

ARTFUL CONNECTIONS WITH MATH GRADE 3

Place Value Collage

2 Sessions – 90 minutes each

Essential Question:

What is the relationship between place value and the concept of scale?

Lesson Goal: Students create a collage that represents a 4-digit number by assigning specific paper colors, sizes, and textures to each place value.

Lesson Objectives:

Students will be able to:

- depict a number to the thousand's place using specific sizes/colors/textures of paper.
- create a collage that uses overlapping to demonstrate visual depth.
- describe and compare works of art that have a similar theme and were created at a different time.

Common Core State Standards for Mathematics

Number and Operations in Base Ten 3.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.

1. Use place value understanding to round whole numbers to the nearest 10 or 100.
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value.

California Visual Art Content Standards

ARTISTIC PERCEPTION 1.5: *Identify and describe elements of art in works of art, emphasizing color, shape/form, texture, and space.*

CREATIVE EXPRESSION 2.1: *Explore ideas for art in a personal sketchbook.*

HISTORICAL AND CULTURAL CONTEXT 3.1: *Compare and describe various works of art that have a similar theme and were created at a different time.*

AESTHETIC VALUING 4.1: *Compare and contrast selected works of art and describe them, using appropriate vocabulary of art.*

Materials

- 12" x 18" black construction paper
- Scissors
- Glue sticks
- Various textured papers (sand paper, newspaper, doilies, gift wrap, aluminum foil etc...)
- Small dot stickers (or use a hole punch)
- Various sized templates for tracing

Key Vocabulary

Math: ones; tens; hundreds; thousands; place value; digit; key

Art: collage; overlap; texture; composition; scale



PRE-SESSION MATH LESSON

- **Focus Question 1:** What does the word value mean? Explain.
- **Focus Question 2:** Why is place value important in mathematics? Explain.

Students can do this in cooperative groups. Students can use other forms of the word value (such as valuable) to get an idea of the definition. Have students discuss what they think value means.

Manipulative use:

Students use base ten blocks to “create” numbers on their place value mat (Workmat 6). Start out with a small number (0-19). Begin by saying a number and ask the students to create that number using base 10 blocks. Walk around the room to check for understanding. Be very specific about the words you use. Examples:

- “How many **ones** are in the number 197?”
- “How many **tens** are in the number 197?”
- “Okay, now many **hundreds** are in the number 1,067?”
- “How many **thousands** are in the number 1,067?”

*Note: As the students gain more confidence, allow them to choose their own numbers for their table or group. Students can divide a paper into fourths and visually represent the four different numbers. Students need to understand that digits are symbols representing a numerical amount or **value**. The base 10 system has 10 digits (0-9) and is the way we organize our numbers. We cannot have any more than nine in each place value. If there are more than nine in any place value, we must regroup.*

Ask the class:

- How would we represent thousands using a manipulative model?

Place Value Chart

1. Distribute 4-column place value chart in each student.
2. Ask the students to write a digit in each of the four columns. Tell them to not repeat a digit and do not use a zero.

Note: Numbers with zeros in them can be included if you assign the class one kind of paper to each place value. Students will then be able to tell if a number has a zero because they will not see that particular paper in the collage.

3. Using the same four digits, instruct the students to create a different number. Write the number in the appropriate columns below the first one.
4. Ask the students to see how many different numbers they can create using the same four digits.

Session 1– Discuss Place Value & Scale, Art Observation, Trace Circles

ACCESS PRIOR KNOWLEDGE (10 min)

Write a four-digit number on the board and ask the students how they know how to read it.

- What does place value mean?

Show students a sample place value collage and ask them to figure out what number it represents.

WARM UP ACTIVITY (10 min)

Explain that scale is the relationship of one object to another. Teacher will demonstrate this concept by drawing a circle on the board, then drawing an even bigger one, so that the first circle does not seem so big, then drawing a tiny circle which will make the first circle look big again.

ART OBSERVATION (20 min)

Show students the Kandinsky and Albuquerque images. Ask the following questions:

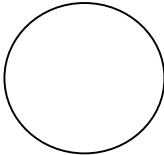
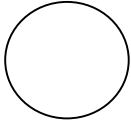
- What do you see?
- How would you describe the shapes you see?
- What do you notice about how the shapes are positioned in the composition? (overlap, going off the page, color, shape)
- How do the circles vary?
- Which composition has more space in it?
- Which circles appear in the front? Back?
- Why do you think the artist put some circles in front of others? Explain that artists use overlapping to create the illusion of space.

