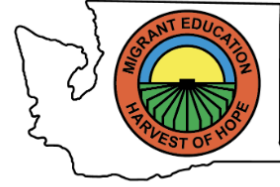




Washington Office of Superintendent of
PUBLIC INSTRUCTION



ARTS IMPACT LESSON PLAN

Theater and Math Infused Lesson

Geometry in Action

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Grade Level: 6th



Enduring Understanding

Constructing and calculating surface areas of prisms and pyramids deepens students' understanding of how all surfaces come together to form a complete three-dimensional object, help them to visualize and manipulate three-dimensional objects, and increase understanding of spatial reasoning. These are fundamental skills in the fields of architecture, engineering, and art, among others. Working in groups increases communication and collaborative skills, skills essential for academic success and social development.

Lesson Description (Use for family communication and displaying student art)

Students construct 3D prisms or pyramids. They calculate the surface area of their shapes. Then they transform the shapes into a prop and create a scene that shows that prop in action.

Learning Targets and Assessment Criteria

Target: Understands the area of a geometric solid.

Criteria: Computes the area of a rectangular prism, triangular prism, square pyramid or triangular pyramid.

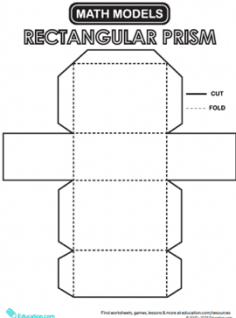
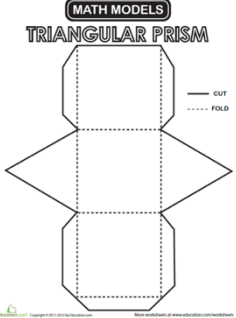
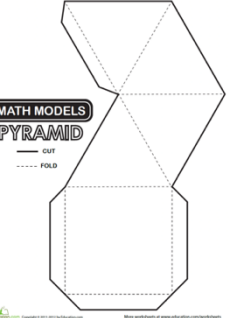
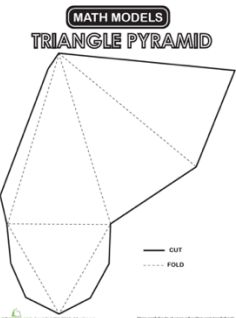
Target: Understands how surface area of 2D shapes combine to find the area of a 3D geometric solid.

Criteria: Creates a 3D representation using nets made up of rectangles, squares, and triangles.

Target: Uses shapes to represent an object.

Criteria: In small groups, create a short scene incorporating the shape as a theatrical property.

Vocabulary	Materials	Learning Standards
<p>Arts Infused: Shape</p> <p>Math: 3D Apex Circle Cube Net Prism</p>	<p>Museum Artworks or Performance Seattle Art Museum: https://www.seattleartmuseum.org/ Tacoma Art Museum: https://www.tacomaartmuseum.org/</p>	<p>WA Arts Learning Standards For the full description of each anchor standard and the grade level performance standards, see: https://ospi.k12.wa.us/student-success/resources-subject-area/arts/arts-k%E2%80%9312-learning-standards</p> <p>Anchor Standard 2: Organize and develop artistic ideas and work. Performance Standard (TH:Cr2.1.6): a. Use critical analysis to improve, refine, and evolve original ideas and artistic choices in a devised or scripted drama/theatre work. b. Contribute ideas and</p>

<p>Pyramid Rectangle Rhombus Solid Square Surface Area Trapezoid Triangle Vertex</p> <p>Arts: Action Prop Scene</p>	<p>ArtsWa: https://www.arts.wa.gov/my-public-art-portal/</p> <p>Frye Art Museum: https://collection.fryemuseum.org/</p> <p>Education.com: https://www.education.com/resources/grade-k-2/math/geometry/three-dimensional-shapes/?arts-crafts=arts-crafts</p>    	<p>accept and incorporate the ideas of others in preparing or devising a drama/theatre work.</p> <p>Anchor Standard 3: Refine and complete artistic work.</p> <p>Performance Standard (TH:Cr3.1.6): a. Articulate and examine choices to refine a devised or scripted drama/theatre work.</p> <p>Anchor Standard 4: Select, analyze, and interpret artistic work for presentation.</p> <p>Performance Standard (TH:Pr4.1.6): Experiment with various physical choices to communicate character in a drama/theatre work.</p> <p>Common Core State Standards (CCSS) in Math https://ospi.k12.wa.us/student-success/resources-subject-area/math/ematics</p> <p>6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>CCSS Mathematical Practices</p> <p>MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics. MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.</p> <p>21st Century Skills Washington Career and Technical Leadership Skills: https://ospi.k12.wa.us/sites/default/files/public/careertech/pubdocs/washingtoncteleadershipskills.pdf</p> <p>Communication</p> <p>3.A Communicate clearly. 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions</p> <p>Collaboration</p> <p>3.B Collaborate with others. 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member</p>
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	<p>Materials Rulers Scissors</p> <p>Pencils Erasers Pencil Sharpeners Cardstock, 8.5x11" Painter's tape, .5" wide Templates printed on copy paper: rectangular prism triangular prism square pyramid triangular pyramid Box for cutout shapes Class assessment worksheet</p>	
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ICON KEY:

