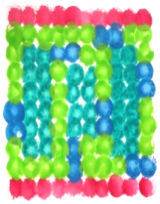
ARTS IMPACT LESSON PLAN

Visual Arts and Math Infused Lesson



Lesson Three: *Equivalent Expressions for Compositions in Color*

Author: Meredith Essex Grade Level: Seventh

Enduring Understanding

Relationships of elements in artistic compositions can be expressed mathematically using equivalent expressions.

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

Students analyze, interpret, and propose numerical expressions and equations representing works of art using estimation, fractions, percentages, and operations. Students then use equivalent numerical expressions to solve a math problem that poses guidelines for developing an artistic composition. Mathematical/artistic compositions are then mapped out using a 100s grid worksheet. Last, a final artwork guided by the worksheet and mathematical calculations is created through daubing/stamping grid squares using a narrow color palette

Learning Targets and Assessment Criteria

Target: Interprets art mathematically.
Criteria: Uses estimation, fractions, percentages, and/or operations to create a numerical expression describing areas within a composition.

Target: Creates a composition based on mathematical guidelines.
Criteria: Uses equivalent expressions to determine size of area for each color.

Target: Creates a composition in a narrow palette.
Criteria: Develops a design that is composed of four colors.

Target: Uses craftsmanship in mathematical composition.
Criteria: Stamps/daubs color precisely within each square leaving grid lines visible.

Vocabulary

Arts infused:
Grid
Pattern
Shape

Math:
Area
Equation
Equivalent Expression
Estimate
Expression
Fraction
Percentage

Arts:
Abstract
Composition
Narrow/limited palette
Nonobjective

Materials

Museum Artworks or Performance

Seattle, WA
Seattle Art Museum

Tacoma, WA
Tacoma Art Museum

Materials
Arts Impact sketchbooks; Copy paper: 8.5x11", copy 100's grid from lesson, one per student; Cardstock: 8.5x11", white, copy 100's grid from lesson, one per student; Ink stamp pads: 4 different colors; Sponge stamp: one square or circle stamp matching grid size or 4 colors of bingo daubers (8 daubers of each color); Classroom Assessment Worksheet

continued

Learning Standards

WA Arts Learning Standards in Visual Arts
For the full description of each standard, see: *http://www.k12.wa.us/Arts/Standards*

Creating (Concepts: Color, Repetition. Technique: Stamping/Daubing)
1. Generate and conceptualize artistic ideas and work.
2. Organize and develop artistic ideas and work.
3. Refine and complete artistic work.

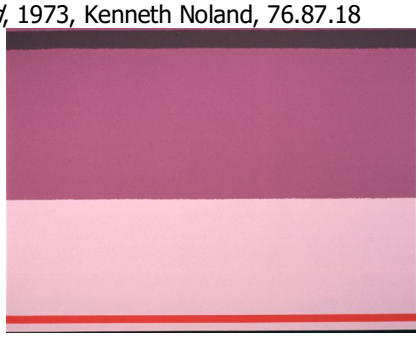
Performing/Presenting/Producing
6. Convey meaning through the presentation of artistic work.

Responding
7. Perceive and analyze artistic work.
8. Interpret intent and meaning in artistic work.
9. Apply criteria to evaluate artistic work.

Connecting
11. Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

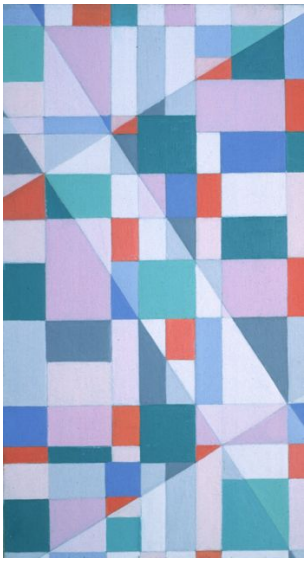
continued

Seattle Art Museum images:
Untitled, 1973, Kenneth Noland, 76.87.18



Lead-Aluminum Plain, 1969, Carl Andre, 77.10

The Terrace of Jade, 1952, Charmion von Wiegand, 56.40



Small woven bag, early 20th century, Columbia Plateau, Yakama Native American, 2013.4.17

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/*
7.EE. Use properties of operations to generate equivalent expressions.
7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*

CCSS Mathematical Practices
MP.2. Reason abstractly and quantitatively.
MP.4. Model with mathematics.
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

Review equivalent expressions. Facilitate process of sketching objects, details, or sides of buildings, textiles, or other combinations of geometric shapes, colors, textures, and/or patterns seen in the real world. Guide students in identifying multiple ways of expressing visual information they have documented using math concepts, operations, and equations.

