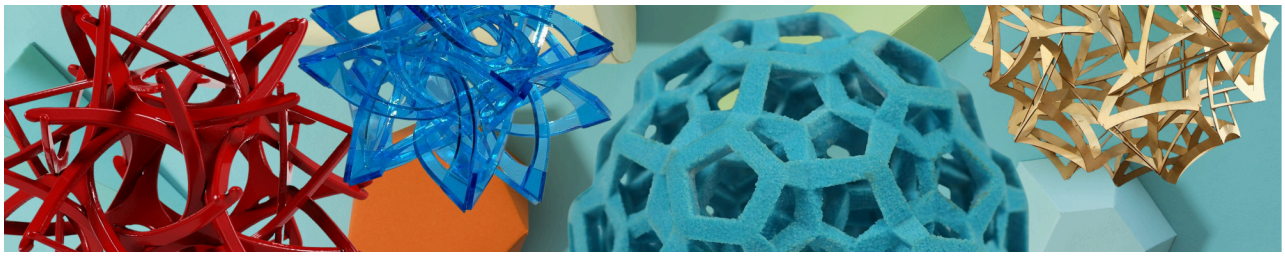
artsNOW
Integrated learning solutions

MONUMENTAL SCULPTURE
Grade Band: 6-8
Content Focus: Visual Arts & Math



LEARNING DESCRIPTION

Discover the endless possibilities of paper sculpture! Let your imagination soar as you dive into this collaborative art-making process, creating large-scale, non-objective sculptures. Students will participate in the design process and analyze their sculptures through the lens of geometric concepts.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How can art-making become a team building process? How are mathematical concepts used in art?	I can work collaboratively to create a geometric sculpture in the round that demonstrates geometric concepts. I can use the design process to design, create, and refine a sculpture in the round.

	I can describe my sculpture in mathematical terms.

GEORGIA STANDARDS

Curriculum Standards	Arts Standards
Grade 6: 6.MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals. 6.GSR.5.1 Explore area as a measurable attribute of triangles, quadrilaterals, and other polygons conceptually by composing or decomposing into rectangles, triangles, and other shapes. Find the area of these geometric figures to solve problems. **Grade 7:** 7.MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals. **Grade 8:** 8.MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals. 8.GSR.8.1 Explain a proof of the Pythagorean Theorem and its converse using visual models. 8.GSR.8.3 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system in practical, mathematical problems.	**Grade 6:** VA6.CR.1 Visualize and generate ideas for creating works of art. VA6.CR.2 Choose from a range of materials and/or methods of traditional and contemporary artistic practices to plan and create works of art. **Grade 7:** VA7.CR.1 Visualize and generate ideas for creating works of art. VA7.CR.2 Choose from a range of materials and/or methods of traditional and contemporary artistic practices to plan and create works of art. **Grade 8:** VA8.CR.1 Visualize and generate ideas for creating works of art. VA8.CR.2 Choose from a range of materials and/or methods of traditional and contemporary artistic practices to plan and create works of art.

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
Grade 6: 6.GM.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. 6.GM.4 Unfold three-dimensional figures into two-dimensional rectangles and triangles (nets) to find the surface area and to solve real-world and mathematical problems. **Grade 7:** 7.GM.6 Apply the concepts of two- and three-dimensional figures to real-world and mathematical situations. a. Understand that the concept of area is applied to two-dimensional figures such as triangles, quadrilaterals, and polygons. **Grade 8:** 8.GM.6 Use models to demonstrate a proof of the Pythagorean Theorem and its converse. 8.GM.7 Apply the Pythagorean Theorem to model and solve real-world and mathematical problems in two and three dimensions involving right triangles.	**Anchor Standard 1:** I can use the elements and principles of art to create artwork. **Anchor Standard 2:** I can use different materials, techniques, and processes to make art. **Anchor Standard 5:** I can interpret and evaluate the meaning of an artwork. **Anchor Standard 7:** I can relate visual arts ideas to other arts disciplines, content areas, and careers.

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
• Area - The measure of the amount of space inside the boundary of a two-dimensional shape • Perimeter - The total distance around the boundary of a two-dimensional shape	• Construction - A type of sculpture in which materials are physically joined together to make a whole • Sculpture in the round - A three-dimensional structure that is meant to be viewed from all sides • Line - The path of a moving point

- Acute angle - An angle measuring less than 90 degrees
- Right angle - A 90 degree angle
- Obtuse angle - An angle measuring greater than 90 degrees
- Isosceles triangle - A type of triangle that has at least two sides of equal length
- Equilateral triangle - A type of triangle in which all three sides are of equal length
- Scalene triangle - A type of triangle in which all three sides have different lengths
- Right triangle - A triangle that has a right angle
- Parallel lines - Lines that will never touch
- Perpendicular lines - Lines that intersect forming a 90 degree angle
- Pythagorean Theorem -
- Design process - A systematic, iterative method used by engineers to solve problems
- Balance - Possessing equilibrium or equal distribution of weight
- Counter balance - A weight balancing another weight
- Shape - A two-dimensional enclosed line; in art, shape can be geometric or organic/freeform

