# ARTS IMPACT LESSON PLAN

Visual Arts and Math Infused Lesson

Lesson Two: Composing with Fractions

Author: Meredith Essex Grade Level: Fifth

Enduring Understanding

Dividing space into fractions and combining neutral and pure color can create emphasis in composition.

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

Students plan and calculate the size of areas of color and shape within their own 4x8 inch composition

by multiplying fractions and using a fraction model. Art composed of fractional polygon shapes is

studied with focus on creating emphasis through use of color in composition. Polygons representing

1/16, 3/16, 1/4, and 1/2 of the total area are identified in composition plans. Using oil pastel

techniques, students add a pure color hue to their smallest shape, and then develop subtle neutral

colors for all other shapes for emphasis.

Learning Targets and Assessment Criteria

Target: Calculates areas for a composition.

Criteria: Uses a fraction model and multiplication to determine the area for 1/16, 3/16, 1/4, and

1/2 of a 4x8” composition.

Target: Organizes composition into polygons representing fractions.

Criteria: Designates and outlines four straight sided shapes with the correct number of grid

squares for 1/16, 3/16, 1/4, and 1/2 of a 4x8” composition. (32 units)

Target: Creates emphasis in composition.

Criteria: Uses pure hues in smallest shape, layers and blends neutral colors in all other shapes.

Target: Uses craftsmanship.

Criteria: Draws perimeter of polygons with ruler, clearly defines shapes with color.

Vocabulary Materials Learning Standards

Arts Infused:

Grid

Shape

Fraction

Math:

Area

Multiplication

Perimeter

Polygon

Arts:

Blot

Color field

Color palette

Composition

Edge

Emphasis

Neutral

Pure Hue

Refine

Value

Museum Artworks or Performance:

Seattle, WA

Seattle Art Museum

Tacoma, WA

Tacoma Art Museum

Materials

1” graph paper: 9x12”; White copy paper:

print, do not copy, the double-sided

Student Practice Worksheet from lesson;

White cardstock: 8.5x11”, print, do not

copy, 8x4 1” grid from lesson; ½” graph

transparency; Drawing pencils: 2B; Vinyl

erasers; Protractors; Rulers; Oil pastels (or

watercolor pencils and small brushes);

Color pencils; Individual color wheels &

color wheel poster; Arts Impact

sketchbooks; Class Assessment Worksheet

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/Standa

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

2

Connections

Everyday Mathematics

5.1, 5.2, 5.3, 5.4, 8.1, 8.5, 8.6, 8.7, 8.8

Seattle Art Museum

Harold Street #14, 1975, Louis Bunce,

83.62

Ollytyumbo, 1978, Peter Millet, 78.67

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/

5.NF.4. Apply and extend previous understandings of

multiplication to multiply a fraction or whole number by a

fraction.

5.NF.6. Solve real world problems involving multiplication

of fractions and mixed numbers, e.g., by using visual

fraction models or equations to represent the problem.

CCSS Mathematical Practices

MP 2. Reason abstractly and quantitatively.

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.

MP 8. Look for and express regularity in repeated

reasoning

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

3

Pre-Teach

Sketchbook Activity: Notice the division of area in rooms, in outdoor spaces like

parks and playgrounds, and in street maps or site plans. Find and sketch a place

or object where space is divided into fractions.

Lesson Steps

1. Warm-Up: Guide students in using a fraction model to calculate fractions that

will be used in a painting composition.

þ Criteria-based teacher checklist: Uses a fraction model and multiplies fractions

to determine the area for 1/16, 3/16, 1/4, and 1/2 of a 4x8” composition.

2. Introduce and guide art and math analysis of Harold Street Number 14 by

Louis Bunce and Ollytyumbo by Peter Millet from the Seattle Art Museum

collection. Introduce creating emphasis in composition using color.

3. Demonstrate and guide recording painting total area and fraction areas on

practice worksheet paper. Show ideas for and guide arranging compositions on

practice worksheet using the area/fractions calculated. Demonstrate using ruler

to draw polygon composition on heavy cardstock printed with gray grid (template

for composition provided in lesson).

þ Criteria-based teacher checklist: Designates and outlines four straight sided

shapes with the correct number of grid squares for 1/16, 3/16, 1/4, and 1/2 of a

4x8” composition. Draws perimeter of polygons using a ruler.

4. Demonstrate adding a pure hue to the smallest shape/fraction to create

emphasis and layering grays, whites, blacks, and browns to create subtle neutral

colors in other shapes using oil pastels (or water color pencils).

þ Criteria-based teacher checklist: Uses pure hues in smallest shape, then layers

and blends neutral colors in all other shapes. Clearly defines shapes

using color.

5. Guide criteria-based self and group reflection.

þ Criteria-based student self and group assessment: Analyzes compositions

artistically and mathematically.

