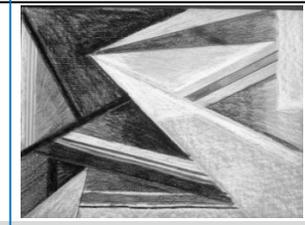


Visual Arts and Math Infused Lesson

Lesson Three: *Depth in Space: Angles, Lines, and Values*

Author: Meredith Essex Grade Level: Fourth



Enduring Understanding

Angles, parallel lines, perpendicular lines, and value can be combined to suggest depth in composition.

**Lesson Description** (Use for family communication and displaying student art)

*Students practice drawing using rulers and black and white drawing tools on gray paper. Students then identify acute, obtuse, and right angles and parallel and perpendicular lines in art. Use of overlapping and converging diagonal lines to create depth in space is analyzed, as well as the use of different values. Students organize and draw a composition including acute, obtuse, and right angles and parallel and perpendicular lines. Additional angles and lines as well as light, medium, and dark values are added to enhance the illusion of depth in space.*

Learning Targets and Assessment Criteria

**Target:** Makes acute, obtuse, and right angles.

**Criteria:** Identifies and draws rays with common endpoint with arcs less than, greater than, and equal to 90°.

**Target:** Creates the illusion of depth in space.

**Criteria:** Draws overlapping converging, parallel, and perpendicular lines.

**Target:** Uses craftsmanship in drawing.

**Criteria:** Uses a ruler to draw lines and creates areas of value clearly between lines.

**Target:** Uses a range of value in composition.

**Criteria:** Draws areas of light, medium, and dark tones.

Vocabulary	Materials	Learning Standards
<p><b>Arts Infused:</b>                      Angle                      Diagonal                      Parallel                      Perpendicular</p> <p><b>Math:</b>                      Acute angle                      Endpoint                      Horizontal                      Obtuse angle                      Ray                      Right angle                      Vertical</p> <p><b>Arts:</b>                      Abstract                      Composition                      Converging line                      Craftsmanship                      Depth                      Gradation                      Overlapping                      Space                      Tone                      Value</p>	<p><b>Museum Artworks or Performance:</b></p> <p><b>Seattle, WA</b>                      Seattle Art Museum</p> <p><b>Tacoma, WA</b>                      Tacoma Art Museum</p> <p><b>Materials</b>                      Rulers; Protractors; Soft colored pencils: white and black; Conté crayons: white and black; Gray charcoal paper: 3x4" (practice) and 9x12" (final composition); Tortillions; Chamois cloths; Arts Impact sketchbooks; Class Assessment Worksheet</p> <p><b>Connections</b>  <i>Everyday Mathematics</i>                      1.2 – Points, Line Segments, Lines and Rays                      1.3 – Angles, Triangles, and Quadrangles</p> <p><i>continued</i></p>	<p><b>WA Arts State Grade Level Expectations</b>                      For the full description of each WA State Arts Grade Level Expectation, see: <a href="http://www.k12.wa.us/Arts/Standards">http://www.k12.wa.us/Arts/Standards</a></p> <p>1.1.1 Elements: Line                      1.1.2 Elements: 2-D shape                      1.1.3 Elements: Value                      1.1.5 Elements: Space                      1.1.7 Principles of Design: Emphasis, movement                      1.2.1 Skills and Techniques: Drawing                      2.1.1 Creative Process                      2.3.1 Responding Process                      4.2.1 Connection between Visual Arts and Math</p> <p><b>Early Learning Guidelines (Pre-K – Grade 3)</b>                      For a full description of Washington State Early Learning and Child Development Guidelines see: <a href="http://www.del.wa.gov/development/guidelines/">http://www.del.wa.gov/development/guidelines/</a> (Age 4-5) 6. Learning about my world: Math: Match and sort simple shapes; Follow simple directions for position. Arts: Show creativity and imagination.</p> <p><i>continued</i></p>

Seattle Art Museum images:

*Boundry*, 1951, John Paul Jones, 69.284



*The Temptation of St. Anthony, #2*, 1919,  
John Covert, 59.146



### Common Core State Standards (CCSS) in Math

For a full description of CCSS Standards by grade level see:  
<http://www.k12.wa.us/CoreStandards/Mathstandards/>

4.G.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

4.G.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

### CCSS Mathematical Practices

MP 4. Model with mathematics.