MATERIALS

- Newspaper or newsprint sheets 24” x 36” (computer paper or lined paper can be substituted)
- Masking tape
- Pencils and sketch paper
- Yardstick or measuring tape to measure dimensions of finished sculpture

INSTRUCTIONAL DESIGN

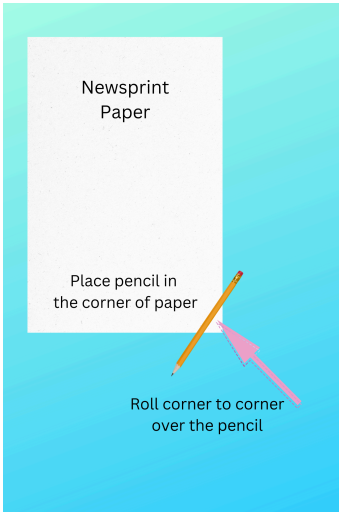
Opening/Activating Strategy

Classroom Tips: Have ample space in the room so groups can move far enough apart during the creating process to enable maximum space for the construction process.

- Show students an image of "Mutual Support" by George Hart. Do not tell students the name of the sculpture.
- Ask students to work collaboratively to make at least ten objective observations about the sculpture (i.e. color, line, angles, overall shape, etc.).
    - Have students share observations as a whole class.
- Next, ask students to guess how Hart constructed the sculpture. Have students share ideas as a class. Students should justify their answers by referring to specific things that they can see in the sculpture.
- Show students the title of the sculpture, "Mutual Support". Ask students how the design of the sculpture demonstrates the name.
- Tell students that this is an example of sculpture in the round.
    - Tell students that sculpture is always three-dimensional and that sculpture in the round means that the viewer can walk all the way around the sculpture to view it from all sides.

Work Session

- Tell students that in this lesson, they will be creating sculptures in the round inspired by the work of George Hart.
- Introduce the design process to students.
- Next, divide students into groups of 2-4.
- Begin by demonstrating how to create building sticks by rolling sheets of newsprint from corner to corner using a pencil as a guide. The sticks are fastened at the end with a small piece of masking tape.
    - Each team will need 20 sticks total.



- Ask students to experiment with the types of geometric shapes they can create with the sticks. Tell students that in their actual sculptures, they can bend the sticks to make smaller shapes.
- Next, have students make a basic drawn design for their sculpture *(Grade 8 students should focus on incorporating right triangles in order to utilize the Pythagorean Theorem).*
    - Tell students that they will need to start with a triangular or square base.
    - Remind students that a sculpture is always three-dimensional, so their final sculpture should not be flat.
    - Tell students that their sculptures must meet the following guidelines:
        - Sculptures must be made up of geometric shapes.
        - Constructions must be three-dimensional.
        - All materials must be fully incorporated into the group constructions.
        - Constructions must be able to stand on their own and be transported easily.
- Students will work intuitively attaching sticks with masking tape until their construction is completed.
- Encourage students to be mindful of strong construction, balance, and counter balance.
- Once sculptures are complete, students will:
    - Calculate the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes.
    - Grade 8 students will use right triangles in their sculptures to demonstrate a proof of the Pythagorean Theorem in their design and sculptures.

Closing/Reflection

- Students will reflect on the design process. Students should look at their original sketches and observe how their final product changed through the creation process.
    - Students should reflect on the following questions. This can be written or done orally through conversation.
        - How did the design change?
        - Why did the design change?
        - What design choices did you make to ensure that your sculpture could stand on its own?
        - If you were to design and create this artwork again, what would you do differently?
- Students will present their sculptures to their peers, as a whole group or several small groups can present to each other, and discuss how their design changed from the original design to the final sculpture.

ASSESSMENTS

Formative

Teachers will assess students' understanding of the content throughout the lesson by observing students' participation in the activator, collaboration during the design process and sculpture creation, and conferencing with students throughout the creative process.

Summative

CHECKLIST

- Students can work collaboratively to create a geometric sculpture in the round that demonstrates geometric concepts.
- Students can use the design process to design, create, and refine a sculpture in the round.
- Students can describe their sculpture in mathematical terms.

DIFFERENTIATION

Acceleration: Have students write step by step detailed instructions to tell another person how to recreate their sculpture using mathematical concepts. If time permits, two groups can swap instructions and attempt to build each other's sculptures. Then, the groups should reflect on the results and evaluate the clarity of their written instructions.

Remediation:

- Show students an example of a completed sculpture so that students can visualize the end result. Analyze how the sculpture was created so that students can see the steps needed to create their sculpture.
- Provide an alternative to creating paper sticks, such as straws.

ADDITIONAL RESOURCES

- Sculptures by George Hart

**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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