# ARTS IMPACT LESSON PLAN

Visual Arts and Math Infused Lesson

Lesson One: Collage Arrays: Adding up Shapes

Author: Meredith Essex Grade Level: Second

Enduring Understanding

Regular repetition of shapes in rows and columns can express number relationships in an array and

unify compositions. Pairing warm and cool colors can create contrast.

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

Students arrange objects in rectangular arrays of up to 5x5 rows. Students observe, analyze, and write

equations in response to artworks with repeating shapes arranged in rows. Students then create a

simple shape template out of tag board, trace it, and cut out matching multiple shapes using paper

folding and cutting techniques. Shapes are arranged and glued in rectangular arrays using a warm/cool

palette for contrast. Students write and share equations corresponding with arrays.

Learning Targets and Assessment Criteria

Target: Arranges and totals number in rectangular arrays.

Criteria: Makes equal number of objects in rows and columns and writes corresponding equation.

Target: Creates contrast in composition.

Criteria: Pairs array shapes in one warm/cool color with opposing warm/cool color for background.

Target: Makes and notates rectangular array collage.

Criteria: Repeats multiple identical shapes by tracing template on paper folded into quarters,

cutting, arranging in rows and columns, and records the addition equation it represents.

Target: Uses craftsmanship in collage.

Criteria: Glues shapes flat and securely.

Vocabulary Materials Learning Standards

Arts Infused:

Identical

Repetition

Rows

Shape

Math:

Addition

Array

Columns

Equation

Even

Odd

Quarters

Sum

Arts:

Collage

Composition

Contrast

Palette

Template

Unity

Warm and Cool

Museum Artworks or Performance:

Seattle, WA

Seattle Art Museum

Tacoma, WA

Children’s Museum of Tacoma

Tacoma Art Museum

Materials

Math manipulatives: small countable

objects; Individual color wheels; Writing

pencils; Tag board/cardstock: 3x3”

pieces; Fadeless art paper in warm & cool

colors: 6x6” pieces; Scissors; Card stock:

12x12” in warm & cool colors; Glue

sticks; Recycled magazines: glue mats;

Arts Impact sketchbooks; Class

Assessment Worksheet

Everyday Mathematics Connections

6.6 – Exploring Arrays

continued

WA Arts State Grade Level Expectations

For the full description of each WA State Arts Grade Level

Expectation, see: http://www.k12.wa.us/Arts/Standards

1.1.2 Elements: Shape

1.1.6 Elements: Color, warm/cool

1.1.7 Principles of Design: Repetition, unity

1.2.1 Skills and Techniques: Collage

2.1.1 Creative Process

2.3.1 Responding Process

4.2.1 Connection between Visual Arts and Math

Early Learning Guidelines (Pre-K – Grade 3)

For a full description of Washington State Early Learning and

Child Development Guidelines see:

http://www.del.wa.gov/development/guidelines/

(2nd Grade): 6. Learning about my world: Math:

Accurately add and subtract with sums to 20; begin to

understand how math is used in everyday life. Arts: Be

interested in a variety of types of art.

continued

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

2

Seattle Art Museum images:

Asmat Shield, early 20th century, Asmat,

2004.240

Tile with Twelve-pointed Star, 15th

Century, Persian, 39.61

Awelye "Women's Ceremony", 2006, Abie

Loy Kamerre, 2009.19

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/

2.OA.3. Determine whether a group of objects (up to 20) has

an odd or even number of members, e.g., by pairing objects

or counting them by 2s; write an equation to express an even

number as a sum of two equal addends.

2.OA.4. Use addition to find the total number of objects

arranged in rectangular arrays with up to 5 rows and up to 5

columns; write an equation to express the total as a sum of

equal addends.

CCSS Mathematical Practices

MP 2. Reason abstractly and quantitatively

MP 6. Attend to precision.

MP 7. Look for and make use of structure.

MP 8. Look for and express regularity in repeated reasoning.

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

3

Pre-Teach

Sketchbook Activity: Notice and draw examples of rectangular arrays that are

part of our daily life: key boards, calculators, phones, mesh or screen,

speakers, windows, ceiling tiles. Note odd and even totals.

Lesson Steps

1. Warm-Up: Demonstrate and guide arranging math small objects in

rectangular arrays with equal number of rows and columns up to 4 and writing

corresponding equation on paper or white board.

Criteria-based teacher checklist: Makes equal number of objects in rows and

columns and writes corresponding equation.

2. Introduce concept of repetition for unity in art and guide student math

analysis of Asmat Shield, early 20th century Asmat, and Tile with Twelvepointed

Star, Persian, from the Seattle Art Museum collection.

3. Introduce concept of “collage”. Demonstrate and guide making small shape

template for creating multiple congruent collage array shapes.

4. Introduce concept of combining warm and cool colors to create contrast in

composition through analyzing Awelye Women’s Ceremony by Abie Loy

Kamerre from the Seattle Art Museum collection.

