

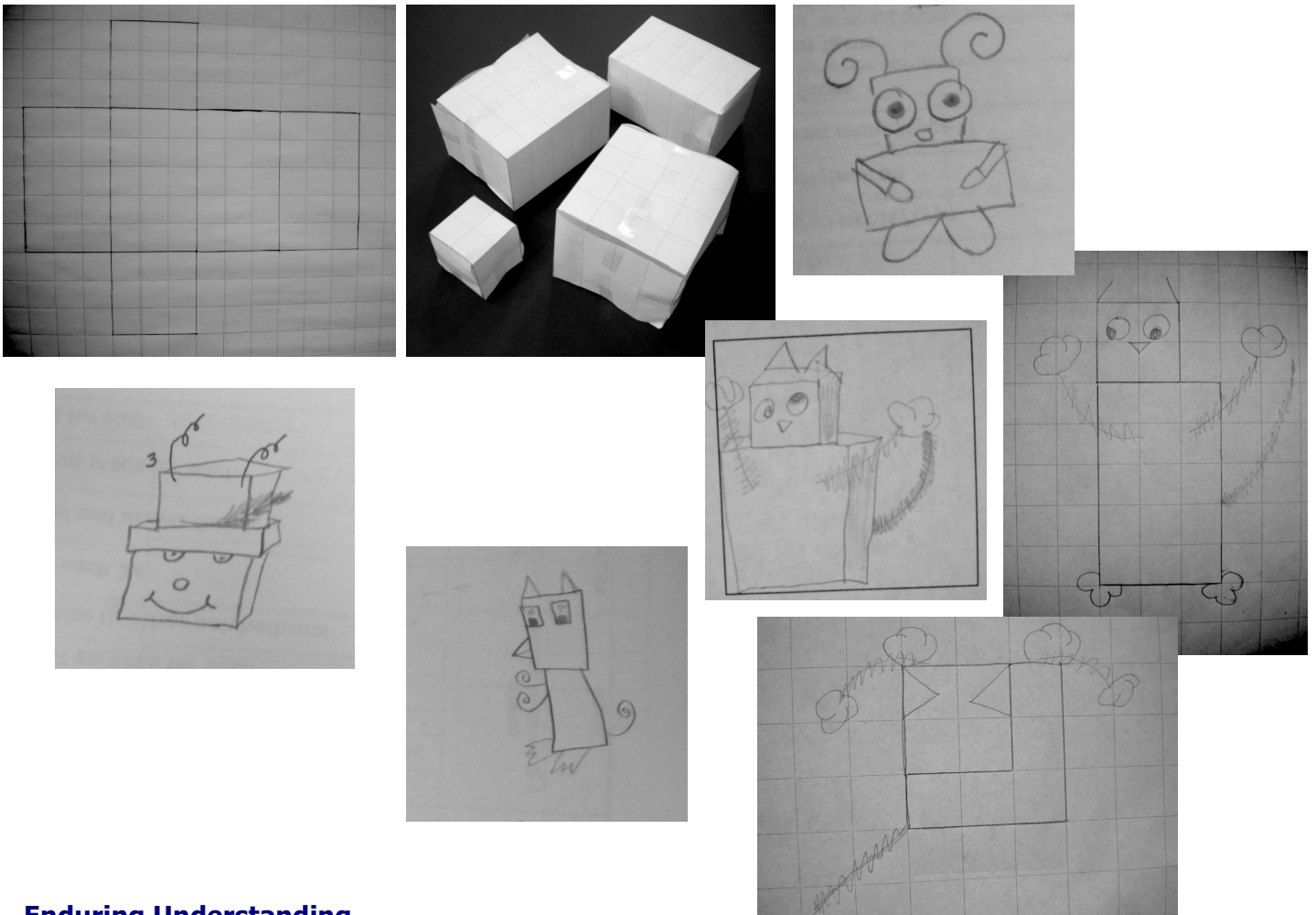
ARTS IMPACT—ARTS-INFUSED INSTITUTE LESSON PLAN (YR2-MAP)

SIXTH GRADE—LESSON ONE Anibots: 2-D Designs to 3-D Figures

Artist-Mentors – Shannon Eakins & Meredith Essex

Grade Level: 6

Examples:



Enduring Understanding

Geometric shapes, measured and drawn mathematically in two-dimensions as adjacent shapes, can be combined to create three-dimensional rectangular prism forms.

