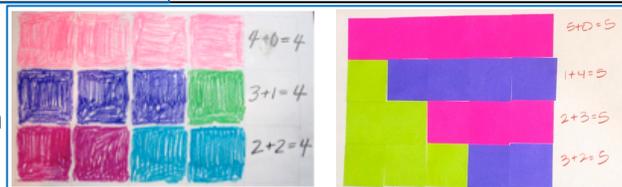


## ARTS IMPACT LESSON PLAN

### Visual Arts and Math Infused Lesson

#### Lesson Three: *Equations in Collage Quilts*

Author: Meredith Essex      Grade Level: Kindergarten



#### Enduring Understanding

Repeating shapes and colors organized in a composition can show number relationships and equations.

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

*Students show number pairs adding up to 4 through arranging objects and coloring 1-inch grid squares. Students also respond to artworks by translating them or parts of them into equations. Students work with showing number pairs adding to up to 5 using objects, and then create a collage grid composed of colored squares showing different number pairs that add up to 5. As an extension, partners and larger groups can explore counting, addition, and equivalency by combining grid collages into larger "quilts".*

### Learning Targets and Assessment Criteria

**Target:** Shows and writes equations using a grid.

**Criteria:** Fills grid squares with one color horizontally to represent a number, uses two different colors in each row below it to show pairs of numbers that add up to 4, and writes corresponding equations.

**Target:** Shows and writes equations using collage grids.

**Criteria:** Glues paper squares in one color horizontally to represent five, glues two different colors in each row below to show pairs of numbers that add up to 5, and writes corresponding equations.

#### **Extension:**

**Target:** Arranges collages to show addition and equivalency.

**Criteria:** Combines 5's collages with a partner and writes equations for a sum of 10; combines collages in group quilts and counts/writes equations.

Vocabulary	Materials	Learning Standards
<p><u>Arts Infused:</u> Above Below Beside Grid Square</p> <p><u>Math:</u> Equal Equation</p> <p><u>Arts:</u> Across Balance Collage Craftsmanship Quilt Repetition Row Up and down</p>	<p><b>Museum Artworks or Performance:</b></p> <p><b>Seattle, WA</b> Seattle Art Museum</p> <p><b>Tacoma, WA</b> Children's Museum of Tacoma Tacoma Art Museum</p> <p><b>Materials</b> <span style="border: 1px solid black; padding: 2px;">Math manipulatives</span>; small objects in different colors; White cardstock: 8.5x14", copy <span style="border: 1px solid black; padding: 2px;">grid</span> from lesson, 2 per student; Crayons; Glue sticks; Bright cardstock: 2x2" squares; Copy paper: 11x17" (optional); Arts Impact <span style="border: 1px solid black; padding: 2px;">sketchbooks</span>; Recycled magazines; glue mats; Class Assessment Worksheet</p> <p style="text-align: center;"><i>continued</i></p>	<p><b>WA Arts State Grade Level Expectations</b> <i>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></i></p> <p>1.1.2 Elements: 2-D shape 1.1.5 Elements: Space: Above, below, beside 1.1.7 Principles of Design: Repetition, balance 1.2.1 Skills and Techniques: Paper collage 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> <i>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></i> (Age 4-5) 6. Learning about my world: Math: Count out 10 items; count and group things by number; follow simple directions for position (beside, next to, between.) (Age 5 and K) 6. Learning about my world: Math: Recognize by sight and name the number of items in a group, up to five; add and subtract numbers up to 10 using objects or drawings; correctly use position words (such as beside, inside, under, etc.) to describe objects. Arts: Learn ways to create artworks; share ideas and explain own artwork to others; talk about what was done and why.</p> <p style="text-align: center;"><i>continued</i></p>

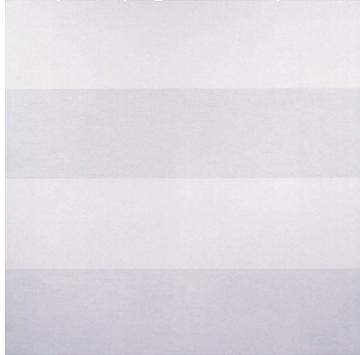
**Connections**

*Everyday Mathematics*

- 2.14 – Number Stories, Stage 1
- 4.8 – Roll and Record with Two Dice
- 4.4 – The Addition Symbol (+)
- 4.15 – Number Stories, Stage 2

Seattle Art Museum images:

*Untitled #2*, 1985, Agnes Martin, 95.39



*Blocks*, 2003, Annie Mae Young, 2005.199



**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/>

K.OA.3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation.