MP 5. Use appropriate tools strategically.

MP 6. Attend to precision.

MP 7. Look for and make use of structure.

### ICON KEY:

-  = Indicates note or reminder for teacher
-  = Embedded assessment points in the lesson

### Pre-Teach

Sketchbook Activity: Search for and, using a ruler, draw right, acute, and obtuse angles seen in the classroom. Also using a ruler, experiment with drawing parallel and perpendicular oriented in different directions.

### Lesson Steps Outline

#### Day One

**1.** Warm-Up: Guide students to practice making lines and tones with drawing tools: black and white colored pencils and conté crayons plus protractors and rulers.

 Criteria-based process assessment, room scan: Practices with drawing tools and materials.

**2.** Introduce and guide art and math analysis of *Boundry* by John Paul Jones and *The Temptation of St. Anthony* by John Covert from the Seattle Art Museum collection. Discuss angles, parallel and perpendicular lines, and value with emphasis on how they are combined to create depth in space.

**3.** Demonstrate and guide using black and white pencils and a ruler to draw angles with focus on craftsmanship. Emphasize abstraction in drawings.

 Criteria-based teacher checklist and peer assessment: Identifies and draws rays with common endpoint with arcs less than, greater than, and  $90^\circ$ .

## **Day Two**

**1.** Demonstrate and guide placing parallel and perpendicular lines to suggest depth in space.

Criteria-based teacher checklist and peer assessment: Draws acute, obtuse, and right angles. Draws overlapping converging, parallel, and perpendicular lines.

**2.** Demonstrate and guide adding value to composition to enhance the illusion of depth with further reference to art examples. Emphasize using both white and black Conté crayons to create light, medium, and dark (or more) values in addition to the gray of the paper.

Criteria-based teacher checklist: Draws areas of light, medium, and dark tones.

**3.** Guide criteria-based self assessment for craftsmanship.

Criteria-based teacher checklist: Uses a ruler to draw lines and creates areas of value clearly between lines.

**4.** Guide criteria-based group reflection.

Criteria-based group reflection: Analyzes depth in space, line, and value. Describes placement of angles, parallel lines, and perpendicular lines in compositions.

## LESSON STEPS

### Day One

**1. Warm-Up: Guide students to practice making lines and tones with drawing tools: black and white colored pencils and Conté crayons plus protractors and rulers.**



Responding to Art in the Classroom

- *On this small practice paper, make acute, obtuse, and right angles using your protractor or ruler and the colored pencils. Spread your fingers out, anchor your ruler down, and press hard so it cannot slip.*
- *Now practice making parallel and perpendicular lines.*
- *Conté crayons are soft: they are excellent for creating light, medium, and dark values (shading). Practice pressing hard and light to create different values with white and black. Also, try creating value using the white and black colored pencils.*



▣ Have student set drawing tools aside for use later (after analyzing artworks).

Criteria-based process assessment, room scan: Practices with drawing tools and materials.

**2. Introduce and guide art and math analysis of *Boundry* by John Paul Jones and *The Temptation of St. Anthony* by John Covert from the Seattle Art Museum collection. Discuss angles, parallel and perpendicular lines, and value with emphasis on how they are combined to create depth in space.**



Responding to Art in the Classroom



▣ 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.