ICON KEY:

3 = Indicates note or reminder for teacher

þ = Embedded assessment points in the lesson

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

4

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

1. Warm-Up: Guide students in using a fraction model to calculate fractions that will be

used in an artistic composition.

• We are going to be making a 4x8” composition. Just like in the art we are about to talk about,

we will be dividing our composition into different polygon shapes calculated by multiplying the

total area (a whole number) by fractions.

• What would be the first step in figuring out what the area of each of these parts, 1/16, 3/16,

1/4, and 1/2, of our art would be?

• Using the 9x12” 1” graph paper, count or multiply grid squares to figure out how large the area

(number of square inches) a 4x8” composition area would be. Dot the corners and use a ruler

to draw the lines for edges of this rectangle.

• What is the total area of this rectangle in square inches? (32) Multiply 32 x 1/2. What is one

half the total area of the rectangle? (18) Show 1/2 or 18 square inches by dividing the 4x8”

rectangle on your grid paper. Now multiply 32 x 1/16, 32 x 3/16, and 32 x 1/4. Show these

fractions (with correct number of squares/area) on your grid paper rectangle, also.

þ Criteria-based teacher checklist: Uses a fraction model and multiplies fractions to determine the area

for 1/16, 3/16, 1/4, and 1/2 of a 4x8” composition.

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2. Introduce and guide art and math analysis of Harold Street Number 14 by

Louis Bunce and Ollytyumbo by Peter Millet from the Seattle Art Museum

collection. Introduce creating emphasis in composition using color.

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 the at beginning of

the lesson.

• When we look at these paintings, what tells us that shapes or colors are organized on a grid?

How might these artists have used math or math tools?

• Where do you see fractions? If you were to estimate which shape/color is which fraction or

percentage, what would you guess? How is it different in the second painting? Why might an

artist just focus on shapes and fractions in their work?

• Watch the overlay of a transparent grid and notice what fraction of a whole these shapes might

represent, and what the area of those fractions might be.

• When we look at these paintings, which colors jump out most? Why? This is called creating

emphasis. How does the division of shapes also create emphasis?

• The primary colors are pure hues directly from the color wheel. The grays, tans, and brown

colors are called neutral colors.

• Do you think those areas with the primary pure colors would stand out as much if the colors

around them were not neutral? Why? What if they were really bright?

3 A transparent grid can be laid over projected images of art to help see fractions and area

in compositions.

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Responding to Art in

the Classroom

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

5

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

6

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

7

3. Demonstrate and guide recording painting total area and fraction areas on the doublesided

Student Practice Worksheet. Show ideas for and guide arranging compositions on

practice worksheet using the area/fractions calculated.

• Mathematical artists, please record the area for 1/16, 3/16, 1/4, and 1/2 on your

practice worksheet paper, page #2.

• Experiment with arranging each fraction/part of your composition by lightly

outlining polygon perimeters or marking their corners (vertices) on the worksheet

grid. You must have shapes representing 1/16, 3/16, 1/4, and ½; label each

shape with the fraction it represents.

• Shapes do not have to be regular polygons such as rectangles or squares, but they need to

have straight sides that follow grid lines with 90 (or 270) degree angles so that fraction/area

calculations can be easily figured out and seen.

Demonstrate using ruler to draw polygon composition on heavy cardstock printed with

gray grid (template for composition provided in lesson).

• When you have decided on your fraction composition, draw it on the paper for your final

composition. Notice this paper is heavier and has the 4x8 grid already printed on it. Outline

your fraction shapes using a ruler and pencil.

• STOP AND LOOK: Switch papers with a partner and have them check your composition plan to

make sure each of your polygons correctly correlates with an area and fraction.

þ Criteria-based teacher checklist: Designates and outlines four straight sided shapes with the correct

number of grid squares for 1/16, 3/16, 1/4, and 1/2 of a 4x8” composition. Draws perimeter of

polygons using a ruler.

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Drawing with a Ruler

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

8

4. Demonstrate adding a pure hue to the smallest shape/fraction to create emphasis and

layering grays, whites, blacks, and browns to create subtle neutral colors in other shapes

using oil pastels (or watercolor pencils).

• We are using oil pastels (watercolor pencils may be substituted here): They blend

and layer well, but are challenging to fit into small, precise areas. Fill inside your

polygons carefully with oil pastel leaving grid lines visible.

• We are creating emphasis through using a pure primary color in our smallest

fraction area. Which shape is that on your composition?

• In that pure hue (1/16) area add a primary color. We know that if we put equally

as bright colors around it, it would not be emphasized, so now we move on to

using neutral colors.

• Develop some very quiet neutral colors around a bright pure hue to emphasize it.

Grays and browns might seem boring, but by layering oil pastel color, you can

create a huge range of different quiet, neutral colors.