**CCSS Mathematical Practices**

- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

## ICON KEY:

 = Indicates note or reminder for teacher

 = Embedded assessment points in the lesson

## Pre-Teach

Guide students to write (on white boards or paper) and arrange objects to reflect simple equations/number pairs.

- *Write  $4+0=4$ . Choose four of the same kind of objects to show this equation.*
- *Write  $2+2=4$ . Choose two different colors of objects to show this equation.*
- *Write  $1+3=4$ . Choose two different colors of objects to show this equation.*

## Lesson Steps Outline

### Day One

**1.** Introduce and guide math analysis and discussion of *Untitled #2* by Agnes Martin from the Seattle Art Museum.

**2.** Discuss grid paper as a structure and tool for showing math and art ideas. Demonstrate how to show number pairs and equations adding up to four by coloring 2x2" grid squares. Guide students to color the grid squares to show the equations and then to write the equations.

 Criteria-based teacher checklist: Fills grid squares with one color horizontally to represent a number, uses two different colors in each row below it to show pairs of numbers that add up 4, and writes corresponding equations.

**3.** Guide self-assessment through group pair-share.

 Criteria-based student peer-assessment: Fills grid squares with one color horizontally to represent a number. Uses two different colors in each row below it to show pairs of numbers that add up 4. Writes corresponding equations.

## Pre-Teach

Guide students to write equations (on white boards or paper) and arrange objects to show number pairs that add up to 5.

- Write  $5+0=5$ . Choose five of the same kind of objects to show this equation.
- Write  $2+3=5$ . Choose two different colors of objects to show this equation.
- Write  $1+4=5$ . Choose two different colors of objects to show this equation.

## Lesson Steps Outline

### Day Two

**1.** Introduce and guide math analysis and discussion of *Blocks* by Annie Mae Young from the Seattle Art Museum. Note that artists use counting or a grid to make art, but choose also to change shapes and relationships to make the art more interesting.

**2.** Demonstrate selecting and arranging 2x2" pre-cut color squares to show number pairs that equal 5 in collage. Describe assessment and demonstrate gluing process.

Criteria-based teacher checklist: Glues paper squares in one color horizontally to represent five, glues two different colors in each row below to show pairs of numbers that add up to 5, and writes corresponding equations.

**3.** Extension: Guide exploration of addition and equivalency through arranging quilt pieces with partners and larger group. Record corresponding equations on the board.

Criteria-based student pair and group reflection: Combines 5's collages with a partner and writes equations for a sum of 10; combines collages in group quilts and counts/writes equations.