ART-MAKING ACTIVITY (45 min)

1. Students assign different sized circles to each column. The largest size will be in the thousands place and the smallest will be in the ones.
Note: Teachers can mark each size lid with a sharpie and tape it to the board for students to reference or teacher can make sets of 3 different sized lids for each student.
2. Instruct students to choose 3 different kinds of paper (the 4th will be small sticker dots) and assign a kind of paper to each column. Write names of different papers on board.
3. According to the digit in the thousands' column, trace x amount of large circles from the paper assigned to the thousands' column. According to the digit in the hundreds column, trace x amount of large-medium circles from the color assigned to the hundreds column. Repeat for remaining columns.

Note: It is helpful for students to trace their circles on the back of the sandpaper and to use a permanent marker to trace their circles on the foil.

4. Store each students' circles for next session.

Thousands	Hundreds	Tens	Ones
8 1 6 	3 6 8 	5 3 1 	6 5 3 
Sandpaper	Newspaper	Yellow	Dots

CLOSURE (10 min)

- Have students lay their circles and their place value key on their desk and ask a partner to read the 4-digit number their circles represent.
- Instruct students to share how they chose which paper to use for each place value.

Session 2 – Cut out circles, Discuss Composition, Create Collage, Reflect

ACCESS PRIOR KNOWLEDGE (5 min)

- Thinking about what we did last week, how does place value relate to size?
- What do you know about scale?
- What do you know about overlapping?

ART-MAKING ACTIVITY (60 min)

1. Introduce “collage”.
2. Introduce “composition”. Explain the process for cutting and pasting the shapes and the decision-making about placement and overlapping. Encourage students to paste shapes so they extend beyond the frame of the page.
3. Instruct students to glue all shapes on to the black paper, allowing smaller shapes to be glued on top of larger ones. All shapes must be showing so their number can be read. If students decide not to use all the shapes they cut out, they may do so as long as they understand and indicate what number they are depicting.
4. Write the number in standard, expanded, and word form on the back of the artwork, or it can be displayed on the front as the title of the artwork.

Extension: Students who finish early can make a collage using the same digits in a different order. This will illustrate the importance of place value, as the same 4 digits can make an entirely different number and collage.

CLOSURE (25 min)

Have students share their collage and ask the group to identify the number it represents.

- What did you learn today about how to count and read numbers?
- How does your collage relate to Kandinsky’s work or Albuquerque’s work?
- How does your collage differ from a classmate’s collage?
- What worked well in someone else’s collage?
- What would you do differently if you were to do this again?
- Discuss student’s choices for where and how they placed their shapes (e.g. Which part of the paper seems heavier? lighter? Which part of the collage seems to be coming toward you? Moving away from you?)

Rounding

- Round your collage to the nearest thousand, hundred, ten. And then add all the collages to find total.
- Now add all the collages in your table group first and then round the total to the nearest thousand, hundred, ten.
- Compare and see if you got

POST SESSION DEBRIEF

The day after this session, review what the students have learned about place value.

- **Focus Question 3:** How did the place value collage help explain or clarify place value as we understand it in mathematics? Explain.

Answers can be brainstormed by the class as a whole and then recorded in art journals with pictures to help clarify students' understanding.

Have students use their place value collages as math manipulatives to perform activities such as the following:

- Put the collages in your table group in order from least to greatest.
- Add the value of all the collages at your table. Add the collages of the whole class.
- Subtract the collage with the least value from the collage with the greatest value.

Place Value Collage Rubric

Student Name: _____

	1 Does not meet Expectations	2 Approaching Expectations	3 Meets Expectations	4 Exceeds Expectations	Score
Size of circles varies to demonstrate an understanding of scale.	Artwork shows only one different sized circle.	Artwork shows at least two different sized circles.	Artwork shows at least four different sized circles.	Artwork shows five different sized circles and effectively illustrates an understanding of scale.	
All circles of the same size are the same color (or texture).	Colors (or textures) are not designated to circles in any systemic way.	Some circles are cut from their designated color (or texture).	Most circles are cut from their designated color (or texture).	Each circle size has a unique color (or texture).	
The amount of circles corresponds to the number.	Two or less place values are depicted correctly.	At least three place values are depicted correctly.	At least four place values are depicted correctly.	All five place values show the correct number of circles.	
Artwork demonstrates an ability to trace and cut carefully.	Shapes cannot be identified as circles.	Some shapes can be identified as circles.	Most shapes can be identified as circles.	Each shape is traced and cut as a near perfect circle.	
Artwork shows an understanding of overlapping.	No overlapping is evident.	Some overlapping is evident.	Most shapes overlap.	Overlapping creates a sense of visual depth in artwork.	

