artsNOW
Integrated learning solutions

# MOSAICS AND MATH
## Grade Band: 3-5
## Content Focus: Visual Arts & Math

## LEARNING DESCRIPTION

In this lesson, students will use multiplication and division to create a mosaic using a watercolor crayon resist.

## LEARNING TARGETS

| Essential Questions | "I Can" Statements |
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| How can you utilize multiplication and division to create a mosaic?<br><br>How can you use an array to determine factors of 54? | I can use multiplication and division to create a mosaic.<br><br>I can use crayon and watercolor to create a crayon watercolor resist painting.<br><br>I can create an array using a ruler and pencil.<br><br>I can determine factors of 54. |

## GEORGIA STANDARDS

| Curriculum Standards | Arts Standards |
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| **Math**<br>**Grade 3:**<br>3.GSR.7: Identify area as a measurable attribute of rectangles and determine the area of a rectangle presented in real-life, mathematical problems.<br><br>3.GSR.8: Determine the perimeter of a polygon presented in real-life, mathematical problems.<br><br>3.PAR.3: Use part-whole strategies to solve real-life, mathematical problems involving multiplication and division with whole numbers within 100.<br><br>**Grade 4**<br>4.PAR.3: Generate and analyze patterns, including those involving shapes, input/output diagrams, factors, multiples, prime numbers, and composite numbers.<br>4.GSR.8: Identify and draw geometric objects, classify polygons based on properties, and solve problems involving area and perimeter of rectangular figures.<br><br>**Grade 5**<br>5.NR.2: Multiply and divide multi-digit whole numbers to solve relevant, mathematical problems.<br><br>**Science**<br>**Grade 4:**<br>S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle.<br>a.Plan and carry out investigations to observe the flow of energy in water as it changes states from solid (ice) to liquid (water) to gas (water vapor) and changes from gas to liquid to solid.<br>b.Develop models to illustrate multiple pathways water may take during the water cycle (evaporation, condensation, and precipitation). | **Grade 3:**<br>VA3.CR.1 Engage in the creative process to generate and visualize ideas by using subject matter and symbols to communicate meaning.<br><br>VA3.CR.2 Create works of art based on selected themes.<br><br>VA3.CR.3 Understand and apply media, techniques, processes, and concepts of two dimensional art.<br><br>VA3.RE.1 Use a variety of approaches for art criticism and to critique personal works of art and the artwork of others to enhance visual literacy.<br><br>**Grade 4:**<br>VA4.CR.1 Engage in the creative process to generate and visualize ideas by using subject matter and symbols to communicate meaning.<br><br>VA4.CR.2 Create works of art based on selected themes.<br><br>VA4.CR.3 Understand and apply media, techniques, processes, and concepts of two dimensional art.<br><br>VA4.CN.3 Develop life skills through the study and production of art (e.g. collaboration, creativity, critical thinking, communication).<br><br>**Grade 5:**<br>VA5.CR.1 Engage in the creative process to generate and visualize ideas by using subject matter and symbols to communicate meaning.<br><br>VA5.CR.2 Create works of art based on selected themes.<br><br>VA5.CR.3 Understand and apply media, techniques, processes, and concepts of two dimensional art. |

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| **Grade 5:**<br>S5P1. Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change.<br>a.Plan and carry out investigations of physical changes by manipulating, separating and mixing dry and liquid materials. | VA5.CN.3 Develop life skills through the study and production of art (e.g. collaboration, creativity, critical thinking, communication). |

## SOUTH CAROLINA STANDARDS

| Curriculum Standards | Arts Standards |
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| **3rd Grade**<br>3.ATO.1 Use concrete objects, drawings and symbols to represent multiplication facts of two single-digit whole numbers and explain the relationship between the factors (i.e., 0 – 10) and the product.<br>3.ATO.2 Use concrete objects, drawings and symbols to represent division without remainders and explain the relationship among the whole number quotient (i.e., 0 – 10), divisor (i.e., 0 – 10), and dividend.<br>3.ATO.3 Solve real-world problems involving equal groups, area/array, and number line models using basic multiplication and related division facts. Represent the problem situation using an equation with a symbol for the unknown<br><br>**4th Grade**<br>4.ATO.1 Interpret a multiplication equation as a comparison (e.g. interpret 35 = 5x7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.) Represent verbal statements of multiplicative comparisons as multiplication equations.<br>4.ATO.2 Solve real-world problems using multiplication (product unknown) and division (group size unknown, number of groups unknown). | **Anchor Standard 1:** I can use the elements and principles of art to create artwork.<br><br>**Anchor Standard 2:** I can use different materials, techniques, and processes to make art.<br><br>**Anchor Standard 5:** I can interpret (read) and evaluate the meaning of an artwork.<br><br>**Anchor Standard 7:** I can relate visual arts ideas to other arts disciplines, content areas, and careers. |

## KEY VOCABULARY

| Content Vocabulary | Arts Vocabulary |
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- Array - A way of arranging objects or images in rows and columns
- Multiplication - Repeated addition of numbers of the same size
- Division - Repeated subtraction of numbers of the same size
- Factor - A number that can be used to evenly divide into another number