Lesson Steps Outline

1. Introduce and guide art analysis of *Lead-Aluminum Plain* by Carl Andre. Guide students in creating a mathematical interpretation and equivalent expressions describing the art.

☑ Criteria-based teacher process assessment: Participates in math and art visual analysis.

2. Introduce the more complex artistic compositions *Untitled* by Kenneth Noland, *The Terrace of Jade* by Charmion von Wiegand, and/or *Small woven bag*, early 20th century Yakama Native American from the Seattle Art Museum collection. Lead discussion about ways to analyze and interpret this art using math concepts and expressions.

Guide student pairs in creating an equation that could represent the artwork and sharing their ideas.

☑ Criteria-based teacher checklist: Uses estimation, fractions, percentages, and/or operations to create a numerical expression describing areas within a composition.

3. Introduce the creative process of generating a composition dictated by specific artistic/mathematical guidelines. Introduce concept of narrow palette.

4. Demonstrate and guide mapping out a composition on a 100s grid worksheet that reflects a specific artistic/mathematical problem to solve. Guide students in using equivalent expressions to help identify what size each area of color will be in their composition.

☑ Criteria-based teacher checklist: Uses equivalent expressions to determine size of area for each color. Develops a design that is composed of four colors.

5. Guide students in developing a final composition (on 100s grid printed on cardstock) based on their 100s grid worksheet.

☑ Criteria-based teacher checklist: Develops a design that is composed of four colors. Stamps/daubs color precisely within each square leaving grid lines visible.

6. Facilitate peer assessment and reflection on the math and art of the learning process. Students share worksheets and final products.

☑ Criteria-based peer assessment and class reflection: Checks for math accuracy seen in worksheet and final product. Reflects on visual effects created with a narrow palette.

LESSON STEPS

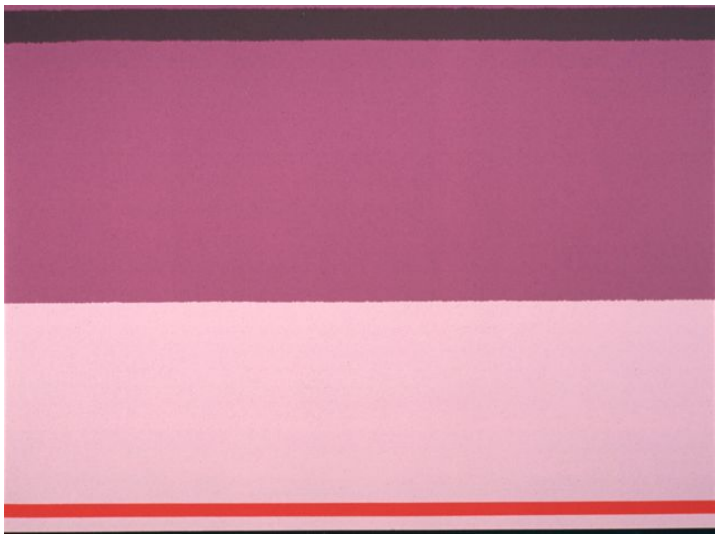
1. Introduce and guide art analysis of *Lead-Aluminum Plain* by Carl Andre. Guide students in creating a mathematical interpretation and equivalent expressions describing the art.