□ = Indicates note or reminder for teacher

▣ = Embedded assessment points in the lesson

Pre-Teach

Teach the difference between a prism and a pyramid. A pyramid is a 3D solid shape with a polygonal (triangle, square, rectangle, pentagon, etc.) base and triangular sides that meet at a point called the apex or vertex. A prism is a 3D solid shape with two identical and parallel shapes facing each other with a polygonal (triangle, square, rectangle, pentagon, etc.) base. Prisms have two congruent bases and pyramids have only one.

Calculate area, surface area and volume of a rectangular prism, triangular prism, square pyramid, and triangular pyramid using the correct formula for area, surface area and volume.

Lesson Steps Outline

Day One

1. Lead warm-up with students in small groups collaboratively creating geometric shapes (square, circle, triangle, rectangle, trapezoid, rhombus) with their bodies (arms and legs).

2. Model for students how to construct a 3D prism of a cube from paper using precise measuring, cutting, and assembling with tape.

3. Guide students in construction of prisms and pyramids from cardstock using precise measuring, cutting, and assembling with tape.

□ **Summative Assessment:** Creates a 3 Dimensional representation using nets made up of rectangles, squares, and triangles.

4. Direct students to calculate and present the surface area of their shapes.

□ **Summative Assessment:** Computes the area of a rectangular prism, triangular prism, square pyramid or triangular pyramid.

Day Two

1. Lead warm up with students cutting cardstock shapes from a list of shapes.

2. Model pulling out a shape from the box and turning into a prop for a scene.

3. Guide students as they create and present a scene with their group using the prop.

□ **Formative Assessment:** Small groups create a short scene incorporating the shape as a prop.

4. Guide creation of scenes with different shapes.

□ **Summative Assessment:** Small groups create a short scene incorporating the shape as a theatrical property.

5. Guide full group reflection.

LESSON STEPS

Day One

1. Lead warm up, prompt students to make 2D and 3D shapes with their bodies.

In a group, have students make 2D shapes with their bodies (arms and legs): square, circle, triangle, rectangle, trapezoid, rhombus. Then, guide them in making 3D solid shapes with their bodies.

- *Gather in a group of 5 or 6. With your group, I want you to make a circle with your bodies. Now, try a square..., rectangle..., triangle..., trapezoid..., rhombus....*
- *Reminder: You can use the floor, your arms, your legs, and different parts of your bodies to make the shapes.*
- *A 2D shape in math and art is called a **shape**. A 3D shape in math is called a **solid** (in art it is called a form).*
- *Now, see if you can make a 3D cube..., rectangular prism..., triangular prism..., pyramid with a triangular base..., pyramid with a square base....*

2. Model for students how to construct a 3D prism of a cube.

- *I am going to create a cube out of paper and tape. If I'm going to create a cube, how many sides will I need? What characteristics do squares have?*
- *I am going to model measuring and cutting one of the sides of the cube and then we will show you how to put them together with the other sides I have cut out.*

□ The teacher demonstrates creating a cube.

3. Guide construction of prisms or pyramids.

Each group will be assigned a prism or a pyramid to construct depending on if they have 4, 5 or 6 people. 6 people will make a rectangular prism, and 5 people will make a triangular prism or square pyramid, and 4 people will make a triangular pyramid. Each group will be given rulers, scissors, cardstock, and painters tape. Each group will figure out with guidance on how to measure, cut and construct their pyramid or prism.