Art and Math

Target: Makes flat pattern nets for three-dimensional polyhedra.

Criteria: Measures and draws faces and vertices of prisms on 1-inch grid paper.

Art

Target: Invents and draws hybrid figure.

Criteria: Draws and labels Anibot figure made of polyhedra from two points of view on 1-inch grid paper.

Target: Creates a specifications sheet for hybrid form.

Criteria: Fills out a card with information on the Anibot form: Name, Special Design Features, Surface Area, Volume.

Session I

Materials

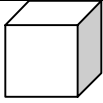
1-inch grid paper 14 x 16 (4 sheets per student), small and large rulers, pencils, erasers, invisible mending tape (ex: Scotch tape), Anibot Production Manual (APM), 2-gallon zipper bags (ex: Ziploc)

Resources

TAM Images: *Hello! Hello!* by Jeffrey Mitchell
Object in Two Triangular Pieces Vaclav Cigler

Learning Targets

- Makes flat pattern nets for three-dimensional polyhedra.



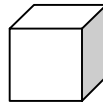
Do Now

Analyze a rectangular prism (block).

How many faces? How many sides? How many vertices? APM 5-2

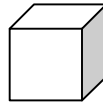
Activities/Prompts

- In Anibot Production Manual page 2, draw and label polygon figures, sides and vertices that you see in TAM sculpture polyhedron (3-D art).



- Previews sculpture art and math process by sharing teacher/artist created Anibot examples.

- Demonstration: Draw four nets with the following dimensions:
APM 5-3 – 5-5



Cube: 2 x 2 inch faces

Cube: 4 x 4 inch faces

Rectangular Prism: 3 x 3 inch top and bottom,
3 x 5 inch side faces

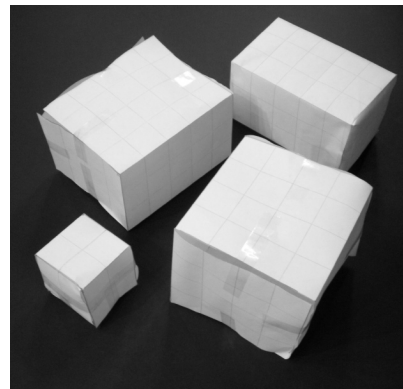
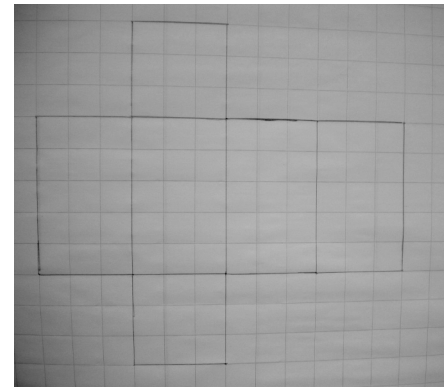
Rectangular Prism: 3 x 4 inch top and bottom,
4 x 5 inch side faces, 3 x 5 inch faces

- Cut out and tape all four nets.

Big Math and Art Ideas

Polyhedra: Rectangular prisms/cubes

2-D nets represent 3-D forms, sides, faces, vertices, sculpture



Self Assessment/Reflection

Students self check for accuracy of nets by taping them into 3-D solids.

Closure

Students put APM and nets (and any other tools as directed by teacher) in zipper bag with name on it. Binder clip student desk/table group bags together for ease of distribution; store.

Assessment Criteria

- Measures and draws faces and vertices of prisms on 1-inch grid paper.

Next Steps/Follow up Needs

An additional class session might be needed to complete nets and begin Anibot design planning detailed in

Session II.

Session II

Materials

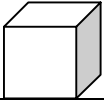
1-inch grid paper 9 x 12 (2 sheets per student), small and large rulers, pencils, erasers, Anibot Production Manual (APM), 2-gallon zipper bags

Resources

TAM Images: *Tin Man* by Charles Parriot, *Witch* by Charles Parriot

Learning Targets

- Invents and draws Anibot figure.
- Creates a *specifications sheet* for Anibot form.