## LESSON STEPS

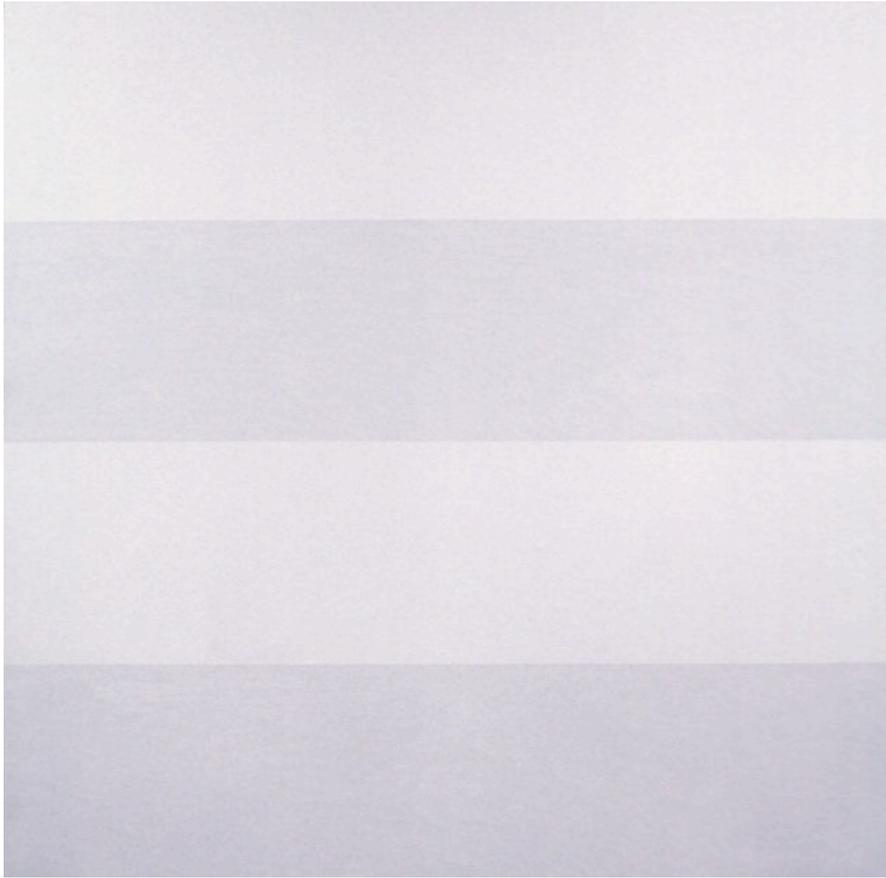
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### Day One

1. Introduce and guide math analysis and discussion of *Untitled #2* by Agnes Martin from the Seattle Art Museum.



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.

- *How many parts do we see in this painting? Are they the same size? Same color?*
- *What math equation do you think the artist used when she made this painting?*
- *Talk about your ideas with a partner and share what you think with the whole class.*
- *Write the equation that we agree on the board ( $2+2=4$ ).*

## 2. Discuss grid paper as a structure and tool for showing math and art ideas. Demonstrate how to show number pairs and equations adding up to four by coloring 2x2" grid squares.



Filling in Grid Squares

▣ Grid paper created for this lesson is intended to be used horizontally in a format similar to the paper collage equations created in the next session. The 2x2" grid paper has 20 squares, so there will be a blank row of squares up and down and across providing space to write equations.

- *Why might an artist or mathematician (math expert) need paper like this? How would it help them count, draw, add, subtract? How would it help to show equations?*
- *Now let's use color squares to show all of the pairs of number that add up to 4. Color just inside the grid lines so we can still see them.*
- *In math and art, precision and good craftsmanship are important. Color to make sure your square stays a square—that way we can read your equation with or without numbers.*
- *Just like with our objects, use one color to show 4+0 by coloring in four squares across on the top row. Then, write the equation 4+0=4 next to the line of four squares of the same color.*
- *In the next row using two new colors, (below the 4 squares next to each other representing 4+0) let's show 3+1 by coloring 3 squares beside each other using one color, and coloring 1 square in a new color to show the equation. Then, write the equation 3+1=4 next to the line with three squares of one color and one square of another color.*
- *Using two more new colors, (below the squares next to each other representing 3+1) let's show 2+2 by coloring 2 squares beside each other using one color, and coloring 2 squares in a new color to show the equation. Then, write the equation 2+2=4 next to the line with two squares of one color and two squares of another color.*



☑ **Criteria-based teacher assessment:** Fills grid squares with one color horizontally to represent a number. Uses two different colors in each row below it to show pairs of numbers that add up 4, and writes corresponding equations.

## 3. Guide self-assessment through group pair share.

- *Let's compare our color grids and written equations. Look closely. How do the colors tell us that 3+1 = 1+3?*
- *Switch papers with a partner and check to make sure the color squares match all of the equations on your partner's paper and discuss.*



Guiding Reflecting on Student Art

☑ **Criteria-based student peer-assessment:** Fills grid squares with one color horizontally to represent a number. Uses two different colors in each row below it to show pairs of numbers that add up 4. Writes corresponding equations.

## Day Two

1. Introduce and guide math analysis and discussion of *Blocks* by Annie Mae Young from the Seattle Art Museum. Note that artists use counting or a grid to make art, but choose also to change shapes and relationships to make the art more interesting.



