellas from China and Ghana below. Also search for umbrellas from Japan, Bali, Indonesia, and Nigeria).</p> <p>Materials Newsprint: 18x24”, 3 per student; Large paper coffee filters: 18” diameter, 3 per student; Liquid watercolor: assorted colors (some warm – red, yellow, orange; some cool – blue, green, violet), 6 bottles of each color; Palettes or small cups; Water containers, 1 per 2 students; Pipettes/droppers: one per watercolor bottle, approximately 36 droppers;</p> <p><i>continued</i></p>	<p>Learning Standards</p> <p>WA Arts State Grade Level Expectations <i>For the full description of each WA State Arts Grade Level Expectation, see:</i> http://www.k12.wa.us/Arts/Standards</p> <p>1.1.2 Elements: Shape/Form 1.1.6 Elements: Color 1.1.7 Principles of Organization: Balance 1.2.1 Skills and Techniques: Paper Construction, watercolor painting 2.1.1 Creative Process 2.3.1 Responding Process 4.2.1 Connection between Visual Arts and Physics, Engineering</p> <p>Early Learning Guidelines (Pre-K – Grade 3) <i>For a full description of Washington State Early Learning and Child Development Guidelines see:</i> http://www.del.wa.gov/development/guidelines/ (Age 4-5) 6. Learning about my world: Science: Ask questions and identify ways to find answers. Try out these activities and think about what to do next to learn more. Arts: Show an increasing ability to use art materials safely and with purpose.</p> <p><i>continued</i></p>

Cardboard/tagboard: 1/2x18" strips, 4 per student; Paper bowls: approximately 6" diameter, 1 per student; Copy paper: 8.5x11", prior to day 2 of lesson, copy the pie graph from the lesson, one per student; Recycled wrapping paper tubes or slender mailing tubes (approx. 1.5" diameter x 18"); Scissors; Glue: Elmer's or Tacky glue; Glue sticks; Hole punches (5 per class); Curling ribbon in a variety of colors; Class Assessment Worksheet

Seattle Art Museum images:
Lady Wearing an Eboshi, on High Geta an Holding an Umbrella, c. 1780-1800, Utagawa Toyokuni, 2014.32.6



Headdress (Okeneken), 20th c., Ijebu, 81.17.531



Schubert's Sonata, 1992, Mark Di Suvero, 95.81



continued

Next Generation Science Standards

<http://www.nextgenscience.org/next-generation-science-standards>

Topics:

Energy
Engineering Design

Disciplinary Core Ideas:

PS3.B. Conservation of Energy and Energy Transfer
LS1.A. Structure and Function
ETS1.A. Defining Engineering Problems
ETS1.B. Designing Solutions to Engineering Problems

Science Kits Addressed:

PreK: Building Structures

Performance Expectations:

K-PS3.2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
1-LS1.1. Use materials to design a device that solves a specific problem or a solution to a specific problem.

Crosscutting Concepts:

Cause and Effect
Structure and Function

Science and Engineering Practices:

1. Asking Questions and Defining Problems
2. Developing and Using Models
3. Planning and Carrying out Investigations
6. Constructing Explanations and Designing Solutions

Tacoma Art Museum images:
Blanket Stories: Transportation Object,
Generous Ones, Trek, Marie Watt, 2014



ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

Pre-Teach

Notice and discuss how sunshades protect us from the sun. Experiment with putting two bowls of water outside, one in the sun, and one under an umbrella or other source of shade. Come back after one hour. Which is cooler? Why do you think so?

Lesson Steps Outline

Day One

1. Guide exploration of the function of lightshades/sunshades. Hypothesize how shades work to keep us cool from the sun.

 Criteria-based process assessment: Analyzes how sunshades protect us from heat and light.

2. Introduce the concept of structure – that both sculptures and functional objects have structures that keep them up. Lead an exploration of objects around the room and then works of art to try to figure out what keeps them up.

Introduce and guide art analysis of *Schubert's Sonata* by Mark Di Suvero from the Seattle Art Museum collection and *Blanket Stories: Transportation Object, Generous Ones, Trek* by Marie Watt from the Tacoma Art Museum collection. Look for visual clues that suggest how the sculptures might be being supported.

 Criteria-based process assessment: Analyzes sculptures for structure.

3. Introduce *Lady Wearing an Eboshi, on High Geta and Holding an Umbrella* by Utagawa Toyokuni and *Headdress (Okeneken)* by an anonymous Ijebu artist from Nigeria from the Seattle Art Museum collection. Explore the structure of an umbrella through works of art and in real life.