- *If you are in a group with 6 people, you will be creating a **rectangular prism**. Groups with 5 people will create either a **triangular prism** or a **square pyramid**. Groups of 4 will create a **triangular pyramid**.*
- *Use the templates to see what your geometric shape looks like in 2D format. This is called a **net**.*
- *Measure, compare and discuss the measurements of each section of the geometric solid your group will be building. This will help you create and build the shape assigned to your group.*

- *Cut out and assemble the 2D net of your shape to create a 3D solid structure.*
- *Measure, compare and discuss the measurements of each section of the 3D structure.*
- *Using the information gained from inspecting the flat 2D template and the 3D structure, collaborate with your group on creating your assigned 3D structure. Make sure you double- and triple-check your measurements before cutting.*

□ Summative Assessment: Create a 3D representation using nets made up of rectangles, squares, and triangles.

4. Direct students to calculate and present the surface area of their shapes.

Once they have created their prism or pyramid, they will need to compute the surface area of their shape and present their findings to the class.

- *Once you have cut out and assembled your 3D solid, I want you to compute the area of your shape.*
- *To find the surface area of a triangle: $\text{Base} \times \text{Height} \div 2 = \underline{\hspace{2cm}}$ (square cm or in)*
- *To find the surface area of a rectangle or square: $\text{Length} \times \text{Height} = \underline{\hspace{2cm}}$ (square cm or in)*
- *How will you figure out the surface area of the whole 3D solid?*
- *Present your shape and the measurements of each side. What is the surface area? The winning group to answer will get a jolly rancher per person.*

□ Summative Assessment: Computes the area of a rectangular prism, triangular prism, square pyramid or triangular pyramid.

Day Two

1. Lead warm up.

Give students card stock and have students cut out a shape from a list of shapes.

- *For 5 minutes I want you to cut out 1-2 different shapes and we will place them in a box. The shape size should take up the full paper.*

2. Model pulling out a shape from the box and turning into a theatrical property for a short scene.

- *In the theatre there is a word used to label anything that is held in your hand and used in a scene. That word is a prop. So, we are going to change the shape drawn from the box into a prop and create a scene that shows that prop in action.*
- *You could also turn the shape into a costume piece, like a hat, or a piece of jewelry.*
- (Take a shape from the box) *What can I turn this shape into?*

Teachers create a short scene incorporating the shape/prop into the action.

3. Guide students as they create and present a scene with their group using the prop.

Working in the same group from the previous session, instruct each individual in the group to draw one shape from the box. As a group, they must create a short scene that demonstrates their shapes in action as props, costumes, or other objects that make sense in the scene.

- *Once you have your shapes, you have a few minutes to decide what they could be and create a short scene that shows the shapes in action.*
- *Remember everyone needs to participate in the scene. An actor can also be part of the scenery or an object.*

Each group will present a short scene with their one prop.

□ Formative Assessment: With a small group creates a short scene incorporating a prop.

4. Guide creation of scenes with different shapes.

Repeat the same process with the groups using different shapes and continue if time permits.

Variation: Group can choose the shapes they want to use.

□ Summative Assessment: With a small group creates a short scene incorporating a prop.

5. Guide full group reflection.

- *What did you have to do to make us believe your shape was the prop you intended it to be?*
- *What did you notice other groups did to make us believe their prop was real?*

VARIATIONS ON THIS LESSON that build in complexity:

Depending on time available, the creation of 3D objects could be done in multiple ways to build on learning:

