ARTS IMPACT—ARTS-INFUSED INSTITUTE LESSON PLAN (YR2-AEMDD)
LESSON TITLE: Mapping Angles from Above
Visual Art and Math Lesson

Artist-Mentor – Meredith Essex   Grade Level: Fifth Grade
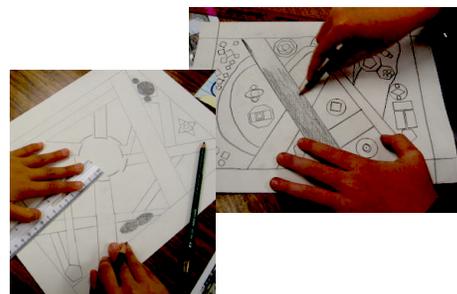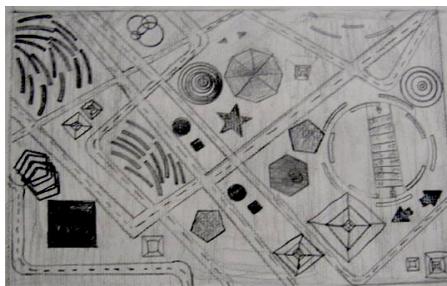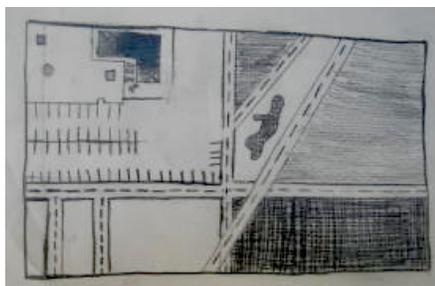
Enduring Understanding
Streets seen from above can be intersections of lines creating right, acute, and obtuse angles.

Target: Recognizes parallel, perpendicular, and oblique lines in art, maps and aerial photos.
   Criteria: Identifies equidistant lines and lines that intersect to make right, acute, or obtuse angles.

Target: Uses parallel lines.
   Criteria: Draws equidistant lines to create streets and a map border.

Target: Creates a bird's eye view of a city neighborhood.
   Criteria: Make right, acute, and obtuse angles for streets and building shapes.

Target: Makes lines that are straight and even.
   Criteria: Uses straightedge and templates to enhance craftsmanship.

Target: Adds tones and patterns to define city elements.
   Criteria: Uses distinct light, dark and medium values and repeated sequences of lines.

Teaching and Learning Strategies
Introduction to Arts-Infused Concepts through Classroom Activities:

Arts-Infused Concepts: Parallel and Perpendicular Lines; Right, Acute and Obtuse Angles
- Organize wooden blocks/pattern blocks, rulers, and yardsticks to represent a city neighborhood grid, view and draw from above.
- Go on a school walk and notice the different intersections of lines and the angles they make.
- Find parallel, perpendicular, vertical and horizontal lines.
- Mapping: Study *Google Earth* and other maps.
- Bird's eye view: find and discuss examples of different points of view.

1. **Reviews parallel, perpendicular and oblique lines. Reviews/introduces right, acute, and obtuse angles.** *Prompts: I'm going to use strips of paper on the overhead or whiteboard. I'm going to change the relationships of lines. Here are two vertical lines. What is their relationship? (parallel) I'm going to move one. Where do I have to move it to make the lines perpendicular? What type of angle did I just make? (right angle) Now I'm going to intersect the lines, making one line diagonal/oblique. What types of angles do you see? (acute angle; obtuse angle). In your Geometry Search Journal, draw*

parallel and perpendicular lines. Label a right angle. Make oblique lines which intersect and label acute and obtuse angles.
Student: Identifies, draws, and labels parallel, perpendicular and intersecting lines; right, acute, and obtuse angles.
Embedded Assessment: Criteria-based teacher checklist

2. **Introduces Wayne Thiebaud's *Diagonal City*.** *Prompts: What do you see? What materials did the artist use to make his art?* (graphite pencil and paper) *There are different types of lines that work together in this drawing? What line relationships are there?* (parallel; perpendicular, and intersecting line) *Where do you see angles? What kinds of angles do you see? Where do you see different areas of tone (light-to dark) What point of view do we see here?*
Student: Identifies parallel and perpendicular lines; identifies right, acute, and obtuse angles.

