



**UNIT: CREATIVE CALCULATIONS–MULTIPLICATION AND DIVISION
MOSAICS AND MATH**

Grade Band: 4

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
How can you utilize multiplication and division to create a mosaic?	I can use multiplication and division to create a mosaic.
How can you use an array to determine factors of a given number?	I can use crayon and watercolor to create a crayon watercolor resist painting.
	I can determine factors of a given number.



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GEORGIA STANDARDS

Curriculum Standards	Arts Standards
<p>4.NR.2.3 Solve relevant problems involving multiplication of a number with up to four digits by a 1-digit whole number or involving multiplication of two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p>4.NR.2.5 Solve multi-step problems using addition, subtraction, multiplication, and division involving whole numbers. Use mental computation and estimation strategies to justify the reasonableness of solutions.</p>	<p>VA4.CR.1 Engage in the creative process to generate and visualize ideas by using subject matter and symbols to communicate meaning.</p> <p>VA4.CR.2 Create works of art based on selected themes.</p> <p>VA4.CR.3 Understand and apply media, techniques, processes, and concepts of two dimensional art.</p> <p>VA4.CN.3 Develop life skills through the study and production of art (e.g. collaboration, creativity, critical thinking, communication).</p>

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
<p>4.NSBT.5 Multiply up to a four-digit number by a one-digit number and multiply a two-digit number by a two-digit number using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using rectangular arrays, area models and/or equations.</p> <p>4.NSBT.6 Divide up to a four-digit dividend by a one-digit divisor using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.</p>	<p>Anchor Standard 1: I can use the elements and principles of art to create artwork.</p> <p>Anchor Standard 2: I can use different materials, techniques, and processes to make art.</p> <p>Anchor Standard 7: I can relate visual arts ideas to other arts disciplines, content areas, and careers.</p>

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
<ul style="list-style-type: none"> <u>Equation</u> - A mathematical sentence that has two equal sides separated by an equal sign <u>Array</u> - A way of arranging objects or images in rows and columns 	<ul style="list-style-type: none"> <u>Line</u> - A continuous mark made on some surface by a moving point. It may be two dimensional, like a pencil mark on a paper or it may be three dimensional (wire) or implied (the edge of a shape or form) often it is an outline, contour or



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- Multiplication - Repeated addition of numbers of the same size
- Factors - The integers that divide that number without leaving a remainder
- Product - The result of multiplying two or more numbers together
- Division - Repeated subtraction of numbers of the same size

silhouette.

- Shape - A flat, enclosed line that is always two-dimensional and can be either geometric or organic
- Space - The distance or area between, around, above or within things. **Positive** space refers to the subject or areas of interest in an artwork, while **negative** space is the area around the subject of an artwork. It can be a description for both two and three-dimensional portrayals.
- Watercolor wash - A layer of watercolor that completely covers a surface and is translucent
- Watercolor resist - A technique where specific areas of a paper being painted with watercolor are protected from absorbing paint using a resist material, such as wax (like a crayon or oil pastel) or tape
- 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 - How an artist arranges the Elements of Art (line, shape, form, value, color, space, texture) to create an artwork
- Warm colors - Yellow, orange, red (and shades of each)
- Cool colors - Purple/violet, blue, green (and shades of each)
- Analogous colors - Colors next to each other on the color wheel (Example: red, orange, yellow)
- Complementary colors - Colors that are across from each other on the color



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wheel (Example: Orange and blue)

- Contrast - The arrangement of opposite elements in a composition (light vs. dark, rough vs. smooth, etc.) Similar to **variety**, which refers to the differences in a work, achieved by using different shapes, textures, colors and values.

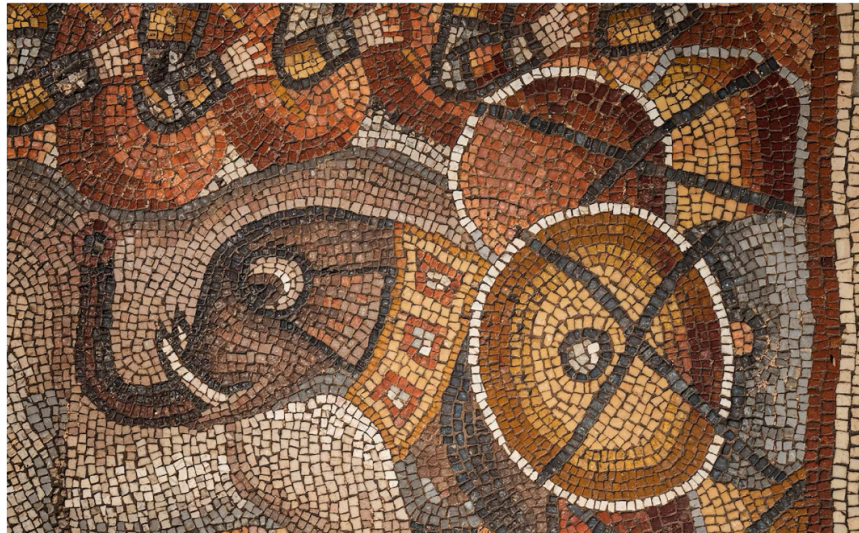
MATERIALS

- 9 x 12-inch black construction paper
- Printed [10x10 arrays](#) on cardstock
- Crayons or oil pastels in a variety of colors
- Watercolor set
- Paintbrushes
- Water cups with water
- Pencil
- Scissors
- Glue sticks
- Paper towels
- [Color wheel](#)