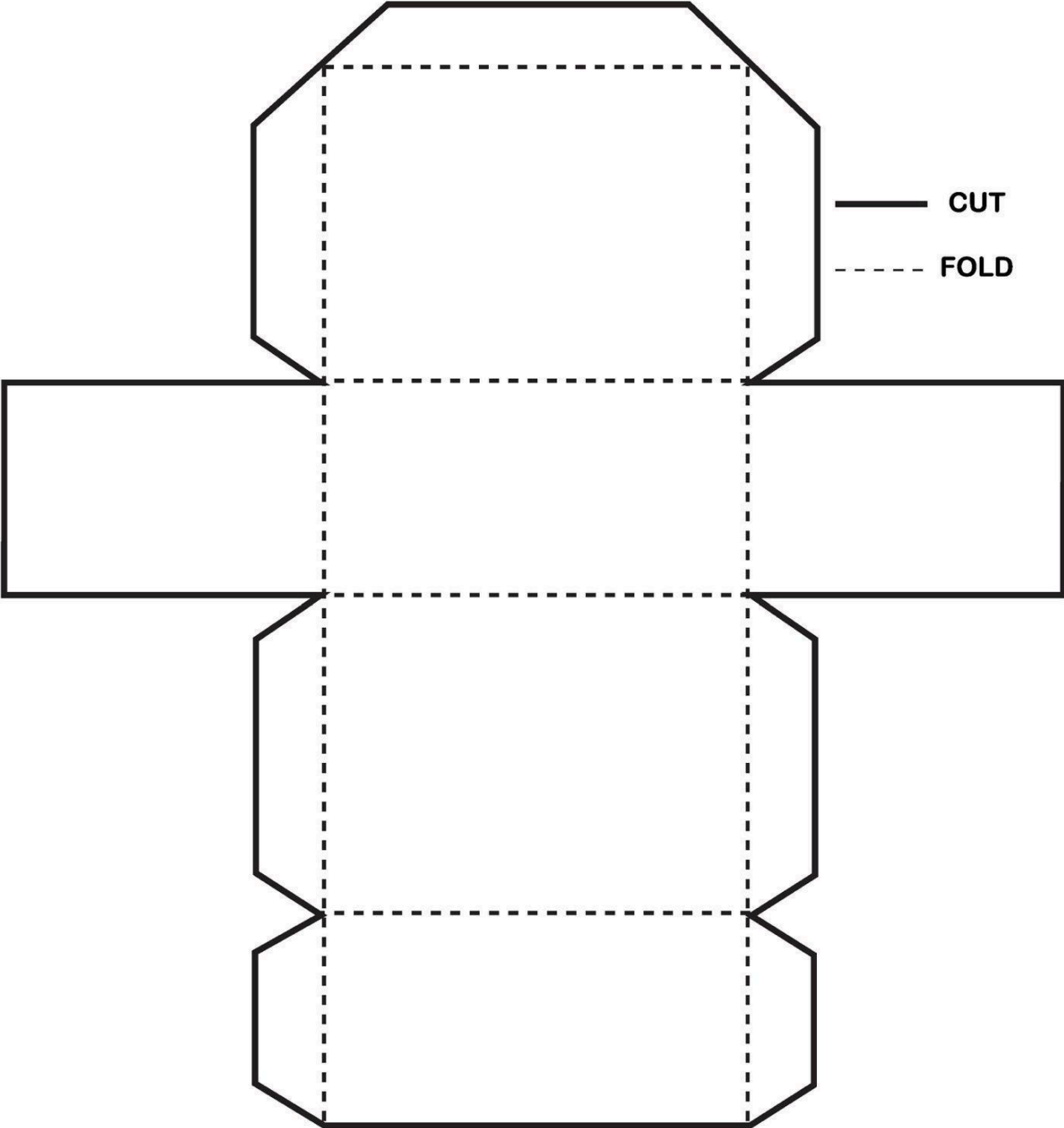
STUDENT GROUPS start by all creating the same shape as a class, meaning each group begins by creating their own cube after the teacher demonstrates.

STUDENT GROUPS then create a new shape using a provided template.

STUDENT GROUPS then create another shape "free hand." They must cut out the shapes without the aid of a template and engineer how to design and construct the shape.