3. **Introduces maps and aerial photographs showing a bird's eye viewpoint. Demonstrates creating a border and mapping streets and using lines and angles to show intersections.** *Using right, acute, and obtuse angles can show an intersection of streets as seen from above. We want to imagine a city or a neighborhood. Pretend you're in a helicopter or flying above your city like a bird. We want to show how people in your city or neighborhood are going to get around using streets. We need good traffic flow: no collisions. You need to get from point A to point B in the quickest possible ways. (diagonal/oblique lines) Make the streets for your City Street Plan. You could show a larger street by creating parallel lines for streams of traffic moving in two directions. Discuss why cities use one-way streets as well. I have lined up the edge of my ruler with the edge of my paper and drawn a light line parallel to all four edges. Notice how I am using my 2H pencil, which is the very lightest, to draw in my street system. Once I have established the flow of traffic I am starting to show the tops of buildings, trees and other features as seen from above just like looking at a map. Remember that a bird's eye view is different than a side view of buildings and trees.*
Student: Analyzes using a bird's eye viewpoint, observes demonstration.

4. **Guides students as they create a bird's eye view of a city showing streets and roads** using parallel and perpendicular lines, right, acute and obtuse angles. *Prompts: We're going to lay down some perpendicular lines, some parallel lines, and intersecting lines to create three kinds of angles: right, acute and obtuse. Once you have your streets mapped in notice the shapes of your city blocks between the streets: if your streets are straight, you have polygons. How about triangles? Can you classify them—are they right, acute, obtuse? Keep building your street system until you reach the edges of your border. You may want to include some open spaces, negative space. As you draw your lines don't forget to use tools—the straightedge/ruler, and template tools for creating curved lines and other shapes/figures. Self-check to make sure that your lines are precise, straight and even.*
Student: Makes a city street plan.
Embedded Assessment: Criteria-based teacher checklist; criteria-based self-assessment

5. **Demonstrates and guides students in adding areas of tone or line pattern to further define the components of their city.** *Prompts: Note that you have four different drawing pencils: 2H which we started with is the hardest and 6B is the softest and darkest, the others are in between. Experiment! Think about how you can fill an area with a tone of gray and another with a lighter or darker tone of gray in order to lend definition to your map. Work to control the pressure and direction of your pencil; you may want all of your roads to be the same tone of gray. Add patterns of lines: repeating, straight, curved, or zigzag to define areas like rooftops or tree tops.*
Student: Create building entry design.
Embedded Assessment: Criteria-based teacher checklist

6. **Facilitates criteria-based reflection. Displays city maps on the board**. *Prompts: Draw and label a portion of the streets seen in a peer's map that show acute, right and obtuse angles. Draw and compare the properties/attributes of polygons you see in the negative space between streets in the maps. Describe the challenges of using the tools What kind of realizations did you have about mapping from above instead of looking at city features from the ground?*
Student: Participates in critique
Embedded Assessment: Criteria-based class critique; criteria-based peer critique
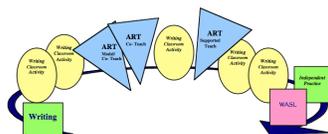
BEFORE next VISUAL ART lesson:
Math Centers
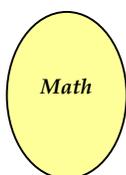
Math   1. Create a map of neighborhood using parallel and perpendicular lines.
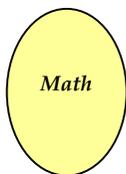
Math   2. Highlight (with pens) and classify polygons and triangles found on old city maps.