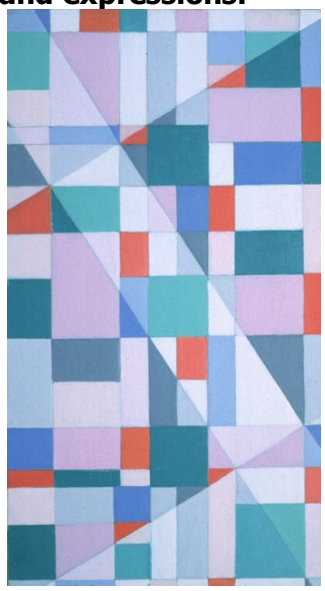
The Seattle Art Museum's collection is available on-line at: http://www.seattleartmuseum.org/emuseum/code/collection.asp. To find the images in this lesson, enter the accession number for the work of art in the search box on the collections page of SAM's website. Accession numbers for these works of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

- *In looking at the artwork, a giant checkerboard, what would be some ways that we could describe this art using mathematical expressions?*
- *If we simply looked at the number of black and gray squares, we could use 18b + 18g = the total number of equal squares in the composition.*
- *What are some other equivalent expressions we could use to describe the art?*
- *Think about its organization into alternating shapes or rows. How else could we show what we see? For instance: 6(3b + 3g) =.*

☑ Criteria-based teacher process assessment: Participates in math and art visual analysis.

2. Introduce the more complex artistic compositions *Untitled* by Kenneth Noland, *The Terrace of Jade* by Charmion von Wiegand, and/or *Small woven bag*, early 20th century Yakama Native American from the Seattle Art Museum collection. Lead discussion about ways to analyze and interpret this art using math concepts and expressions.





- *What art elements stand out most in these compositions? Shape, color?*
- *In analyzing these more complex artistic compositions mathematically, what math concepts might best describe them? Area, percentages, fractions?*

Guide student pairs in creating an equation that could represent the artwork and sharing their ideas.

- *Talk with a peer: use estimation to propose a mathematical equation/expression that could describe the art.*
- *Share your findings with the class: Talk about how you used approximate measurement or estimation in translating the composition into areas, fractions, or percentages.*

☑ Criteria-based teacher checklist: Uses estimation, fractions, percentages, and/or operations to create a numerical expression describing areas within a composition.

3. Introduce the creative process of generating a composition dictated by specific artistic/mathematical guidelines. Introduce concept of narrow palette.

- *Using our SAM artworks as inspiration, we are using a 100's grid as an artistic and mathematical structure to help us organize our artistic compositions and interpret them mathematically using area, percentages, fractions, or whole numbers.*

- *Many artists choose to use a limited palette/number of colors within a composition. They rely on the organization of their composition, the relationship of pattern or shape (rather than a broad range of color), to make their compositions interesting.*

- *In the art we have looked at, which artwork has the least number of colors, and which has the most? We will be using four colors in our own compositions.*

- *Our art and math challenge is to use very specific mathematical guidelines in the placement and size of the area of each of the four colors.*

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4. Demonstrate and guide mapping out a composition on a 100s grid worksheet that reflects a specific artistic/mathematical problem to solve. Guide students in using equivalent expressions to help identify what size each area of color will be in their composition.

Students can all be assigned the same artistic/mathematical problem to solve using equivalent expressions, or students can be assigned different possible math problems to guide development of their compositions from the list in the lesson.

- *Our artistic/mathematical problem to solve is to create a design that follows specific guidelines. What if…*

  20% of the total area of the composition is color #1and the remainder of the area of the composition is divided into three parts: ½ is color #2, ¼ is color #3 and ¼ is color #4.

- *How can we translate these guidelines into a composition on a 100 unit grid? How can equivalent expressions help us figure the amount of the total area that each color #1-#4 will fill or occupy?*

- *First of all, think about how many units are in a 10x10 grid. What are some ways that we can show this problem to solve mathematically using equivalent expressions? (for instance, for the first problem listed above: 100-20 =.5 x 80 + .25 x 80 + .25 x 80)*

- *On the bottom of the 100s grid worksheet, write the equivalent expressions that show your math thinking. Also note which color in your composition you choose to be color #1, #2, #3, and #4.*

- *Create your design by identifying the units/areas of the grid (using 100's grid practice worksheet) that will be each color (color does not need to be contiguous: guidelines reflect total area for each color). Label areas to note which color goes where.*

☑ Criteria-based teacher checklist: Uses equivalent expressions to determine size of area for each color. Develops a design that is composed of four colors.