5. Demonstrate and guide selecting warm or cool colors for array shapes and

an opposing – warm or cool for the background.

Criteria-based room scan: Pairs array shapes in a warm/cool color with an

opposing warm/cool color for background.

6. Demonstrate and guide folding paper for multiples and cutting and

arranging array shapes.

Criteria-based teacher checklist: Repeats multiple identical shapes by tracing

the template on paper folded into quarters, cutting, arranging in rows and

columns, and records the addition equation it represents.

ICON KEY:

3 = Indicates note or reminder for teacher

= Embedded assessment points in the lesson

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

4

7. Demonstrate and guide gluing using glue mat or book and glue sticks.

Criteria-based teacher checklist: Glues shapes flat and securely.

8. Lead criteria-based self-assessment and group gallery walk reflection.

Criteria-based student self assessment and group reflection: Checks for

compositions matching equations, craftsmanship, and warm/cool color pairing.

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

5

LESSON STEPS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Warm-Up: Demonstrate and guide arranging math small objects in rectangular arrays

with equal number of rows and columns up to 4 and writing corresponding equation on

paper or white board.

• If I have 2 rows and 2 columns, what is my total number of objects? Is it an odd or even

number? What is the equation that matches this array? (2+2=4)

• Make 3 rows and 3 columns. Predict whether this array’s total will be an odd or even number.

Now write the equation that matches it. (3+3+3=9)

• Make 4 rows and 4 columns. Predict whether the total will be odd or even and share your

thinking. Now write the equation that matches it. How many groups of 4? (4+4+4+4=16).

Criteria-based teacher checklist: Makes equal number of objects in rows and columns and

writes corresponding equation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Introduce concept of repetition for unity in art and guide student math

analysis of Asmat Shield, early 20th century Asmat, and Tile with Twelvepointed

Star, Persian, from the Seattle Art Museum collection.

3 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.

Responding to Art in

the Classroom

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

6

• What do you notice about these artworks? Where do you see repeated shapes? Often in art,

shapes are repeated to create a sense of unity and calm: a feeling that all parts belong to

together in a composition.

• How do you think artists used math in these artworks?

• If we made an array to show the largest repeating shapes (notice the white flower shapes in

the Persian Tile) in these artworks: how many rows and how many columns would we need for

each of them (Amsat Shield: 2 columns, 6 rows), (Persian Tile: 2 columns, 2 rows).

• What would the equations be that go with these artworks? (2+2+2+2+2+2=12); (2+2=4)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Introduce concept of “collage”. Demonstrate and guide making small

shape template for creating multiple congruent collage array shapes.

• Collage means “to paste” in French. We will be cutting out

identical shapes to make a collage array.

• We are making a shape that is small, simple, and easy to cut out

of 3x3” tag board.

• This will be our “template” that is used to trace around to make

shapes exactly the same size and color for our collage arrays.

• “Customize” your 3x3 square: Use your pencil to draw where

you might trim off a corner, add a curved edge or change the

square into another shape. Don’t cut too much off! It can be a

completely imaginary shape, a simple star, a diamond, a shape

of an animal…but it needs to be easy to cut out, trace around,

and cut out again and again.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Introduce concept of combining warm and cool colors to create contrast in composition

through analyzing Awelye Women’s Ceremony by Abie Loy Kamerre from the Seattle Art

Museum collection.

Creating Templates

Prompting for Creativity

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

7

• Look closely; how do you think the idea for this art is similar to arrays? How is it different?

• We are actually focusing more on an art concept than math when we look at this art: contrast.

Contrast means to stand out.

• Look at the color wheel. One half of the colors on the color wheel are cool colors: Green, blue,

and violet. Think of cool places like forests, lakes and mountains. The other halves of the colors

on the color wheel are red, orange, and yellow. Think of hot things and places: fire, sun, deserts.

• Artists put warm and cool colors next to each other to create contrast—to make areas stand

out—in their compositions.

• When you look closely at this art, notice which rectangles jump out the most. What makes them

stand out? What warm and cool colors did the artist put next to each other to create contrast?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Demonstrate and guide selecting warm or cool colors for array shapes and an opposing

– warm or cool – for the background.

• Choose a 6x6” colored paper in a warm or cool color. We are going to make our array shapes

all the same color to emphasize color contrast, repetition, and math all at the same time.

• Now pick an opposing color for your big collage background paper (if you chose a warm color

for shapes, choose a cool color for background, or the opposite).

Criteria-based room scan: Pairs array shapes in a warm/cool color with an opposing warm/cool color

for background.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Demonstrate and guide folding paper for multiples and cutting and arranging

array shapes.

3 Students can be assigned the number of shapes in arrays – for differentiated

learning – or can create their own number of shapes for arrays.

• Using good craftsmanship-care, thought, and time invested in

your art: Fold your color 6x6” small paper carefully in half, lining

up edges vertically and creasing. Trace around your template

twice on the folded paper.

(This will make 4 shapes for a 2x2 array).

