

ARTFUL CONNECTIONS WITH MATH GRADE 2

Addition Clay Model 2 sessions - 90 minutes each

Guiding Question: How can I represent the sum of an addition problem using a quantity of similar shapes for each place value?

Lesson Goal: Create a clay model of a functional object using shapes to represent place value.

Learning Objectives:

- Practice addition problems, including multiple two-digit numbers;
- Practice using place value when adding numbers;
- Design a functional object using a set number of similar shapes; and
- Create a 3D model of the object based on a drawing of the design.

Common Core Standards in Mathematics

CCSS.MATH.CONTENT.2.NBT.B.9

Explain why addition and subtraction strategies work, using place value and the properties of operations.

CCSS.MATH.CONTENT.2.NBT.B.5

Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

CCSS.MATH.CONTENT.2.NBT.B.6

Add up to four two-digit numbers using strategies based on place value and properties of operations.

Visual Arts Standards

VA: Cr1.2 Make art or design with various materials and tools to explore personal interests, questions, and curiosity.

ARTFUL CONNECTIONS WITH MATH GRADE 2

VA: Cr2.1 Experiment with various materials and tools to explore personal interests in a work of art or design.

VA: Cr3.1 Discuss and reflect with peers about choices made in creating artwork.

VA: Re8 Interpret art by categorizing subject matter and identifying the characteristics of form.

VA:Pr5.1 Distinguish between different materials or artistic technique for preparing artwork for presentation.

Materials and Tools:

Notebook or drawing paper

Colored pencils

Clay

Cardboard square (for base)

Acrylic paint in blue, red, and yellow

Elmer's glue

Glue brushes

Glue cups

Wood pieces for clay tools (skewers, tongue depressors, craft sticks, etc.)

Toothpicks (to reinforce clay forms, if necessary)

Beads (optional for regrouping activity)

Snack size ziplock bags (optional for regrouping activity)

Gallon size ziplock bags (optional for regrouping activity)

Session 1 - Design a Functional Object Based on a Number

Access Prior Knowledge:

- What do you remember about place value?
- What can you tell me about adding numbers?
- What do you imagine "Design" is?
- We will be designing a piece of furniture later in this class. What do you think designers do first when they are making a piece of furniture?

ARTFUL CONNECTIONS WITH MATH GRADE 2

Math Lesson - Addition Practice:

1. Begin with a very simple two digit addition problem that does not require regrouping. Write it on the board, and solve it slowly with the class. Emphasize beginning with the ones place before moving to the tens. Show that the answer is the same if the two numbers are switched ($22 + 65$ is the same as $65 + 22$).
2. Move on to a problem adding four two digit numbers that also does not require regrouping. This time, ask the students to work out the answers themselves in their journals. Discuss their answers and ask how they found them.
3. Next, work on a problem that requires regrouping in the ones place only. Do this together on the board. Emphasize the concept that each place value holds only one digit (0 - 9), and cannot hold a two digit number. Where does the extra go?
4. Optional: a hands-on way to demonstrate regrouping is to give a quantity of objects to count (like beads) and small ziplock snack bags to each table group.
 - a. Ask the students to place 10 beads in each small bag - not more, not less. Explain that this makes them easier to count. Instruct them to "Make a ten". Any extra beads are the ones. The number of small bags is the digit in the tens place.
 - b. Write the number of beads each group has on the board.
 - c. Allow the groups to combine (regroup) their ones to make more groups of tens in bags. Again, the extra are the ones. Continue regrouping the "extra" beads until all possible groups of ten are made and bagged.
 - d. Ask the students, "How many extra single beads do we have now? This is the digit in the one's place?"
 - e. "How many small bags of beads do we have? This is the digit in the tens place, if there are less than 10 bags".
 - f. If there are more than 10 small bags, ask the class: "What do we do?" Count (regroup) these small bags in groups of 10 into a larger ziplock bag. Count by tens to make a hundred. Then ask, "How many extra small bags of ten beads do we have after we make a hundred? This is the digit in the tens place".

ARTFUL CONNECTIONS WITH MATH GRADE 2

- g. Write the number of the total on the board. Check the work by adding the original two digit numbers from each group written on the board using the standard method.
5. Students work in their journals to practice at least three problems adding four, two-digit numbers. They can generate the numbers to add by rolling dice for the digits, or by picking numbers at random written on pieces of paper. One of these sums will be the basis for the clay sculpture.