 Criteria-based process assessment: Reflects on the structure of umbrellas as an engineer.

4. Guide an exploration with photos of umbrellas/parasols from China and Ghana. Introduce concept of warm and cool colors, and visual excitement through warm and cool color contrast.

 Criteria-based process assessment: Identify warm and cool colors.

5. Guide color and liquid watercolor explorations, then painting the sunshade circles with warm and cool colors.

Criteria-based teacher checklist: Uses warm colors (red/yellow/orange) and cool colors (blues/green/violet).

Day Two

1. Introduce the concept of radial structure. Look for examples of radial structure in nature and human-made objects.

Criteria-based process assessment: Identifies radial structures in our environment, natural and human-made.

2. Help students create the radial structure of their sunshades. Then help students glue painted sunshades to radial structures, attaching shaft in the center.

Criteria-based teacher checklist: Describes and builds a sunshade with equal length spokes that cross in the center.

3. Guide students testing sunshades for effectiveness.

Criteria-based teacher checklist: Tests a sunshade for strength, and reinforces if necessary.

4. Guide group reflection and have a parasol parade!

Criteria-based reflection: Reflects with the whole class on warm and cool artistic color choices and radial structure.

LESSON STEPS

Day One

1. Guide exploration of the function of lightshades/sunshades. Hypothesize how shades work to keep us cool from the sun.

▣ Show a lamp with a lampshade to demonstrate how shades protect us from both light and heat.

- *Today we are going to be scientists to try to figure out how something in nature works.*
- *When you are outside and it's hot and sunny, where can you go to get cooler? (Under a tree, under a roof, go back inside where there is a roof to protect us from the sun, etc.)*
- *Why do you think that trees and roofs help us feel cooler?*
- *The light from the sun makes us feel warm. When we put something between us and the light of the sun, we feel cooler.*
- *We call structures that keep us cool from the sun "sunshades."*
- *How do you think this lampshade is similar to a sunshade?*

▣ You might have students come up one-by-one and put a hand over the lamp so that they can feel the heat from the light bulb, and then put a hand outside the shade to notice how the shade protects us from the heat of the light (as well as it's brightness).

- *Today we are going to make our own sunshades!*

Criteria-based process assessment: Analyzes how sunshades protect us from heat and light.

2. Introduce the concept of structure – that both sculptures and functional objects have structures that keep them up. Lead an exploration of objects around the room and then works of art to try to figure out what keeps them up.

- *To make our sunshades we will need to think like artists and engineers!*
- *Artists make all different kinds of art, including 3-D art that stands up by itself.*
- *Engineers study how things work, and then design and make things that help people.*
- *Something that both artists and engineers have to know about it is how things are put together and how they stand up.*
- *The strong frame inside a person (skeleton), a work of art, a building, or even a thing like an umbrella is called its structure.*
- *What structure holds up our table? What structure holds up the lampshade? What helps it stand up?*
- *A sculpture is a work of art that we can walk all the way around, like a statue.*
- *Let's see if we can figure out what structures might be holding up these sculptures.*

Introduce and guide art analysis of *Schubert's Sonata* by Mark Di Suvero from the Seattle Art Museum collection and *Blanket Stories: Transportation Object, Generous Ones, Trek* by Marie Watt from the Tacoma Art Museum collection. Look for visual clues that suggest how the sculptures might be being supported.

☐ Try asking a student or two to make their bodies into the shapes of the sculptures to explore kinesthetically how the sculptures are being supported.



☐ The Seattle Art Museum's collection is available on-line at: <http://www.seattleartmuseum.org/emuseum/code/collection.asp>. To find the images in this lesson, enter the accession number for the work of art in the search box on the collections page of SAM's website. Accession numbers for these works of art are listed in the materials box at the beginning of the lesson.



☰ The Tacoma Art Museum's collection is available on-line at:
<http://tacomaartmuseum2.tru-m.com/Page.aspx?nid=128>

Criteria-based process assessment: Analyzes sculptures for structure.

3. Introduce *Lady Wearing an Eboshi, on High Geta and Holding an Umbrella* by Utagawa Toyokuni and *Headdress (Okeneken)* by an anonymous Ijebu artist from Nigeria from the Seattle Art Museum collection. Explore the structure of an umbrella through works of art and in real life.

☐ First show the works of art of umbrellas and then a real umbrella or parasol to explore the structure.



- *An umbrella or parasol is a structure that protects us from the sun.*
- *What do you notice about the umbrellas in these two works of art?*
- *What can you tell me about the structure of an umbrella by looking at these two works of art?*
- *Let's look at this real umbrella. What more can you find out about the structure of the umbrella? What makes it stay open?*

☑ Criteria-based process assessment: Reflects on the structure of umbrellas as an engineer.