• You can also create very subtle changes in those neutrals by adding a tiny bit of gray or white

around the perimeter of polygons and by layering browns and blacks (or combining

complementary color pairs in slightly different ways). Each

neutral shape needs to stand out, so develop a neutral color

that is distinct for each polygon. Make sure your edges and

shapes are clearly seen; your math is part of what makes your

composition effective!

• To refine and complete your composition, especially if some of

the precision of shapes is lost through blending, you can draw

or layer on top of areas with color pencils: Lines can be redrawn

with a ruler to define polygons as needed.

þ Criteria-based teacher checklist: Uses pure hues in smallest shape, layers and blends neutral colors

in all other shapes. Clearly defines shapes using color.

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5. Guide criteria-based self and group reflection. Display art so that it’s visible to everyone.

• Check your craftsmanship: are your polygon areas precise?

• Notice and compare all of the different compositions that can be generated using

the same criteria. What does that say to you about using math in art?

• Where do you see emphasis and how did the artist’s choices create that? Think

about composition of shapes and color.

• Notice and ask another student how they created an interesting color effect with neutral color.

þ Criteria-based student self and group assessment: Analyzes compositions artistically

and mathematically.

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Everyday Mathematics Extensions:

5.5, 5.6, 5.7, 5.8, 8.9, 8.11

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Oil Pastels

Prompting for Creativity

Guiding Reflecting on

Student Art

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9

Composing with Fractions Student Practice Worksheet, page 1

Name: Date:

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

10

Composing with Fractions Student Worksheet, page 2

Name: Date:

Total area of composition (in square inches):

Area of fractions in square inches:

1/16 x 4 x 8 inches =

3/16 x 4 x 8 inches =

1/4 x 4 x 8 inches =

1/2 x 4 x 8 inches =

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

11

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

12

ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

Fifth Grade Lesson Two: Composing with Fractions

3 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 Shape/Fractions Emphasis Craftsmanship 4

Criteria

Student Name

Uses a fraction

model and

multiplication to

determine the area

for 1/16, 3/16, ¼,

1/2 of a 4x8 inch

composition

Designates and outlines

four straight sided shapes

with the correct number of

grid squares/area for 1/16,

3/16, ¼, 1/2 of a 4x8 inch

composition (32 units)

Uses pure hues

in smallest

shape, layers

and blends

neutral colors

in all other

shapes

Draws

perimeter of

polygons with

ruler, clearly

defines shapes

with color

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

13

ARTS IMPACT LESSON PLAN Visual Arts and Math Infusion

Fifth Grade Lesson Two: Composing with Fractions

CLASS ASSESSMENT WORKSHEET

Disciplines VISUAL ARTS AND MATH VISUAL ARTS Total

Concept Shape/Fractions Emphasis Craftsmanship 4

Criteria

Student Name

Uses a fraction

model and

multiplication to

determine the area

for 1/16, 3/16, ¼,

1/2 of a 4x8 inch

composition

Designates and outlines

four straight sided shapes

with the correct number of

grid squares/area for 1/16,

3/16, ¼, 1/2 of a 4x8 inch

composition (32 units)

Uses pure hues

in smallest

shape, layers

and blends

neutral colors

in all other

shapes

Draws

perimeter of

polygons with

ruler, clearly

defines shapes

with color

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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 – Fifth Grade Lesson Two: Composing with Fractions

14

ARTS IMPACT FAMILY LETTER

VISUAL MATH AND ARTS LESSON: Composing with Fractions

Dear Family:

Today your child participated in an Arts and Math lesson. We looked at examples of paintings that

were divided into shapes. We analyzed those shapes and talked about the idea of multiplying or

dividing a whole space or number by a fraction. We also noticed how the artists created areas of

emphasis through using bright pure colors in the smallest areas and neutral colors in all the other

shapes to attract the eye of the viewer. We multiplied fractions and used color for emphasis in

developing our own paintings.

• We calculated the size or area of shapes for our own small 4x8 inch composition. We did this by

multiplying the total area of our painting by four different fractions.

• We also drew a fraction model that illustrated the relative size of each fraction.

• We studied how artists create emphasis in works of art through use of color and shape.

• We arranged polygons that equaled 1/16, 3/16, 1/4, and 1/2 of our total composition.

• We used oil pastel techniques to add a pure color hue to our smallest shape then developed

quiet neutral colors for all of the other shapes. This bright color created an area of emphasis.

At home, you could experiment with multiplying fractions in drawings or collages. You could search for

and find spaces that are divided into fractions in creative ways like stained glass windows, or tiled

surfaces. You could also note areas of emphasis created with color in these spaces.

Enduring Understanding

Dividing space into fractions and combining neutral and pure color can create emphasis in composition.

ARTS IMPACT VISUAL ARTS AND MATH INFUSION – Fifth Grade Lesson Two: Composing with Fractions

15