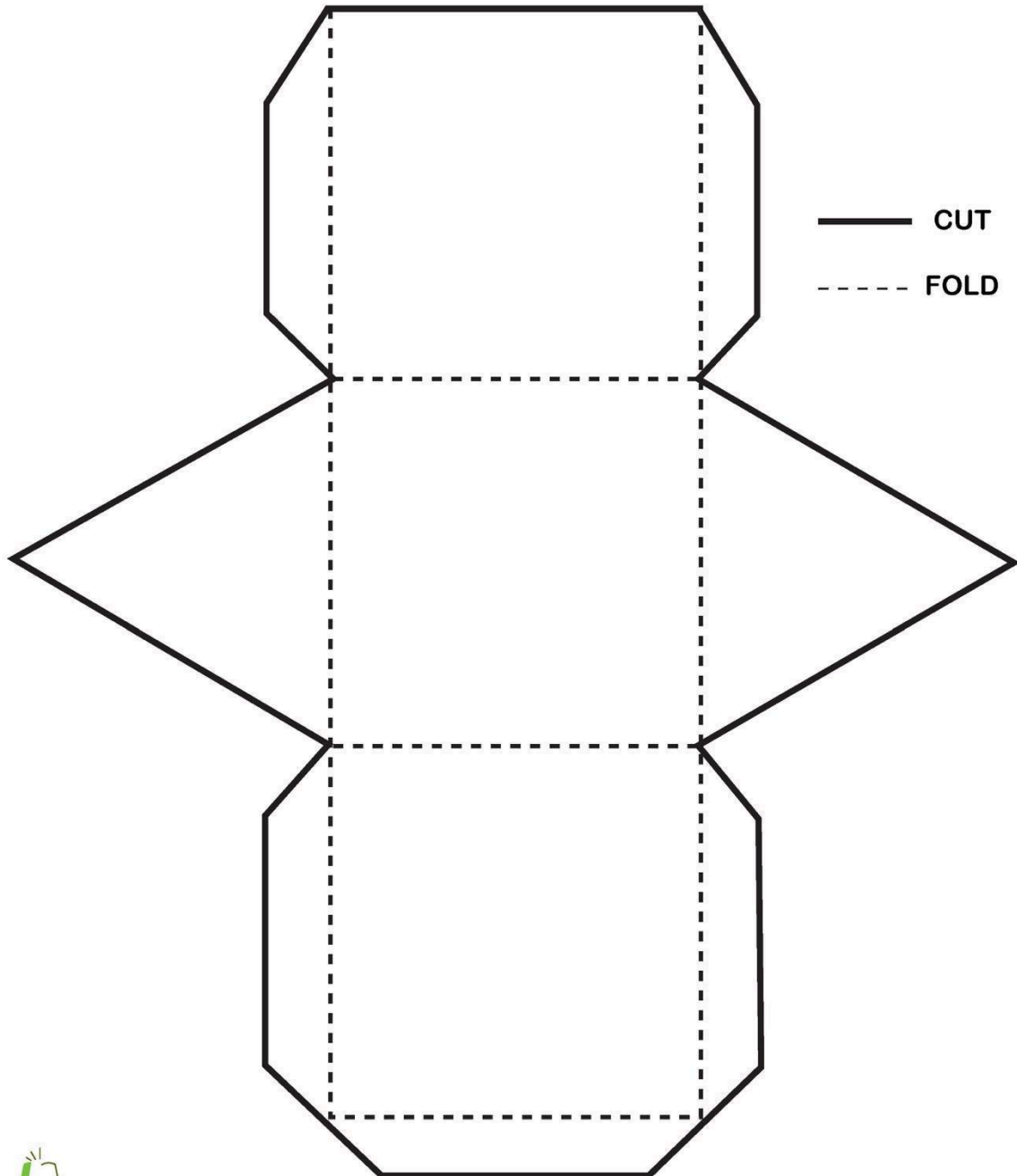
MATH MODELS

RECTANGULAR PRISM



MATH MODELS

TRIANGULAR PRISM

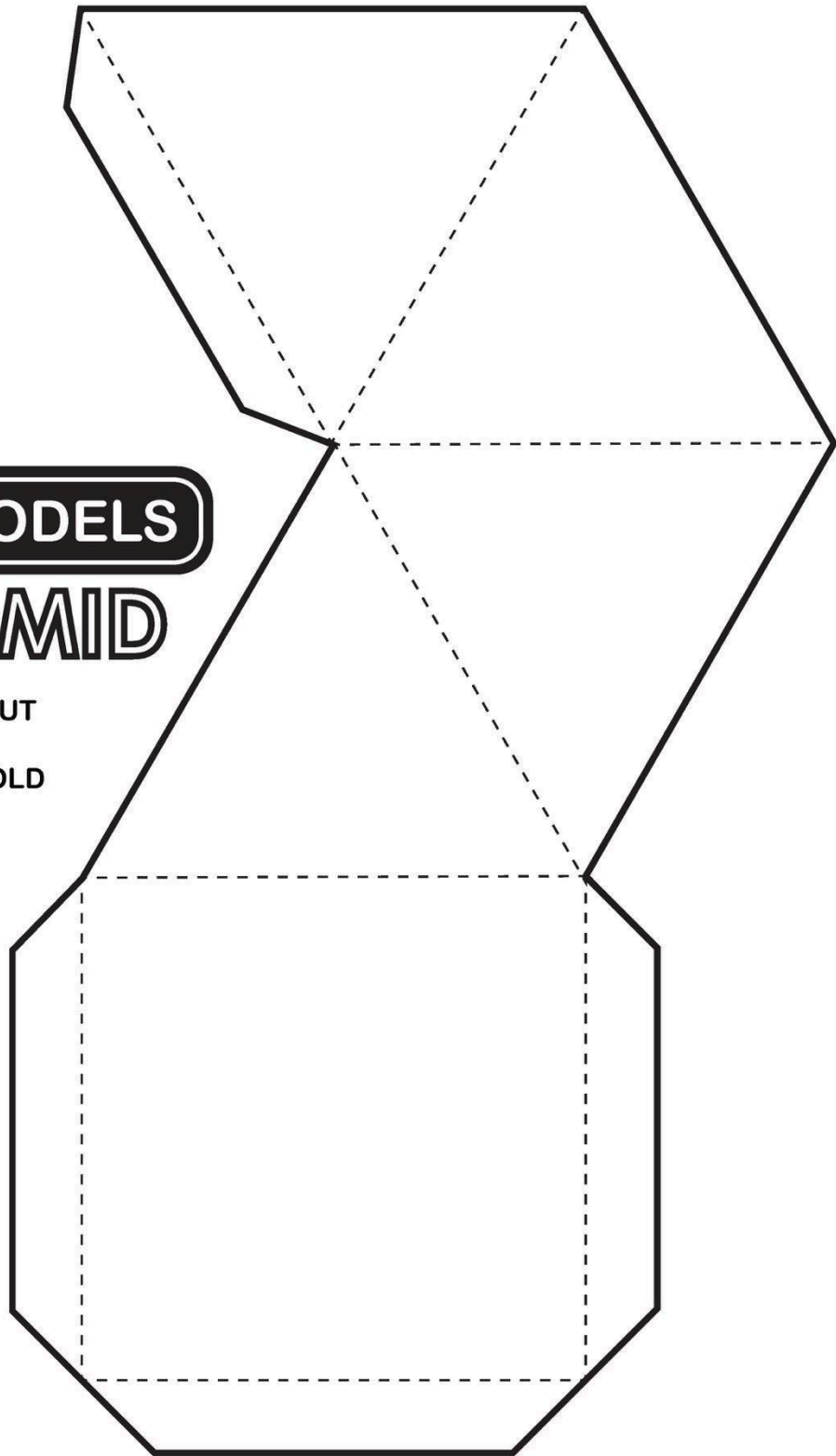