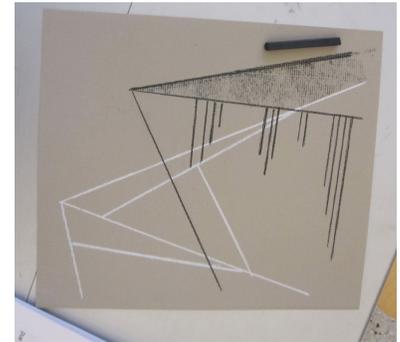
- Notice the rays/lines and angles in these works of art. Find an acute, obtuse, and right angle in each and share your findings. Now find places where you see parallel and perpendicular lines in each and share your findings.
- Do you think the artist used math tools (ruler, protractor) to make this art? Why?
- Do these pictures seem flat, or do they show depth in space? What did the artist do that created the sense of parts being closer and parts being farther away?
- Do these artworks have colors, or do we see mostly shades or tones of gray? Value is a word for "shading". How does value used in the art help to create depth?

### 3. Demonstrate and guide using black and white pencils and a ruler to draw angles with focus on craftsmanship. Emphasize abstraction in drawings.



Drawing with a Ruler

- Using math tools helps us be more precise and use good craftsmanship. Craftsmanship means care, thought, and time invested in our art.
- We are going to combine angles, lines, and value to create an artistic composition that shows depth in space. We are not concerned about making a realistic picture of something—our work will be abstract.
- In white or black pencil, draw a point somewhere in the upper left or right corner.
- Draw three diagonal lines/rays that begin at that point and reach towards the bottom and sides of your paper. What kinds of angles do they form? Add some lines between them for obtuse and right angles.
- STOP and LOOK: Switch papers with a partner and check for acute, obtuse, and right angles.



Criteria-based teacher checklist and peer assessment: Identifies and draws rays with common endpoint with arcs less than, greater than, and  $90^\circ$ .

## Day Two

### 1. Demonstrate and guide placing parallel and perpendicular lines to suggest depth in space.

- *Look at the space above or around your diagonal lines and add some parallel and perpendicular lines behind the rays/shapes that you have drawn. We are creating depth through overlapping and by using diagonal lines that converge.*
- *Add some more lines—they might be more converging lines/rays that make angles between some of your first lines. Also, make sure you have all three types of angles somewhere in your drawing.*
- *STOP and LOOK: Switch papers with a partner and check for acute, obtuse, and right angles and parallel and perpendicular lines in their composition. Use a protractor or the corner of a paper (for right angles) to check.*

Criteria-based teacher checklist and peer assessment: Draws acute, obtuse, and right angles. Draws overlapping converging, parallel, and perpendicular lines.

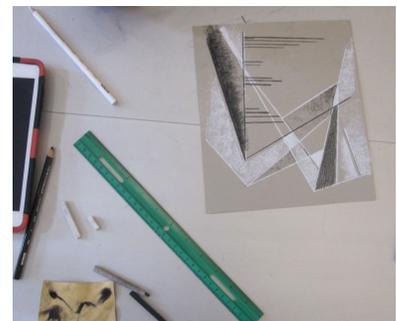
### 2. Demonstrate and guide adding value to composition to enhance the illusion of depth with further reference to art examples. Emphasize using both white and black Conté crayons to create light, medium, and dark (or more) values in addition to the gray of the paper.

- *In the art that we have studied, dark and light values are placed together in ways that really show depth. Think about creating this effect in your own art. In The Temptation of St. Anthony, which direction do you think light is coming from? How can you tell?*



Prompting for Creativity

- *Value can also be gradated: gently change from light to dark or the opposite through gradually changing pressure. Experiment with this effect.*
- *Thoughtfully, making sure to use light, medium, and dark values, add areas of Conté crayon and black or white pencil to your drawing. Where are you placing light values next to dark values? Are they creating depth? Also, make sure that your value does not cover up any your mathematical lines.*
- *STOP and LOOK: Switch papers with a partner and talk about where you see light, medium, and dark values in their art. Notice where they could enhance the effects of depth through adding more value or lightening or darkening areas. You can also talk about rotating the paper to change its orientation if one way suggests more depth than another.*



- *Refine your art based on feedback from your partner. Decide which orientation shows the most depth, and sign in the lower right corner in pencil.*

Criteria-based teacher checklist: Draws areas of light, medium, and dark tones.