4. Guide an exploration with photos of umbrellas/parasols from China and Ghana. Introduce concept of warm and cool colors, and visual excitement through warm and cool color contrast.

▣ Show images of Chinese and Ghanaian umbrellas that are used to protect people from the sun more than rain.



<http://www.thebeijinger.com/forum/2012/05/26/where-buy-high-quality-quintessentially-chinese-decorated-traditional-paper>

- *In China and other parts of Asia, people have been making special umbrellas out of silk and oiled paper for a long time.*
- *We call these kinds of umbrellas "parasols." Parasol comes from the Italian words 'parra' (shield from) and 'sol' (the sun). How can an umbrella shield us from the sun?*
- *In Ghana, West Africa, the Asante people also use umbrellas to shield their leaders from the sun.*

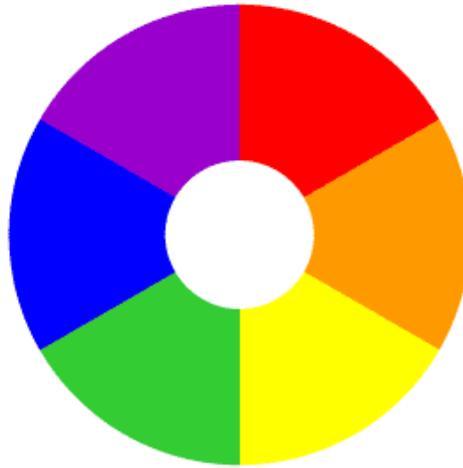


http://www.britishmuseum.org/research/online_research_catalogues/ag/asante_gold_regalia/catalogue_image.aspx?image=orcs_ag_plate6.jpg&retpage=34141&catparentPageId=33914

- Which colors do you see in these umbrella and parasols from China and Ghana?

☐ Show color wheel to help children find warm and cool colors in the art and around the room.

COOL COLORS WARM COLORS



- Artists call yellow, red and orange – the colors that are found in hot things in nature like fire – warm colors.
- We call blue, green and violet – the colors that are found in cool things in nature like water and ice – cool colors.
- Can you point to a warm color in the pictures? Can you point to cool color?

Criteria-based process assessment: Identify warm and cool colors.

5. Guide color and liquid watercolor explorations, then painting the sunshade circles with warm and cool colors.

☐ Hand out large coffee filters, liquid watercolors in palettes or small cups, pipettes, and a water cup between every two students for rinsing out pipettes between colors. Each child should get 1 coffee filter on which to practice, and then 1-2 more on which to try different designs for their sunshade. In the end, each child will choose one of their painted circles for their sunshade.

- We are going to make our sunshades out of large circles of special paper that lets a little but not a lot of light through, like a lampshade or parasol.
- The paper is very absorbent, which means it will soak up the paint and let it spread out a little. That means you only have to put a little bit of paint on it. Then, watch what the colors do!
- Every time you want to change colors, put your pipette into the water and squeeze some water in and out of it a couple of times so it is clean when you put it in the next color.
- If you want to paint your design so it is the same all around the circle, you could start by folding your paper circle through the circle to make a pie-shaped folded up circle.

- *Like the artists in Ghana and China, we are going to use both warm and cool colors on our sunshades. When you put warm colors next to cool colors it makes a work of art exciting to look at!*
- *Artists and engineers practice with materials to figure out what they can do with them. On your first circle, practice using both warm and cool colors. Then make one or two more circle paintings with warm and cool colors.*
- *Will you make a design with your colors? Lines? Dots? Shapes?*

Criteria-based teacher checklist: Uses warm colors (red/yellow/orange) and cool colors (blues/green/violet).

LESSON STEPS

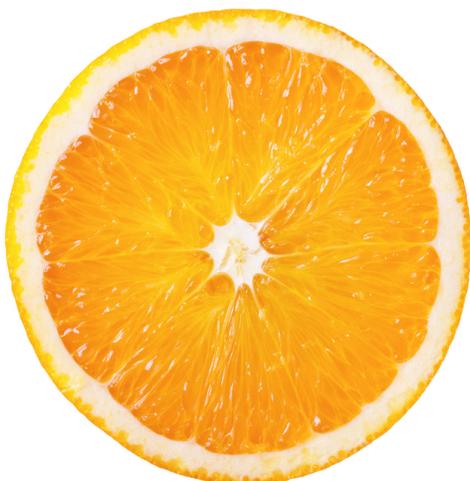
Day Two

▣ Before class, make copies of the 8-pie circle template from the lesson to help students line up their cardboard strips radially. Also, cut 1" notches at the tops of the cardboard tubes, and fold them down so they fan out from the handle to glue securely to the radial strips to reinforce the structure and act as a handle for the sunshade.