MATH MODELS

PYRAMID

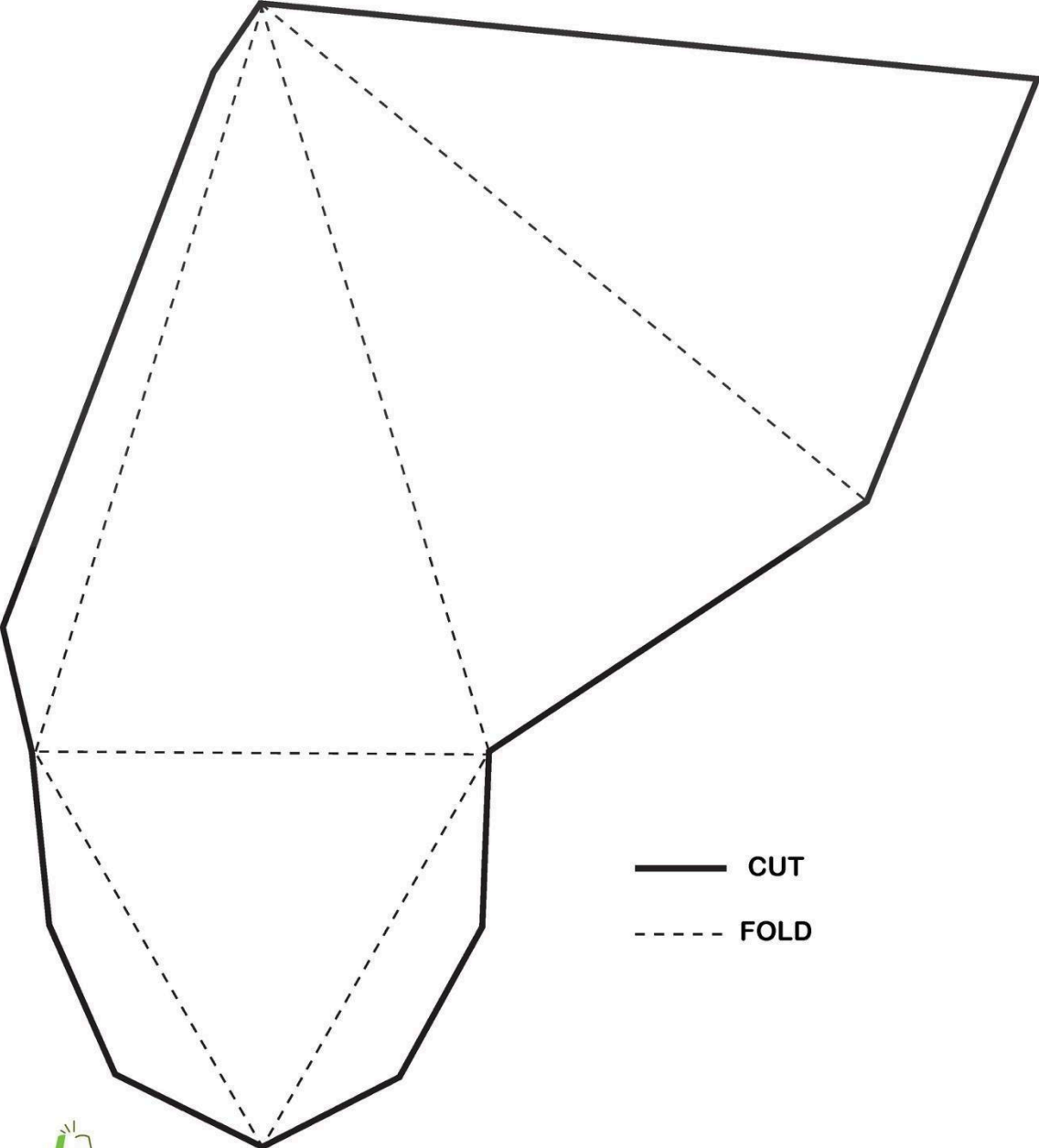
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MATH MODELS