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5. Guide students in developing a final composition (on 100s grid printed on cardstock) based on their 100s grid worksheet.

- *It is important that all grid squares are filled, yet the grid lines are still visible in our compositions. We will be using a dauber or stamp to create a color shape in each of the 100 grid squares that will form our composition.*

- *Using your practice 100s grid worksheet as a guide, now strategically use stamping/daubing to stamp a color in the units you have designated for each color.*

- *Be mathematically and artistically precise, using an up and down motion to stamp or daub.*

☑ Criteria-based teacher checklist: Develops a design that is composed of four colors. Stamps/daubs color precisely within each square leaving grid lines visible.

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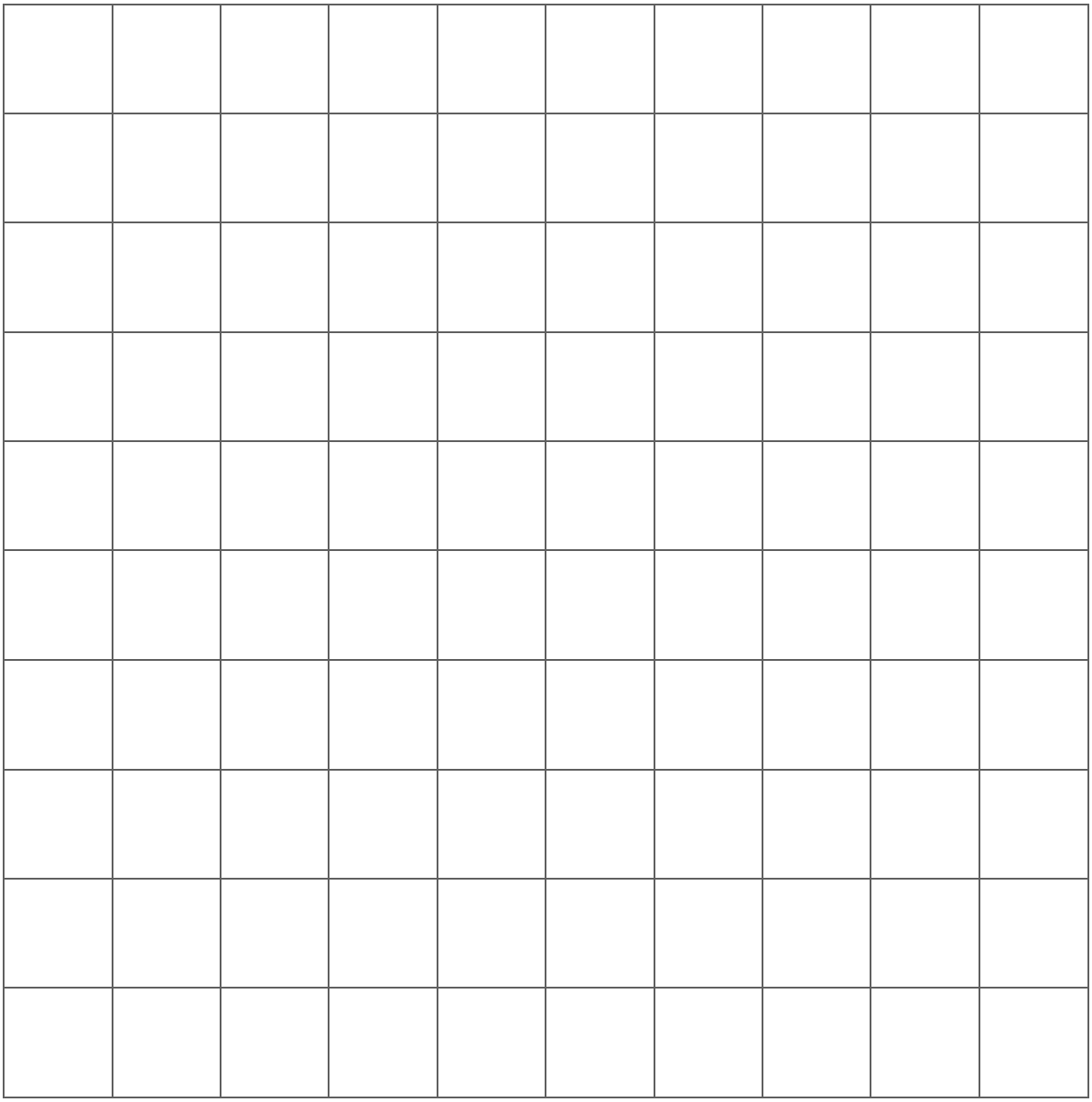
6. Facilitate peer assessment and reflection on the math and art of the learning process. Students share worksheets and final products.