1. Introduce the concept of radial structure. Look for examples of radial structure in nature and human-made objects.

▣ Bring back the real umbrella to examine as you introduce radial design.

- *Let's look again at the umbrella. What did we discover before about the structure that holds it open?*
- *A name that both artists and scientists use to describe a design like that, in which the lines all connect in the center, is radial design.*
- *Where can you find radial designs in our classroom? Outside? During snack?*





Criteria-based process assessment: Identifies radial structures in our environment, natural and human-made.

2. Help students create the radial structure of their sunshades. Then help students glue painted sunshades to radial structures, attaching shaft in the center.

Show students how to use the 8-pie circle template in the back of the lesson to help them line up their cardboard strips radially. Then glue the strips together in the center with Elmer's or Tacky glue.

- *The other day we made the painted circles that will be the top of our sunshades. We each get to choose our favorite one of the circles we painted for our sunshade.*
- *Today we're going to make the structures that hold our sunshades underneath.*
- *Like the other circular objects we just explored, the structure for our circular sunshade will have a radial design, in which the lines all connect in the center.*
- *I taped some circles with lines on them to the table. What makes the lines have a radial design?*
- *Lay down each one of the strips of your cardboard on one line that crosses your circle, crisscrossing each other in the middle.*
- *When all your lines are crisscrossing in the middle of your circle, ask a teacher to help you glue them together in the middle.*

Teacher may want to add a staple or two to the center to keep the strips secure while they dry.

- *Once you've made your radial structure, put glue stick on each arm of the structure and glue it to your sunshade circle.*
- *You get to make your sunshade into either a hat or a parasol. Which will you choose?*
- *If you are making a hat, we need to attach a paper bowl to the center and put some strings on it to tie it on. If you are making a parasol, we need to attach a handle where all the lines crisscross.*

Criteria-based teacher checklist: Describes and builds a sunshade with equal length spokes that cross in the center.

3. Guide students testing sunshades for effectiveness.

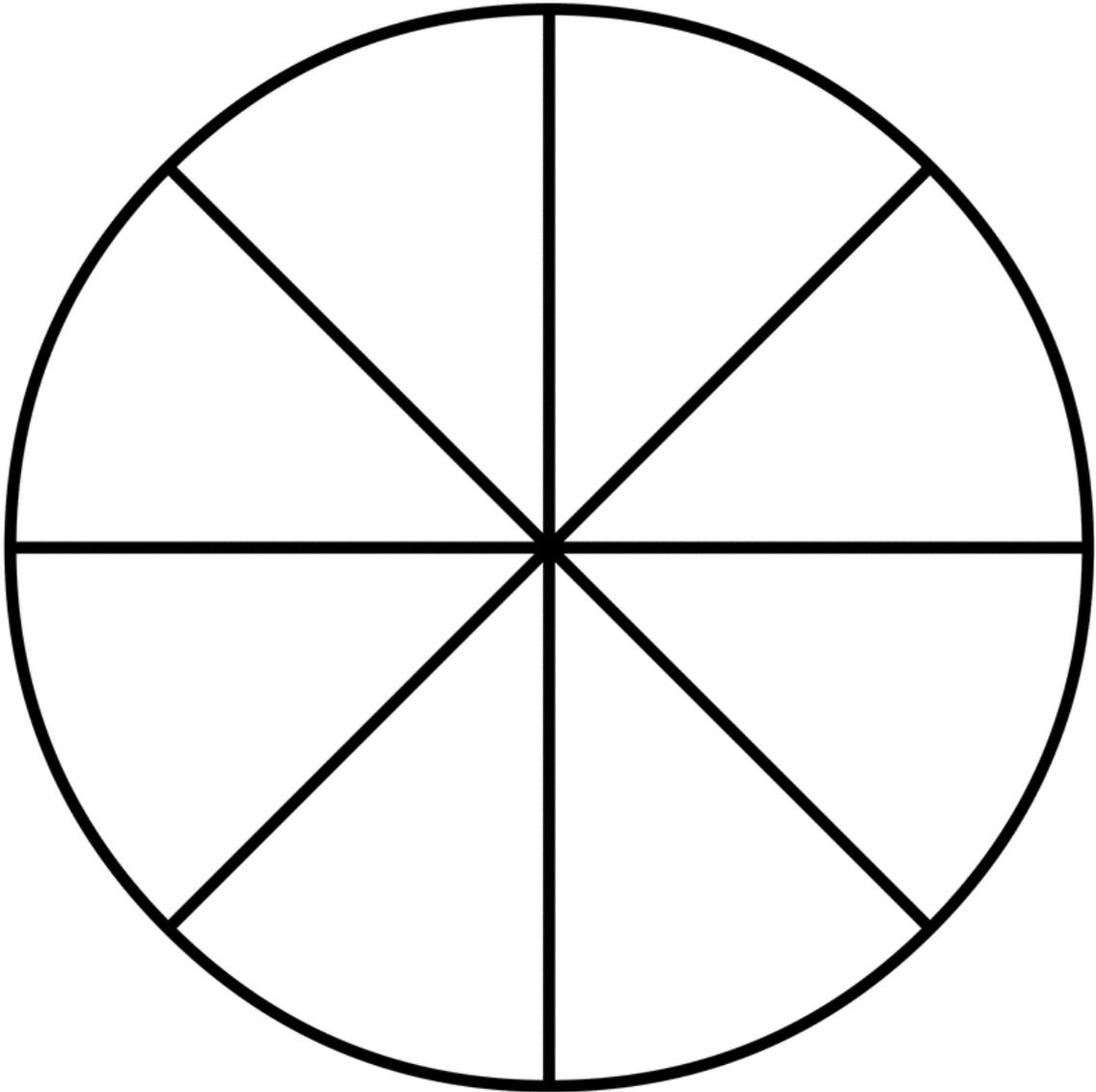
- *We want our sunshades to stay open so they can protect us from the sun.*
- *How can we test our sunshades to see if they can stay open?*
- *How does the handle or bowl help our structure stay strong?*
- *Do you need to make any changes to the structure of your sunshade to make it even stronger?*
- *How will we figure out if they can keep us cool in the sun?*