TRIANGLE PYRAMID



ARTS IMPACT LESSON PLAN Theater and Math Infused Lesson

6th Grade: *Geometry in Action*

CLASS ASSESSMENT WORKSHEET

Disciplines	MATH	MATH	THEATER & MATH	Total 3
Concept	Area	3D Shapes	Props	
Criteria	Computes the area of a rectangular prism, triangular prism, square pyramid or triangular pyramid.	Creates a 3D representation using nets made up of rectangles, squares or triangles.	In small groups, create a short scene incorporating the shape as a prop.	
Student Name				
1.				
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26.				
27.				
28.				
29.				
30.				
Total				
Percentage				

What was effective in the lesson? Why?

What do I want to consider for the next time I teach this lesson?

What were the strongest connections between arts discipline and subject area?

Teacher: _____ Date: _____

ARTS AND MATH INFUSED LESSON: *Geometry in Action*

Dear Family:

Today your child participated in a **Theater and Math** Infused lesson. We learned about prisms and pyramids.

- We discovered how to construct 3D prisms or pyramids. and to calculate their area.
- We created short scenes incorporating a 3D shape as a prop.

At home, you could find a household object and use it in interesting ways as a prop. You could also ask your student to teach you how to calculate the surface area of a 3D shape.

Enduring Understanding

Constructing and calculating surface areas of prisms and pyramids, deepen students understanding of how all surfaces come together to form a complete three-dimension object, help to visualize, and manipulate three-dimensional objects, and increase understanding of spatial reasoning – fundamental skills for fields in architecture, engineering, and art. Working in groups increases communication and collaborative skills, skills essential for academic success and social development.

This classroom art project was created in partnership with Arts Impact And the WA State Migrant Education Program

For 25 years, Arts Impact programs have infused the arts into everyday learning, increasing access to the arts, improving student learning outcomes, and closing opportunity gaps. National data proves that when our most vulnerable students learn in and through the arts, they flourish.

Arts Impact brings professional artists into schools throughout Washington to collaborate with classroom teachers, creating new student-driven lessons that integrate the arts with math, literacy, science, and social studies.



Mission: Arts Impact engages educators, children, and youth from BIPOC and Migratory families as well as other marginalized communities in culturally grounded, arts integrated learning so that each student thrives academically, artistically, socially and emotionally.



Arts Impact is a not-for-profit 501(c)(3). For more information visit our website at www.arts-impact.org or contact us at info@arts-impact.org.