



NEVADA MUSEUM OF ART

Donald W. Reynolds Center for the Visual Arts
E.L. Wiegand Gallery

160 West Liberty Street, Reno, Nevada, 89501
775.329.3333 | nevadaart.org

ORBITAL REFLECTOR | DESIGN LESSON

GRADE: 3-5

STANDARDS:

ART: VA:Cr1.1.4a. Brainstorm multiple approaches to a creative art or design problem.

SCIENCE: 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

OBJECTIVE:

Students will be able to plan, design, and compare sculptural creations in order to determine which one is the most reflective.

VOCABULARY:

Reflection: Reflection occurs when light bounces off objects. How much reflection depends upon how even the surface is. If the surface is rough, the light scatters. If the surface is smooth and flat, the light bouncing off it will be more visible.

Sculpture: creating figures or designs in three dimensions, a three-dimensional work of art.

TIME: 2 Class Periods

MATERIALS:

- Student Journal or Notebooks
- Various reflective materials (cd's, foil, shiny paper or fabric, metal with sanded edges, etc.)
- Cardboard, glue, tape, scissors, string
- Flashlights

LESSON:

ENGAGEMENT:

Show students two different images of Orbital Reflector, the original design and the final design. Ask them to compare and contrast the two images. Have them record and discuss their answers.

Pose the following question to students: **Why did the design of Orbital Reflector change?**

Give students ample time to consider their answers and record them in a journal or notebook.

Have students discuss their answers as a class.

Discuss the following information with the students:

One of the criteria of the satellite was to be as bright and visible as possible, for people to be able to see the satellite from the surface of earth with the naked eye. During the process of engineering and designing the satellite, our team of engineers determined that the diamond shape would be more reflective than the sphere.

Introduce the term **Reflection**.

EXPLORATION:

Ask students about the Design and Engineering process. How do engineers work? How do we decide what the best design is? Discuss as a class.

Show students the Design + Engineering timeline on the Educator Page of the Orbital Reflector website (orbitalreflector.com). Discuss the steps as a class, encourage students to record the design and engineering steps in their journal or notebook.

Ask student to identify the design criteria or goal of the satellite. Discuss answers as a class.



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EXPLANATION:

Challenge students to design their own Orbital Reflector sculpture.

Introduce and discuss the term **Sculpture**.

How will they design the most reflective object? Have students sketch and record their initial designs in their journal or notebook. Give them a few minutes to work alone or in small teams to create a design they think is reflective.

Ask students how they will measure how reflective their design is. How will they know if one design is more reflective than another? This may be challenging for students; the point is for them to define their own parameters. It may be as simple as comparing two different design and using our eyes to determine which one we think looks brighter or more reflective. There are also free light meter apps you can download if you want to involve an element of measurement, data collection, and instrumentation.

ELABORATION:

Present students with abundant supplies and materials to build their satellites. Encourage them to use cardboard or cardstock to build the underlying form and then cover it with reflective materials of their choice.

Make sure every design has a string attached in order to hang their sculpture for testing and display.

Give the students ample time to explore the materials and work on their sculpture. When students are nearing completion, introduce flashlights to the room

and allow students to begin testing the reflectiveness of their sculpture.

Encourage them to make some changes or modifications to their design in order to make their sculpture more reflective.

Have them record and changes they make in their journal or notebook. Have them record their final design in their journal or notebook as well.

EVALUATION:

When the students are finished, ask the students how they will test the reflection of each sculpture. Allow the students to conduct these tests, record and share their results.

Ask students to present their final sculpture and their data on how reflective their sculpture is. Encourage students to discuss which sculpture were the most or least reflective and why.

EXTENSION:

Hang the sculptures throughout the room or turn them into mobiles. Post photographs of completed projects to the Museum's social media!