Art Observation:



Gerrit Rietveld, Red Blue Chair, 1918 - 1923



Erith Sottsass, Carlton Bookcase, 1981

ARTFUL CONNECTIONS WITH MATH GRADE 2

Questioning Strategy:

Ask the class the following questions when looking at the artwork of Rietveld and Sottsass:

- What do you see?
- What kinds of lines and colors do you see?
- How would you describe the objects are we looking at?
- How are these objects balancing? How do you think they can hold weight?
- How do the shapes, or the form help the objects work? Why do you think the form is also important in a piece of furniture?
- How can functional objects also be considered Art?
- What is the difference between a Designer and an Artist? Think of our conversation about Design. How do the artistic process and design process compare or contrast?

Drawing is a great way to start this process - this will lead us into the next part of our lesson...

Art Activity - Draw designs for a piece of furniture

Steps:

1. Begin with an Introduction with the following quote, "Designers and Artists often plan their work by drawing or sketching ideas first. Today, you will be sketching ideas for a piece of furniture inspired by the images we just looked at."
Explain that in the next session students will make a clay model of a piece of furniture.
2. Show the project example. Point out that the model will be made out of a number of shapes based on one of the sums of the addition problems completed earlier. Point out the different shapes in the project example.
3. Students will then choose one of their sums to be the basis of their sculpture:
 - Ask students to think about how many ones, tens and hundreds are in each sum in their journal.
 - The ones will be represented by cubes, the tens by long, thin rectangles, and the hundred by larger rectangle slabs. (Show examples)

ARTFUL CONNECTIONS WITH MATH GRADE 2

- Ask the class, “Which sum do you think would give you the best number of shapes to work with? Please circle that number in your notebook.”
- 4. “What are some pieces of furniture you can think of?” Write a list on the board as students brainstorm possible kinds of furniture they could create.
- 5. “What furniture objects are of particular interest to you? What piece of furniture would you like in your house or your yard or your room?”
- 6. Choose one example, (not a chair or a bookcase), and demonstrate the process of thinking about how a specific number shapes could be formed into that kind of functional object. For instance:
 - Write an example number on the board.
 - Review how many cubes, thin rectangles and rectangular slabs this would give you to work with.
 - Narrate the process of thinking about which shapes could be used for specific parts of the piece of furniture. “If I’m making a bed, I think the rectangular slab would be horizontal, under the mattress, and the cubes could be the legs. Then I could use the thin rectangles for decoration as the headboard, and if it were my bed, I would like...”
 - Draw out the design on the board while narrating this thought process.
 - Point out repeated forms in the drawing and how the object is balanced.
- 7. Students sketch designs in their notebook based on the number they chose.
- 8. Optional: give out red, blue and yellow colored pencils to let them plan the color of their model. Explain that they will be using primary colors to paint their furniture model in the next session.
- 9. Optional: It can be helpful to provide students with paper cut outs the approximate size and shape of the ones, tens and hundreds clay pieces they will be using to build their model. They can practice putting these paper shapes together in different ways to generate ideas for furniture. Use white cardstock or construction paper in red, blue and yellow.

Closure:

Discussion:

- Sometimes when we make art or design objects we copy parts of other people’s work, or we are thinking about their work while we make our own. How did the images of furniture we looked at today influence your design?

ARTFUL CONNECTIONS WITH MATH GRADE 2

- If you were thinking about other objects you see around you or in your memory, what were they? How did they influence your design?

Session 2 - Create Clay Model

Access Prior Knowledge:

- What do you remember about adding numbers?
- What do you remember about the pieces of furniture we looked at last week?

Art Activity - Create and Paint Clay Model

Steps:

- Before the activity cut the clay into rectangular clay slabs. These will probably be half or one third of a full slab of clay. Approx. $\frac{3}{4}$ " thick.
- **Note:** Many students will be able to cut long rectangles and cubes from these slabs. You may wish to pre-cut the thin rectangles as well, as the cubes can be easily cut from thin rectangles.

Introduction:

Instruct the class to open their notebooks to the sketch of their design from the last session. If students need more time to think about their design before working with clay, give them 10 - 15 minutes now to draw and warm up for making the model. Also, remember to remind the students that they are working with the sum they circled in their notebooks. Have them figure out how many rectangular slabs, thin rectangles and cubes they need to represent their sum. Tell students it is OK if the clay model is different from the sketch.

Demonstrate - How to create the clay model:

1. Show students a sketch you have created based on a number. Show them the number of ones, tens and hundred shapes you will use to make the form.
2. Show students how to cut and count the shapes they need for their model. Rectangular slabs (hundreds) should be pre-cut.
 - Demonstrate assembling the shapes into the shape of the model. Students may bend pieces and join them, but may not cut them into smaller pieces. Explain that the clay should not be pinched thin, if it is shaped. The clay model will be fragile, and thin pieces will break.