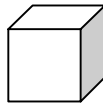
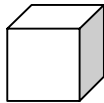
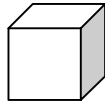


Do Now

Draw a three dimensional object from two points of view (from the side, top...). Eraser, pencil... APM 5-6

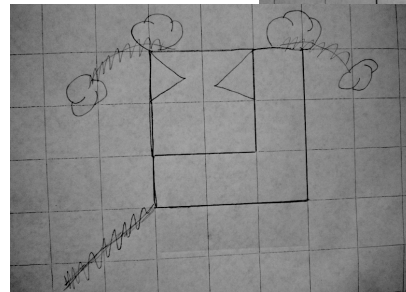
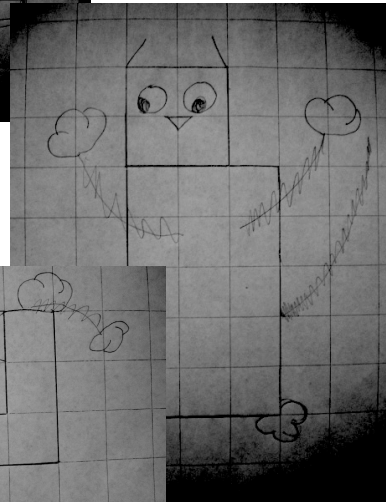
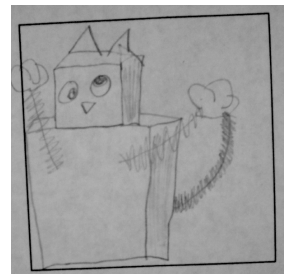
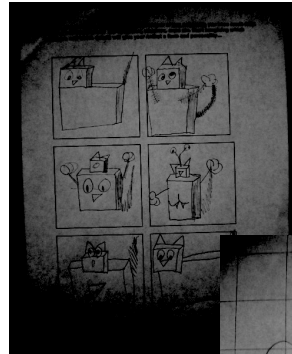
Activities/Prompts

- Guides students in arranging and sketching different combinations of two polyhedra made from nets with added details of eyes, arms, whiskers etc for Anibot designs. APM 5-7
- Think about how sculptor Charles Parriot communicates information about character with 3-D forms. Decide on one Anibot design (chosen from six sketches) and sketch it to exact size and scale of your rectangular prisms on one inch grid paper. Draw it from two points of view. APM 5-8
- Circle the two types/dimensions of polyhedra you will use for your Anibot. APM 5-8
- Assists students in brainstorming names for Anibots and their functions. What are their special design features? How can they be upgraded? Guides students in filling out APM 5-9.



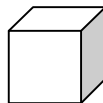
Big Math and Art Ideas

Polyhedra: Rectangular prisms/cubes
2-D nets represent 3-D forms, sides, faces, vertices, sculpture, surface area, volume



Self Assessment

Peer check; students complete self-checklist and reflect: *Why do designers of toys or cars or buildings need to draw their product designs from more than one point of view?* APM 5-10



Closure

Students place APM, drawings, and the two taped net polyhedra (two extras are recycled) that are used in Anibot design in zipper bag and store.

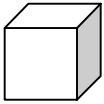
Assessment Criteria

- Draws and labels hybrid figure made of polyhedra from two points of view on 1-inch grid paper.
- Fills out a card with information on the Anibot form: Name, Special Design Features, Surface Area, Volume.

Next Steps/Follow up Needs Students may need an additional class period to generate Anibot ideas.

Session I

Teaching and Learning Strategies



DO NOW WARM-UP

Analyze a rectangular prism (block).

How many faces? How many sides? How many vertices? APM 5-2

1. Introduces sculptures from the Tacoma Art Museum Collection: Jeffry Mitchell, *Hello! Hello*, 2002 and *Object in Two Triangular Pieces*, 1986 by Vaclav Cigler and asks students to analyze the math in the art by finding and describing the three dimensional forms seen. (APM 5-2) *Prompts:* What kind of three-dimensional **polyhedra do you notice in each of these sculptures? In your Anibot Production Manual on page 2, draw and label **polygon figures**, **sides** and **vertices** that you see in *Object in Two Triangular Pieces* or *Hello! Hello!***

Student: Looks at and talks about art; draws and labels a polyhedron seen in art.