@NevadaArt
#OrbitalReflector

LINKS AND RESOURCES:

<https://www.orbitalreflector.com/educators/>



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Figure 1: *Orbital Reflector* Original Design



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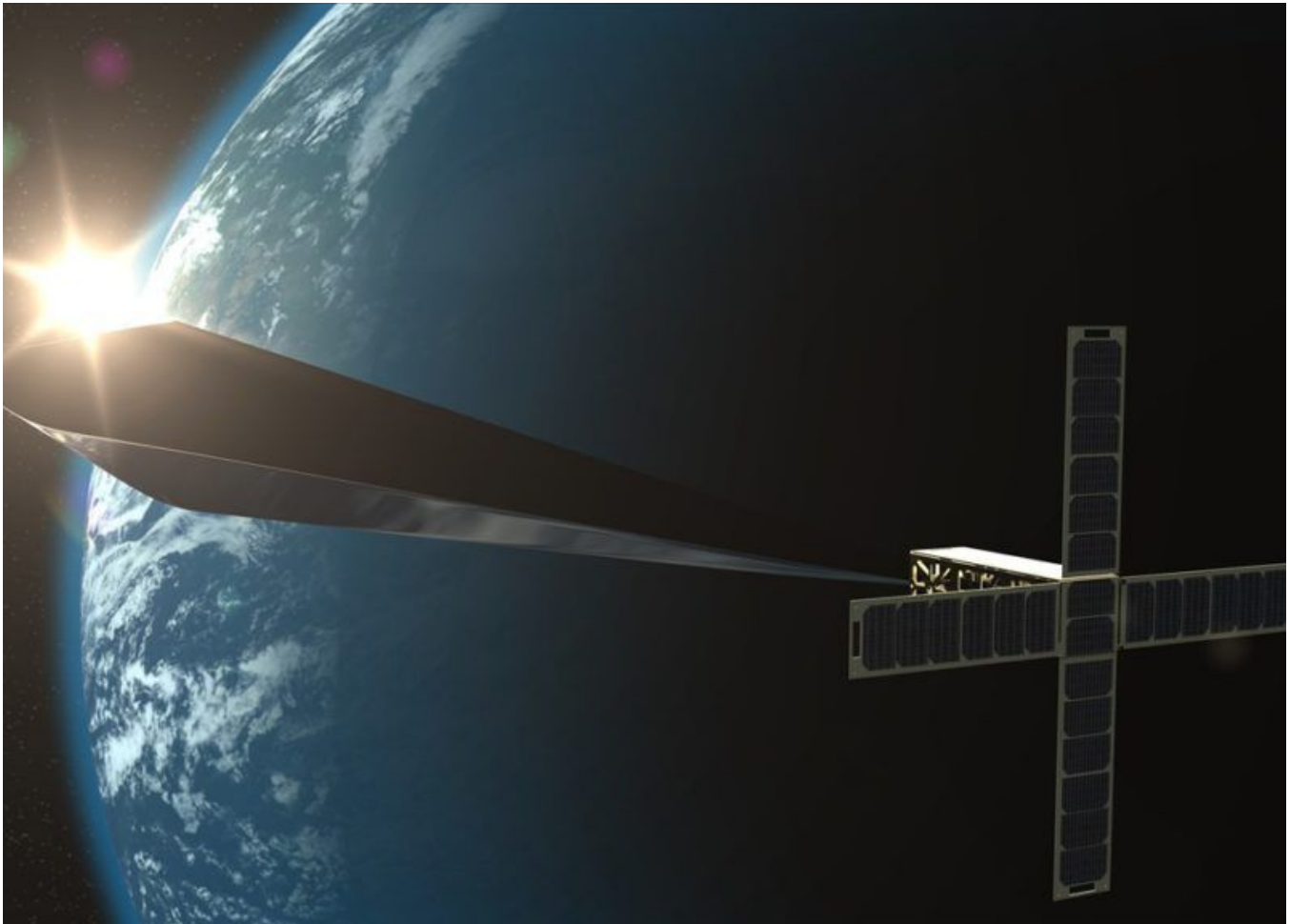


Figure 2: *Orbital Reflector* Final Design