- 7 Elements of Art - Line, shape, form, texture, color, value, space
- Line - One of the seven Elements of Art; it is a mark made by a pointed tool such as a brush, pen or stick; a moving point.
- Shape - One of the seven Elements of Art; it is a flat, enclosed area that has two dimensions, length and width. Artists use both geometric and organic shapes.
- Space - How the Elements of Art are organized in an artwork. It is used to create the illusion of depth. Space can be two-dimensional, three-dimensional, negative and/or positive.
- Watercolor wash - A layer of watercolor that completely covers a surface and is translucent
- Variegated watercolor wash - A watercolor wash that transitions from one color to another color
- Crayon watercolor resist - The process of using crayon or oil pastel (oil based) to draw on a surface and then covering it with a watercolor wash.
- Mosaic - An artform that is a picture or pattern produced by arranging together small colored pieces of hard material, such as stone, tile, or glass. *(Oxford Languages)*
- Composition - The way the Elements of Art are arranged in an artwork
- Warm colors - Red, orange, yellow
- Cool colors - Green, blue, violet
- Analogous colors - Colors next to each other on the color wheel (Example: red, orange, yellow)

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| | • Complementary colors - Colors across from each other on the color wheel (Example: Orange and blue)<br><br>• Contrast - An arrangement of opposite elements in a composition to create visual interest |

## MATERIALS

- 12x18-inch black construction paper
- 9x6-inch white mixed-media paper
- Crayons or oil pastels in warm and cool colors
- Watercolor set
- Paintbrushes
- Water cups with water
- Ruler
- Pencil
- Scissors
- Glue sticks

## INSTRUCTIONAL DESIGN

**Opening/Activating Strategy**

- Show students an image of an ancient Roman mosaic on a board (Examples of ancient Roman mosaics).
- Ask students to identify as many geometric shapes as they can in the image.
- Have students compare their findings with a partner.
- Then, ask students to take turns outlining the shapes on the board.
- Explain that Shape is one of the seven elements of art that they will be using to create their own mosaic.
- Show students where the ancient Roman Empire was in relationship to where students live.
- Define for students what a mosaic is.
- Briefly go over the 7 Elements of Art. Ask students to identify as many as they can in the image of the ancient Roman mosaic.

**Work Session**

- Explain that students will be focusing on Line, Shape, Space, and Color in their mosaic.
- Demonstrate to students how to create a 6x9-in array using pencil and ruler.
  *Teacher tip: Have students mark their paper at each one inch interval around the entire paper. Then, have students connect the marks to create an array.*
- Ask students to use mathematical concepts that they have learned to determine how many 1-inch squares they have.
- Ask students to identify the area and perimeter using mathematical strategies.

- Tell students that in the next step, they will be creating a watercolor-resist painting. They will draw with crayon and paint over the crayon with watercolor. The wax in the crayon will "resist" the water in the watercolor.
- Show students a color wheel.
    - Discuss the different ways we can organize colors into color schemes: Warm, cool, complementary, and analogous (see color wheel)
    - Tell students that they will be drawing lines and shapes over the entire surface of their paper using **either** warm **OR** cool colored crayons.
- Tell students that next they will be painting over the entire surface of the paper in watercolor. Show students how to create a variegated watercolor wash using the video.
    - Students should create a variegated watercolor wash in warm colors if students used cool colored crayons; students should use cool colors if they used warm colored crayons. This will create contrast.
    - Direct students to make observations about the water cycle as they watch the water in the watercolor evaporate and the paper dry. Ask students if this is a chemical or physical change.
- Once the watercolor wash is mostly dry, students should cut out each square and divide them into equal groups using factors of 54.
- Explain that students are going to arrange their groups (factors of 54) in a composition on their black paper. Once they have arranged them, they will glue them down.
    - Composition is how an artist arranges the elements of art, like line, shape, and color, in their artwork.
      *Teacher tip: Have students place all of their pieces on their paper BEFORE beginning to glue them down.*

**Closing/Reflection**

- Have students explain to a partner how they grouped their pieces of the watercolor-resist into factors of 54 in their mosaic.
- Ask students to explain how they determined the size of their groupings.
- Ask students to identify which elements of art they used in their mosaic.

## ASSESSMENTS

**Formative**

Teachers will assess understanding through the:

- Shapes students identified in Roman mosaic
- Students' ability to group pieces of mosaic into factors of 54
- Students' color choices (checking for understanding of warm and cool colors)

**Summative**

**CHECKLIST**

- Students will demonstrate what they learned by creating a watercolor crayon resist mosaic that utilizes contrasting warm and cool colors and demonstrates that they can arrange watercolor pieces in factors of 54 in a compositionally interesting way on their paper.

## DIFFERENTIATION

**Acceleration:** Instead of using 1x1-inch squares, have students determine other ways to divide their paper into equal sections (example).

**Remediation:**

- Rather than creating a watercolor resist, have students use construction paper in contrasting colors to create their mosaic.
- Students can also fold paper into equal sections instead of using a ruler to measure equal sections before cutting.
- Provide an array for students rather than having students create their own with rulers.

## ADDITIONAL RESOURCES

- Color wheel
- How to create a variegated watercolor wash video
- Examples of ancient Roman mosaics
- Example of Mosaic 1; with factors of 54
- Example of Mosaic 2: with factors of 54

**This integrated lesson provides differentiated ideas and activities for educators that are aligned to a sampling of standards. Standards referenced at the time of publishing may differ based on each state's adoption of new standards.*

*Ideas contributed by: Katy Betts*