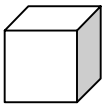
2. Previews sculpture art and math process by sharing teacher/artist created Anibot examples (examples and photos on Arts Impact disk). *Prompts:* We are going to build a creature called an Anibot—a soft sculpture made out of two polyhedra. We will be constructing it out of clear vinyl, tape and recycled materials for stuffing. Its polyhedra parts are detachable.

Student: Observes demonstration, examines Anibot examples.

3. Introduces concept of nets and demonstrates drawing four nets using specified dimensions on one inch grid paper. *Prompts:* Using the math tools of ruler and grid paper, I am drawing a flattened pattern for each of the polyhedra (rectangular prisms) on my list:

- Cube: 2 x 2 inch faces
- Cube: 4 x 4 inch faces
- Rectangular Prism: 3 x 3 inch top and bottom, 3 x 5 inch side faces
- Rectangular Prism: 3 x 4 inch top and bottom, 4 x 5 inch side faces, 3 x 5 inch faces

I mark each vertex with a dot after I measure by counting boxes on the grid paper. If I run off the edge of the grid paper, I can always tape another piece, matching lines, on to it to complete my net. Notice that I align my ruler with the grid lines on the paper every time I draw.



Student: Draws each of the four specified nets. APM 5-3 – 5-5

Embedded Assessment: Teacher criteria-based checklist; peer check

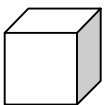
4. Demonstrates cutting out, folding, and taping each of the four nets together to confirm accuracy of net drawings. *Prompts:* If your net does not fold into a three-dimensional rectangular prism, problems need to be identified, and net re-drawn.

Student: Cuts, folds, and tapes all four specified nets.

Embedded Assessment: Student self check for accuracy of net

Session II

Teaching and Learning Strategies



DO NOW WARM-UP

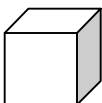
Draw a three dimensional object from two points of view (from the side, top...).

Draw eraser, pencil, objects in the room... APM 5-6

1. Initiates discussion about creating plans for Anibots and how taped nets will be used in the design and visualization process. Guides students in arranging and sketching several different combinations of two polyhedra made from nets. Encourages students to add details

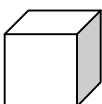
like eyes, ears, whiskers, arms etc. *Prompts: We are going to use our polyhedra made from nets to help design our Anibots. Start imagining which polyhedra and which details will give your Anibot a form and personality. On page 6 of your APM, there are diagrams of different possible combinations of two polyhedra: combine pairs of your 3-D solids made from nets. What sorts of Anibots could they turn into? On page 7 of your APM are six boxes to draw different ideas for Anibots. Are they part animal and part machine—part human and part machine—or totally robotic? What could your creation do? What kinds of things could it be designed/programmed to do?*

Directs students to look at Glass Sculptures by Charles Parriot from the Tacoma Art Museum Collection. APM 5-8 *Prompts: How did the artist communicate information about character using 3-D forms? How do the polyhedra that you have constructed show the "function" of the hybrid?*



Student: Draws different combinations of polyhedra to help brainstorm Anibot ideas. APM 5-7.

2. Guides students as they select one Anibot design (from sketch ideas) and drawing it on 1-inch grid paper from two points of view using the same scale and size of taped net polyhedra selected for the Anibot. *Prompts: We are now starting to create the basic design for our own personal Anibot production/construction. Select one Anibot design from APM page 7. On page 8 of APM, check the boxes for the two types/dimensions of polyhedra you will be using in your Anibot design/construction. Now, using ruler and grid paper, draw your Anibot from the top and the side (two points of view), using the two taped polyhedra selected to guide you. The number of grid squares in drawings for two points of view needs to match the taped net polyhedra.*



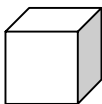
Student: Confirms dimensions of two selected Anibot polyhedra. APM 5-8 Draws and labels anibot from two points of view.

Embedded Assessment: Criteria-based teacher checklist

3. Guides students in the process of filling out an Anibot Specification Sheet. Assists students in brainstorming names for Anibots and their functions.