Total: _____



Several Circles (Einige Kreise), January–February 1926. Oil on canvas, 55 1/4 x 55 3/8 inches (140.3 x 140.7 cm). Solomon R. Guggenheim Museum, New York, Solomon R. Guggenheim Founding Collection, By gift 41.283. © 2012 Artists Rights Society (ARS), New York/ADAGP, Paris

Vasily Kandinsky

This artwork demonstrates for students a composition that uses one repeated shape in different sizes and colors. The composition shows overlapping, which creates a sense of three dimensional depth. The relative scale of the circles also creates a sense of depth as larger objects appear to be coming forward and smaller ones seem to recede.

Although he adopted some aspects of the geometrizing trends of Suprematism and Constructivism—such as overlapping flat planes and clearly delineated shapes—his belief in the expressive content of abstract forms alienated him from the majority of his Russian colleagues, who championed more rational, systematizing principles.

In 1922 Kandinsky joined the faculty of the Weimar Bauhaus, where he discovered a more sympathetic environment in which to pursue his art. While there, Kandinsky furthered his investigations into the correspondence between colors and forms and their psychological and spiritual effects

The importance of circles in this painting prefigures the dominant role they would play in many subsequent works, culminating in his cosmic and harmonious image *Several Circles*. “The circle,” claimed Kandinsky, “is the synthesis of the greatest oppositions. It combines the concentric and the eccentric in a single form and in equilibrium. Of the three primary forms, it points most clearly to the fourth dimension.”

Selection from: www.guggenheim.org

Vasily Kandinsky was born on December 4, 1866, in Moscow. In 1903 and 1904 he began his travels in Italy, the Netherlands, and North Africa and his visits to Russia. He showed at the Salon d’Automne in Paris from 1904.

Kandinsky began teaching at the Bauhaus in Weimar in 1922. He moved with the Bauhaus to Dessau in 1925 and became a German citizen in 1928. The Nazi government closed the Bauhaus in 1933 and later that year Kandinsky settled in Neuilly-sur-Seine, near Paris; he acquired French citizenship in 1939. Fifty-seven of his works were confiscated by the Nazis in the 1937 purge of “degenerate art.” Kandinsky died on December 13, 1944, in Neuilly.



Stellar Axis: Antarctica
Lita Albuquerque, 2006



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Lita Albuquerque

This work also demonstrates relative scale by showing the same form in different sizes. The relative scale of the spheres is based on the brightness of the stars they represent (or the distance of the stars from us). These images also show a work that is abstract, while at the same time representative of the cosmos above the specific site in which it was installed.

Her latest large scale ephemeral Earth Art work *Stellar Axis: Antarctica*, a star map of blue orbs on ice installed on the Ross Ice Shelf in Antarctica in 2006 combines art with science and examines the human connection with the cosmos and the possibility of light as that link. In 2006, Lita Albuquerque led an expedition to the farthest reaches of Antarctica near the South Pole to create the first installment of her global work *Stellar Axis*. The expedition was aided by a grant from the National Science Foundation and was the first and largest ephemeral art work created on the continent. The resulting installation consisted of an array of ninety nine fabricated blue spheres. The placement of each corresponded to the location of one of 99 specific stars in the Antarctic sky above, creating an earthly constellation at the earth's pole. As the planet rotated and followed its orbit the displacement between the original positions of the stars and the spheres drew an invisible spiral of the earth's spinning motion.

The Stellar Axis Expedition's journey to the ice included a team of experts, researchers and artists with Albuquerque at the helm. Their sole purpose was to pursue and materialize a sculpture and ephemeral event on a scale and in a place that was completely unprecedented.

Lita Albuquerque is an internationally renowned installation, environmental artist, painter and sculptor. She has developed a visual language that brings the realities of time and space to a human scale and is acclaimed for her ephemeral and permanent art works executed in the landscape and public sites.

She was born in Santa Monica, California and raised in Tunisia, North Africa and Paris, France. At the age of eleven she settled with her family in the U.S. In the 1970s Albuquerque emerged on the California art scene as part of the Light and Space movement and won acclaim for her epic and poetic ephemeral pigment pieces created for desert sites. She gained national attention in the late 1970s with her ephemeral pigment installations pertaining to mapping, identity and the cosmos, executed in the natural landscape.

Albuquerque, with architect Mitchell De Jarnett, installed *Golden State*, the largest public art commission in California State government history, a plaza design spanning two city blocks at the center of the Capitol Area East End Complex in Sacramento. Albuquerque completed *Celestial Disk*, a star map, sculpture and waterfall in collaboration with architect Robert Kramer, which provides the main entrance to the Cathedral of Our Lady of the Angels, Los Angeles. Albuquerque is a noted educator and has been on the core faculty of the Fine Art Graduate Program at Art Center College of Design for the last twenty years.

Photography by Jean de Pomereu.

For a slideshow of these images, visit:

<http://litaalbuquerque.com/2006/10/stellar-axis-antarcticaantarctica2006/>