Criteria-based teacher checklist: Tests a sunshade for strength, and reinforces if necessary.

4. Guide group reflection and have a parasol parade!

- *What a marvelous group of warm and cool colored sunshades!*
- *Can you show a friend your favorite part of your sunshade?*
- *Where did you use warm colors? Where did you use cool colors?*
- *How do you know that the radial structure of your sunshade is strong?*
- *You just presented and talked about your work at artists, scientists, and engineers!*

Criteria-based reflection: Reflects with the whole class on warm and cool artistic color choices and radial structure.



ARTS IMPACT LESSON PLAN Arts Infusion

Warm and Cool Sunshades

CLASS ASSESSMENT WORKSHEET

Disciplines	VISUAL ARTS	VISUAL ARTS/ENGINEERING/SCIENCE		Total 3
Concept	Color	Artistic Engineering: Radial Structures		
Criteria	Uses warm colors (red/yellow/orange) and cool colors (blues/green/violet).	Describes and builds a sunshade with equal length spokes that cross in the center.	Tests a sunshade for strength, and reinforces if necessary.	
Student Name				
1.				
2.				
3.				
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14.				
15.				
16.				
17.				
18.				
19.				
20.				
Total				
Percentage				

What was effective in the lesson? Why?

What do I want to consider for the next time I teach this lesson?

What were the strongest connections between visual arts and science & engineering?

Teacher: _____

Date: _____

VISUAL ARTS, SCIENCE, AND ENGINEERING LESSON: *Warm and Cool Sunshades*

Dear Family:

Your child participated in an **Arts, Science, and Engineering** lesson. We learned how radial sunshades (umbrellas, parasols, etc.) work, and we made our own!

- We analyzed different sculptures to figure out what made them stand up.
- We explored umbrellas and parasols in art from Nigeria and Japan and real umbrellas to try to figure out what makes it stay open.
- We learned about warm colors (yellow, red, orange) and cool colors (blue, green and violet) and found them in umbrellas and parasols from China and Ghana. We noticed that when artists put warm colors near cool colors it makes a visually exciting design.
- We painted our own sunshades with warm and cool colors.
- We learned that the kind of structure in which lines crisscross in the center of a circle is called a radial design.
- We made our own radial structures for our sunshades by crisscrossing cardboard strips through the center of the circle of our sunshade circles.
- Then, just like engineers, we tested our finished sunshade to make sure they would stay open and protect us from the sun.

At home, you could look for more examples of radial designs, and you could continue to explore structures in furniture and your house.

Enduring Understanding

Sunshades can keep us cool from the sun. Radial structures can support circular forms. Using warm and cool colors next to each other can create visual excitement.