Prompts: When you buy an electronic device they almost always come with an owner's guide or specification sheet. What kinds of things can you learn about the machine you just purchased from these sheets? We will be creating specification sheets to go along with our sculptures so our viewers can get a better idea of what we made. You'll notice that some of the categories on the sheet are facts and figures (surface area and volume) that you will calculate in the next lesson. You will also add a small drawing of your Anibot to you spec sheet when you are finishing it up.

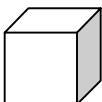
How does a product name for your Anibot entice you to buy it? (I-Pod; etc.) Why do we purchase products to do special functions? What is a function that would be desired enough to spend your money? How could your Anibot work with other products you already own? What other features could be purchased in addition to the basic model you created? What sort of upgrades could be added on later? Last year, students came up with upgrades that enabled Anibots to bake cakes, print money, shop for groceries very quickly, glow in the dark, deodorize, make music videos, swim under water...



Student: Completes all written categories on Anibot Specification Sheet. APM 5-9

Embedded Assessment: Criteria-based self-assessment

4. Guides student self-assessment and reflection. *Why do designers of toys or cars or buildings need to draw their product designs from more than one point of view?*



Student: Self Assesses. APM 5-10.

Embedded Assessment: Criteria-based student self checklist

Vocabulary	Materials and Community Resources	WA Essential Learnings & Frameworks
<p><u>Arts Infused:</u> 2-D 3-D Geometric shape Grid Pattern Rectangle Scale Square</p> <p><u>Math:</u> Congruent Edge Face Geometric solid Net Polygon Polyhedron Rectangular prism Vertex, vertices</p> <p><u>Arts:</u> Design Form Point of view Sculpture Soft sculpture</p>	<p>Museum Artworks Jeffry Mitchell, <i>Hello! Hello!</i>, 2002</p> <p>Václav Cigler, <i>Object in Two Triangular Pieces</i>, ca. 1986, Laminated, cut, and polished glass on polished optical glass, 2003.54.1 a-c</p> <p>Charles Parriott, <i>Tin Man</i>, 1998, from the <i>Oz Suite</i>, Cast glass, 2004.24.3</p> <p>Charles Parriott, <i>Witch</i>, 2001, from the <i>Oz Suite</i>, Cast glass, 2004.24.4</p> <p>Math Resources: Rectangular prism/cube blocks</p> <p>Art Materials: 1-inch grid paper 14 x 16 (chart paper size, cut to quarters) Pencils White vinyl erasers Small and large rulers Invisible mending tape (ex: Scotch tape) 2-gallon zipper bags (ex: Ziploc)</p>	<p>Arts State Grade Level Expectations AEL 1.1 concepts <i>2-dimensional to 3-dimensional Geometric shape and form</i></p> <p>AEL 1.2 skills and techniques <i>Measuring Drawing</i></p> <p>AEL 2.1 applies a creative process <i>Conceptualizes</i></p> <p>AEL 4.2 connections between the arts and other content areas <i>Explains relationships between the arts and other content areas</i></p> <p>Math State Grade Level Expectations 6.4.G two- and three-dimensional figures <i>Describes and sorts polyhedra by their attributes: parallel faces, types of faces, number of faces, edges, and vertices</i></p> <p>6.4.D two- and three-dimensional figures <i>Recognizes and draws two-dimensional representations of three-dimensional figures</i></p>

ARTS IMPACT—ARTS-INFUSED INSTITUTE LESSON PLAN (YR2-MAP)
SIXTH GRADE—LESSON ONE Anibots: 2-D Designs to 3-D Figures
ASSESSMENT WORKSHEET

Disciplines	ART AND MATH		ART			Total 5 Points
Concept	2-D Shapes for Forms		Hybrid Design/Specifications			
Students	Measures and draws faces	Draws vertices for each	Draws and labels Anibot figure made of polyhedra from two points of view	Fills out a card with information on the hybrid form: Name, Special Design Features	Math Specs: Surface Area, Volume	
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2.						
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26.						
27.						
28.						
Total						
Percentage						

Criteria-based Reflection Questions: (Note examples of student reflections on back.)

Why do designers of toys or cars or buildings need to draw their product designs from more than one point of view?

Thoughts about Learning:

Which prompts best communicated concepts? Which lesson dynamics helped or hindered learning?

Lesson Logistics:

Which classroom management techniques supported learning?

Teacher: _____

Date: _____