- *This is a quilt made from fabric pieced together. Do you think that the artist used counting or a grid to figure out how to connect all of the parts? Why?*
- *Finding the equations is harder in this art than the art we looked at before.*
- *Where do you see colors or shapes repeated? Look for the biggest shapes: Are there any rows that remind you of the grid paper and equations we drew before?*
- *Talk about your ideas with a partner and share what you think with the whole class.*
- *Let's find rows on the quilt and write the equation that most of us agree on that matches them on the board (perhaps  $2+1+2=5$  or  $1+4=5$ ...).*

## 2. Demonstrate selecting and arranging 2x2" pre-cut color squares to show number pairs that equal 5 in collage. Describe assessment and demonstrate gluing process.



Craft of Gluing with  
Glue Stick/O'Glue

- Collage means to "paste" in French. We are going to be gluing squares down to make a 5 collage.
- Turn your piece of big white paper sideways, like a hot dog. Then choose colored paper squares to make rows to show all of the number pairs that add up to 5. Line them up with the left edge of your paper in the same way that we colored in our grid squares before – going across.
- Which colors will you use to both show each pair of addends (numbers added together)? What kind of design will your squares make when you look at them all together?
- When you have arranged your colored squares for your "5" quilt, raise your hand and have your teacher check before your glue.
- When you glue, leave your squares in place, lifting only one at a time to glue from left to right. Lift each square, squeeze a blob of glue about the size of a pea, carefully place your square back down, and "squish" it into the glue.
- On the right side of your paper, write the number pair equation that matches each row:  $0+5$ ...  $4+1$ ... $2+3$ ...



Prompting for Creativity



Criteria-based teacher assessment: Glues paper squares in one color horizontally to represent five, glues two different colors in each row below to show pairs of numbers that add up to 5, and writes corresponding equations.

## 3. Extension: Guide exploration of addition and equivalency through arranging quilt pieces with partners and larger group. Record corresponding equations on the board.

- Work with a partner to place two collages together. What is our total for the first rows? (10) How would we write an equation for that? ( $5+5=10$ ) What about the next row down?  $2+3+3+2=10$  or  $3+2+4+1=10$ .
- Let's compare our color grid quilt pieces and written equations. Work with a team to flip two collages upside down to compare with two right side up. Where do we see colors that tell us that  $5+5 = 3+2+4+1$ ?
- What if we add another to make 15? How about 20? How large is our quilt if we combine all of our pieces together? What are some of the equations we could write?

Criteria-based student pair and group reflection: Combines 5's collages with a partner and writes equations for a sum of 10; combines collages in group quilts and counts/writes equations.



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

Kindergarten Lesson Three: *Equations in Collage Quilts*

**CLASS ASSESSMENT WORKSHEET**

Disciplines	MATH	VISUAL ARTS AND MATH		Total 2 (or 3)
Concept	Decomposing Numbers/ Using Grids	Equation Compositions		
Criteria	Fills grid squares with one color horizontally to represent a number, uses two different colors in each row below it to show pairs of numbers that add up to 4, and writes corresponding equations.	Glues paper squares in one color horizontally to represent five, glues two different colors in each row below to show pairs of numbers that add up to 5.	Extension	Combines 5's collages with a partner and writes equations for a sum of 10; combines collages in group quilts and counts/writes equations.
Students				
1.				
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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: *Equations in Collage Quilts*

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Dear Family:

Your child participated in a two-part **Arts and Math** lesson. We talked about how artists can use math to make their art. We even found equations in the shapes and colors we observed in their artwork.

- We showed number pairs adding up to 4 by arranging objects and carefully coloring in two-inch grid squares.
- We wrote the numbers and equations that went along with colorful number pairs adding up to 4.
- On Day Two, we arranged number pairs adding up to 5 using objects then created a collage grid quilt composed of two inch colored squares of paper showing different number pairs that add up to 5.
- Some of us worked with partners and larger groups to explore counting, addition, and equivalency by combining our grid collages into larger "quilts".

At home, you could encourage your child to count totals of repeating shapes that they see around them, and think about all of the different number combinations that can add up to those totals. You can notice things inside and outside composed of shapes that fit together: tiles, quilts, mosaics, or bricks. You could make an "equation collage quilt" out of found materials or papers.

**Enduring Understanding**

Repeating shapes and colors organized in a composition can show number relationships and equations.