• Next, with thumb pointing up and wide-open scissors turn the

paper (not the scissors) to slowly cut out the two traced shapes

through both thicknesses.

• Arrange an array of 4 with your shapes. If you have time and

space on you paper, more of the same shapes can be cut out of

the same color paper to create a 3x3 array if desired.

• Arrange your array, write out the equation in the lower left

corner of your paper, and raise your hand to have a teacher

check your work before gluing.

Criteria-based teacher checklist: Repeats multiple identical shapes by tracing the template on

paper folded into quarters, cutting, arranging in rows and columns, and records the addition equation

it represents.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Folding and Cutting Congruent

Shapes/Fractions, Cutting

through Multiple Layers

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

8

7. Demonstrate and guide gluing using glue mat or book and glue sticks.

• Once your array composition and equation has been checked, remove each shape

one by one, turn over on glue mat or book (recycled magazine), and run glue over

the edge of shape, and then glue exactly where it was.

• Using craftsmanship, rub shapes down well so they are flat and stay put.

• Sign your name in the lower right corner.

Criteria-based teacher checklist: Glues shapes flat and securely.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Lead criteria-based self-assessment and group gallery walk reflection.

• Count your rows and make sure that they match your equation. How many rows of

how many shapes are equal to your total number of shapes? Is your total an odd

or an even number?

• Check your craftsmanship: are all of your shapes cut out well so they match? Did you glue them

down so they are flat and not coming off the paper?

• Check to make sure that you have used warm or cool for shapes, and the opposite (warm or

cool) for the background.

• Take a gallery walk around and stand next to another artist’s collage. Without reading the

equation written in the corner, see if you can look at the array and share the equation you see.

Criteria-based student self assessment and group reflection: Checks for compositions matching

equations, craftsmanship, and warm/cool color pairing.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Everyday Mathematics Extensions:

6.8 – Multiplication Number Stories

6.9 – Multiplication with Arrays

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Craft of Gluing with

Glue Stick/O’Glue

Guiding Reflecting on

Student Art

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

9

ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

Second Grade Lesson One: Collage Arrays: Adding up Shapes

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

STUDENT SELF-ASSESSMENT WORKSHEET

Disciplines MATH VISUAL ARTS AND

MATH

MATH VISUAL ARTS Total

5

Concept Arrays/Addition Arrays/Repetition Addition Contrast Craftsmanship

Criteria

Student Name

Makes equal

number of objects

in rows and

columns and

writes

corresponding

equation.

Repeats multiple

identical shapes by

tracing template on

paper folded into

quarters, cutting,

arranging in rows

and columns.

Records

addition

equation

that collage

array

represents.

Pairs array

shapes in one

warm/cool color

with an opposing

warm/cool color

for background.

Glues shapes flat

and securely.

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

10

ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

Second Grade Lesson One: Collage Arrays: Adding up Shapes

CLASS ASSESSMENT WORKSHEET

Disciplines MATH VISUAL ARTS AND

MATH

MATH VISUAL ARTS Total

5

Concept Arrays/Addition Arrays/Repetition Addition Contrast Craftsmanship

Criteria

Student Name

Makes equal

number of objects

in rows and

columns and

writes

corresponding

equation.

Repeats multiple

identical shapes by

tracing template on

paper folded into

quarters, cutting,

arranging in rows

and columns.

Records

addition

equation

that collage

array

represents.

Pairs array

shapes in one

warm/cool color

with an opposing

warm/cool color

for background.

Glues shapes flat

and securely.

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:

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Second Grade Lesson One: Collage Arrays: Adding up Shapes

11

ARTS IMPACT FAMILY LETTER

VISUAL ARTS AND MATH LESSON: Collage Arrays: Adding up Shapes

Dear Family:

Today your child participated in an Arts and Math lesson. We looked at an Asmat shield and a Persian

ceramic tile and talked about how the artists used repetition of shapes in rows or columns. We also

talked about all of the ways that math might have been used in making this art: especially

measurement, counting, and addition.

• We arranged objects in rectangular arrays (rectangular composition with rows and columns) of

up to 5x5 rows.

• We observed and wrote equations in response to artworks with repeating shapes arranged in

rows and columns.

• We created a simple shape template out of tag board. Then we traced our template on folded

paper to help us cut out matching multiple shapes.

• We studied color wheels and looked at another work of art that placed warm and cool colors

next to each other to create contrast.

• We arranged and glued our shapes in rectangular array collages using a warm and

cool palette.

• We wrote the addition equation that matched our collage array and shared our art and math

with the class.

At home, you could search for repetition of shapes or grids inside and outside and encourage your child

to notice the number of rows and columns seen. Together, you could make arrays out of found objects

like caps, buttons, or rocks and practice writing equations to go along with them (and discover

multiplication along the way)!

Enduring Understanding

Regular repetition of shapes in rows and columns can express number

relationships in an array and unify compositions. Pairing warm and cool colors can create contrast.