- *Switch papers with a classmate and check to see that the math problem, the equivalent expressions, and the 100s grid worksheet plan all match the final composition.*

- *Describe a composition that captures your attention. How did the artist create a dynamic or interesting composition using just a few colors?*

☑ Criteria-based peer assessment and class reflection: Checks for math accuracy seen in worksheet and final product. Reflects on visual effects created with a narrow palette.



Sample artistic/mathematical problems to solve

20% of the total area of the composition is color #1: the remainder of the area of the composition is divided into three parts: ½ is color #2, ¼ is color #3 and ¼ is color #4.

Color #1 forms a border one unit wide around all edges of the 100's grid; Color #2 is a total of 24 units. Color number #3 and #4 occupy equal amounts of area within the grid.

Color #1 fills 10 units of the 100's grid; Color #2, #3 and #4 occupy equal amounts of area on the grid.

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines	**MATH AND VISUAL ARTS**		**VISUAL ARTS**		Total
Concept	**Expressions/Compositions**		**Narrow Palette**	**Craftsmanship**	4
Criteria Student Name	Uses estimation, fractions, percentages, and/or operations to create a numerical expression describing areas within a composition.	Uses equivalent expressions to determine size of area for each color.	Develops a design that is composed of four colors.	Stamps/daubs color precisely within each square leaving grid lines visible.	

ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

Seventh Grade Lesson Three: ***Equivalent Expressions for Compositions in Color***

CLASS ASSESSMENT WORKSHEET

Disciplines	**MATH AND VISUAL ARTS**		**VISUAL ARTS**		Total
Concept	**Expressions/Compositions**		**Narrow Palette**	**Craftsmanship**	4
Criteria Student Name	Uses estimation, fractions, percentages, and/or operations to create a numerical expression describing areas within a composition.	Uses equivalent expressions to determine size of area for each color.	Develops a design that is composed of four colors.	Stamps/daubs color precisely within each square leaving grid lines visible.	
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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: _____

ARTS IMPACT FAMILY LETTER

VISUAL ARTS AND MATH LESSON: ***Equivalent Expressions for Compositions in Color***

Dear Family:

Today your child participated in an **Arts and Math** lesson. We looked at art and talked about how a work of art can be analyzed and interpreted mathematically. We discussed all of the different math concepts that can frame looking at a work of art, and how we might use math to describe the relationships of elements we see in the art.

- We looked at a work of art and discussed different ways the relationship or pattern of shapes and colors within it could be described using mathematical operations and expressions.
- We looked at another more complex work of art and talked with a partner: We analyzed, interpreted, and proposed possible numerical expressions representing these works of art using estimation, fractions, percentages and operations.
- We solved a mathematical problem that presented guidelines for developing an artistic composition using a narrow palette of four colors. We used equivalent expressions to help us figure this out.
- We planned our artistic composition (using our mathematical guidelines/problem as a guide) using a 100 unit grid worksheet. The grid helped us to map out areas for the four colors artistically and mathematically.
- We used our worksheets to help us stamp/daub colors on a final 100s grid printed on cardstock.
- Last we checked the accuracy of our work with a peer and reflected on artistic choices expressed in compositions.

At home, you could generate a complex artistic composition in a broad color palette on a grid. Next you could write complex equivalent equations that express information about your composition. You could also notice and document the effective use of a narrow color palette in advertising, interiors, and exteriors of buildings, and fashion.

Enduring Understanding

Relationships of elements in artistic compositions can
be expressed mathematically using equivalent expressions.