### 3. Guide criteria-based self assessment for craftsmanship.

- *Check for craftsmanship. Are your lines straight and clearly visible?*
- *Have you clearly added value to areas of your composition without losing the effect of your lines?*

Criteria-based teacher checklist: Uses a ruler to draw lines and creates areas of value clearly between lines.

---

### 4. Guide criteria-based group reflection.

- *Look at all of our work as a group. Where do you see depth in space? Describe the ways that other artists used line and value to create that effect.*
- *Notice the different ways that artists placed angles and parallel and perpendicular lines. How does that change the composition?*



Guiding Reflecting on Student Art

Criteria-based group reflection: Analyzes depth in space, line, and value. Describes placement of angles, parallel lines, and perpendicular lines in compositions.

---

### **Everyday Mathematics Extensions:**

Unit 10–Reflection and Symmetry

---

**ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion**

Fourth Grade Lesson Three: *Depth in Space: Angles, Lines, and Values*

Teachers may choose to use or adapt the following self-assessment tool.

**STUDENT SELF-ASSESSMENT WORKSHEET**

Disciplines	VISUAL ARTS AND MATH		VISUAL ARTS		Total
Concept	Angles	Rays/ Space	Craftsmanship	Value	4
Criteria	Identifies and draws rays with common endpoint with arcs less than, greater than, and equal to 90°	Draws overlapping converging, parallel, and perpendicular lines	Uses a ruler to draw lines and creates areas of value clearly between lines	Draws areas of light, medium, and dark tones	
Student Name					

**ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion**

Fourth Grade Lesson Three: *Depth in Space: Angles, Lines, and Values*

**CLASS ASSESSMENT WORKSHEET**

Disciplines	VISUAL ARTS AND MATH		VISUAL ARTS		Total 4
	Concept	Angles	Rays/ Space	Craftsmanship	
Criteria	Identifies and draws rays with common endpoint with arcs less than, greater than, and equal to 90°	Draws overlapping converging, parallel, and perpendicular lines	Uses a ruler to draw lines and creates areas of value clearly between lines	Draws areas of light, medium, and dark tones	
Student Name					
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					
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 math?*

Teacher: \_\_\_\_\_

Date: \_\_\_\_\_

VISUAL ARTS AND MATH LESSON: *Depth in Space: Angles, Lines, and Values*

---

Dear Family:

Today your child participated in a two-part **Arts and Math** lesson. We looked at two artworks with many precisely drawn angles, and parallel and perpendicular lines in them. We identified acute, obtuse, and right angles. We also noticed how both of the artists created the illusion of depth in their compositions. We created our own composition suggesting depth by combining mathematical lines and angles and areas of light, medium, and dark.

- We practiced drawing using rulers and black and white colored pencils and conté crayon drawing tools on gray paper. We made different kinds of angles and parallel and perpendicular lines.
- We identified acute, obtuse, and right angles and parallel and perpendicular lines in art.
- We also talked about how overlapping and converging diagonal lines are used to create depth in space, as well as the use of different values (shading).
- We organized and drew a composition including acute, obtuse, and right angles, and also parallel and perpendicular lines.
- We added additional angles and lines and light, medium, and dark values to enhance the illusion of depth in space within our compositions.

At home, you could encourage your child to draw and label different kinds of angles using a protractor and ruler. Together, you could draw buildings, maps, or mazes using angles and parallel and perpendicular lines. You could notice ways that lines, shapes, and values are used to create the illusion of depth in artwork or advertising.

### **Enduring Understanding**

Angles, parallel lines, perpendicular lines, and value can be combined to suggest depth in composition.