ARTFUL CONNECTIONS WITH MATH GRADE 2

- Demonstrate scoring and joining pieces. All clay pieces that touch need to be scored and joined thoroughly.
 - Demonstrate adding toothpicks to strengthen parts of the model that could break. Explain that the adults will help with this.
 - Distribute the clay to each student. Cardboard bases can be distributed now or after the clay model is complete to keep them clean while students work with the clay. Students create their models.
3. Demonstrate painting the model with glue paint:
Make sure model is in position in the middle of the cardboard base, and the clay model is entirely finished. All joins are strong, all pieces are in place, toothpicks have been added if necessary. Do not make changes to the clay once painting has begun.
 4. Show students how to not drip when using the glue paint.
The entire model needs to be covered on all sides with glue paint. Encourage the students to use the primary colors, if Red, Blue and Yellow are available. Encourage the students to keep the colors separate on their model, so it is best to work with one color at a time and complete all of one color before using another.
 5. Demonstrate how to paint without going over previous colors. If yellow is to be used in a model, paint all the yellow areas first.

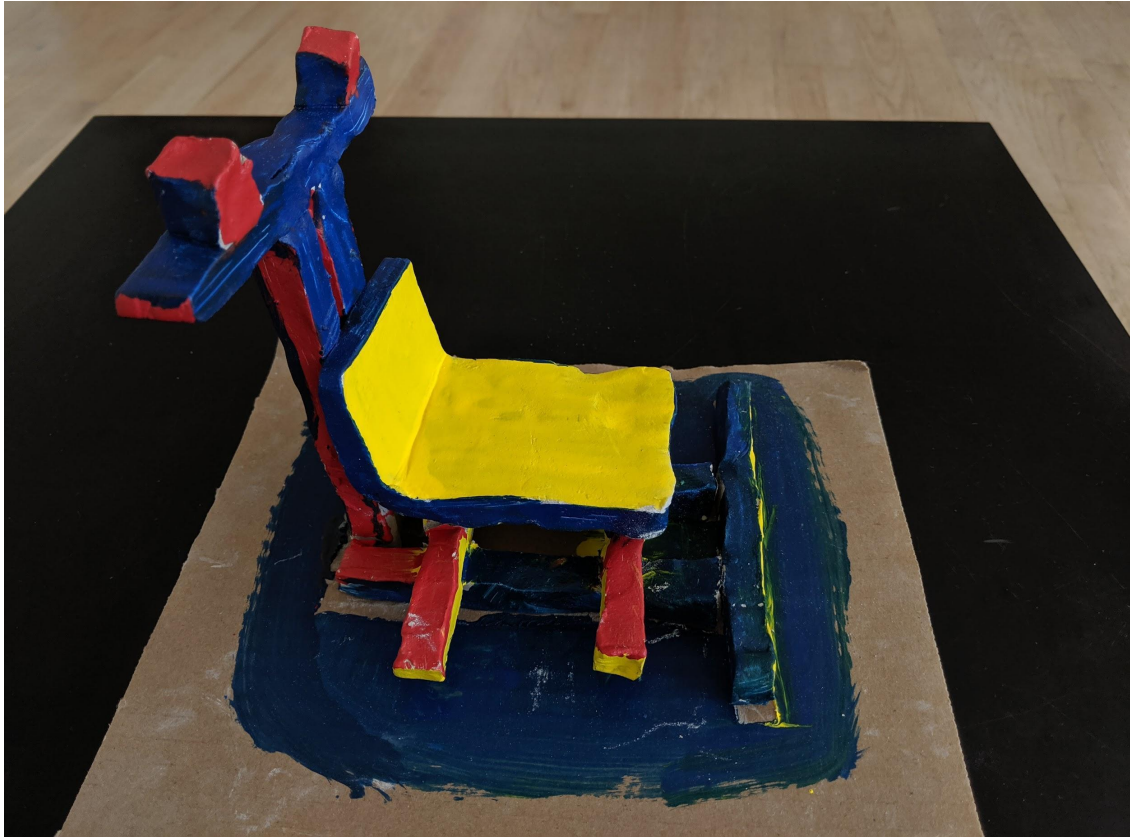
Options: Paint different faces of cubes different colors. Painting all faces of a shape one color to emphasize the 3D form. Painting joined shapes or shapes with the same function the same color to emphasize their connection.

The painting of the model can emphasize repeated forms or balance in the model. Do not paint the cardboard base. Students paint their models.

Sharing (Pair Share Reflection):

- What do you like most about your own model?
- What would you change?
- What do you like most about your partner's artwork?
- **Whole class:** Who sees a model created by another student that they would like to talk about?
- How has the artist used color in their design?
- What shapes do you notice about the artwork you have chosen?

ARTFUL CONNECTIONS WITH MATH GRADE 2



Sample Project

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