**Independent Practice: Hand draw it! Draw it on paper! A "cute" angle--less than 90˚.*9 An* obtuse angle--more than 90˚. A right angle--exactly 90˚.*900°*

Vocabulary	Materials and Community Resource	WA Essential Learnings & Frameworks
Arts: negative space tone point of view Arts Infused: diagonal geometric shape horizontal intersecting parallel line pattern perpendicular line vertical Math: acute angle oblique line obtuse angle right angle	**Museum Artworks:** Maps, site plans, aerial photographs *Diagonal City* by Wayne Thiebaud (available for checkout through Tacoma Public Schools, part of the Take 5 Art Print Set) Google Earth model train sets blocks **Art Materials:** Geometry Search Journals 2H, 2B and 4B, 6B graphite pencils rulers shape templates white vinyl erasers or art gum erasers 6 x 9 in. OR 9 x 12 in. white drawing paper	*AEL 1.1 concepts:* geometric shape, vertical, horizontal line, tone, pattern, angles *AEL 1.1.2 principles of organization:* balance *AEL 1.2 skills and techniques:* drafting *AEL 4.2 connections between arts and other content areas:* geometry: angles *MATH GLE: 1.3.1 Understand properties of angles* **Math State Frameworks** *Grade 4: 1.3.1* Explains parallel and perpendicular lines and gives examples to demonstrate them *Grade 5: 1.3.1* Describes a 2-dimensional shape and or figure using properties including number of sides, vertices, and types of angles. *Grade 5: 1.3.2* Draws, describes, and/or labels angles, quadrilaterals, parallel and/or perpendicular lines

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LESSON TITLE: Mapping Angles from Above

ASSESSMENT WORKSHEET

Disciplines	**MATH**	**VISUAL ART AND MATH**	**MATH**			**VISUAL ART**	**VISUAL ART**		Total 8
Concept	**LINES/ANGLES**	**LINE**	**LINE**			**CRAFTSMANSHIP**	**TONE**	**PATTERN**	
Student	Identifies equidistant lines and lines that intersect to make right, acute, or obtuse angles	Draws equidistant lines to create streets and a map border	Makes right angles for streets and building shapes	Makes acute, angles for streets and building shapes	Makes obtuse angles for streets and building shapes	Makes lines that are straight and even	Uses distinct light, dark and medium values	Uses repeated sequences of lines	
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28.									
Total									
Percentage									

Criteria-based Reflection Questions: (Note examples of student reflections.)

Self-Reflection: *hat kind of realizations did you have about mapping from above instead of looking at city features from the ground?*

Peer to Peer: *Draw and label a portion of the streets seen in a peer's map that show acute, right and obtuse angles. Draw and compare the properties/attributes of polygons you see.*

Thoughts about Learning:

Which prompts best communicated concepts? Which lesson dynamics helped or hindered learning?

Lesson Logistics:

Which classroom management techniques supported learning?

Teacher: _____ Date: _____

Fifth Grade—Visual Art and Math—Mapping Angles from Above

ARTS IMPACT—ARTS-INFUSED LEARNING FAMILY LETTER

VISUAL ART AND MATH LESSON – Mapping Angles from Above

Dear Family:

Today your child participated in a **math and art** lesson. We designed and made city street plans.

- We looked at Wayne Thiebaud's *Diagonal City.* We found places where the artist used **parallel lines**, **perpendicular lines**, and **oblique** (diagonal) **lines** that **intersect.** We analyzed the drawing and found three kinds of **angles** used by the artist: **right angles** (making an 'L', 90 degrees), **acute angles** (those smaller than 90 degrees that seem sharp and pointed), and **obtuse angles** (angles larger than 90 degree right angles).

- We reviewed how to draw parallel, perpendicular, and oblique lines and learned how to intersect those lines to make right, acute, and obtuse angles.

- We thought about our city streets plan and the kinds of streets we wanted to create for our city. We drew parallel, perpendicular, and oblique lines. We talked about the open space (**negative space**) in areas in between our lines drawn for streets. Some of our negative space was shaped like **triangles**, or other **straight-sided polygon shapes/figures**.

- We used a **straightedge** and **templates** to makes lines that are straight and even. We also added **tones** and **patterns of lines** to define city elements.

- We included three kinds of angles in our drawing: right angles, acute angles, and obtuse.

You could point out the types of lines and angles in your own home. You could inspect your home and pretend you were architects and wanted to remodel by changing the angle of a wall.

Enduring Understanding

Streets seen from above can be intersections of lines that create right, acute, and obtuse angles.