INSTRUCTIONAL DESIGN

Opening/Activating Strategy

- Show students an image of an ancient mosaic, such as the image below, on the board ([Examples of ancient Roman mosaics](#)).



- Ask students to identify the colors, lines, and shapes that they see in the artwork.
- Have students compare their findings with a partner.
- Ask students how they think this artwork was made.

- Define for students what a mosaic is. Explain that a mosaic is an artform in which an image is created by putting together separate pieces of material, such as small square stones.
 - Students should understand that in a mosaic, the image is created by combining individual pieces of a material.
- Explain that Shape is one of the seven elements of art that they will be using to create their own mosaic.
- *Optional: For context, show students where the [ancient Roman Empire](#) was in relationship to where students live.*

Work Session

Teacher notes:

- *Based on how much time you have available, this artwork can be created without adding a watercolor wash. Students can use crayons, colored pencils, markers, oil pastels, etc. to create designs on their array.*
- *This lesson can be chunked over multiple days.*

Introduce the Artwork:

- Explain that students will be focusing on the Elements of Art: Line, Shape, and Space, in their mosaic.
- Show students an example of an array ([sample array](#)).
- Ask students to use mathematical concepts that they have learned to determine how many unit squares they have.
- Next, ask students how many factor pairs there are and what the factors are in order of least to greatest.
- Pass out a [10x10 array](#) printed on cardstock.
- Have students select one factor pair of 24. Students should use the 10x10 array to create an array of their factor pair (or allow them to create their own array if they want to do 1 x 24 or 2 x 12).
- 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.
 - Encourage students to draw various types of overlapping lines to their array. Give students three to five minutes to add lines to their array.
- *Optional: 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 next they will be painting over the entire surface of the paper in watercolor. A watercolor wash is an even coat of paint that covers the entire surface of the paper. Students should **paint over** the crayon or oil pastel.
 - Project the image of the [color wheel](#). Ask students to choose a color(s) for their watercolor wash that is different from the colors they already used. This will create contrast, so that their crayon or oil pastel will show up.
- While the watercolor is drying, show students examples of finished artwork. Ask students what multiplication or division problems are represented in each of the artworks.



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- Next, have students plan their mosaic artwork on a scratch piece of paper. Their plans should show the image they are creating out of equal groups.
 - Circulate and check that students understand how they will be creating an image out of equal groups.
- Once the watercolor wash is mostly dry, students should cut out each square and divide them into their predetermined equal groups.
- Explain that students are going to arrange their equal groups in a composition on their black paper. Once they have arranged them, they will glue them down.
 - *Teacher tip: Have students place all of their pieces on their paper BEFORE beginning to glue them down. This will allow students to plan spatially as well as for the teacher to ensure that they have equal groups.*
- Students should write their multiplication or division problem on their artwork or on a notecard to be displayed with their artwork.

Closing/Reflection

- Have students explain to a partner how they created their mosaic using equal groups.
- Ask students to identify which elements of art they used in their mosaic.

ASSESSMENTS

Formative

- Teachers will assess understanding through:
 - Discussion of the example mosaic in the activator
 - Students' discussion of the factors of a given number
 - Students' ability to group pieces of mosaic into factors of the total number provided by the teacher
 - Students' plans for their final artwork

Summative

CHECKLIST

- Students will demonstrate what they learned by creating a mosaic made by arranging pieces in equal groups to make an image.
- Students can express their artwork in terms of a multiplication or division problem.



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DIFFERENTIATION

Acceleration:

- Instead of using squares, have students determine other ways to divide their paper into equal sections ([example](#)) or allow them to create arrays of a different shape, such as circles.
- Allow students to create their own arrays using rulers.
- Give students different numbers to use to create their mosaic, such as 36 or 49.

Remediation:

- Rather than creating a watercolor resist, have students use construction paper in contrasting colors to create their mosaic.
- Provide students with a smaller number, such as 12.

ADDITIONAL RESOURCES

- [Examples of ancient Roman mosaics](#)

CREDITS

U.S. Department of Education- STEM + the Art of Integrated Learning
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**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.*

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