



# Tunnel Vision Diorama

## Lesson Plan

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Educator Resources

Spring 2016

### Sunlight in Sun Tunnels, Nancy Holt



*Sun Tunnels* (1973–76), by Land art artist Nancy Holt, is an installation of four large concrete cylinders in the north-western desert of Utah. The cylinders are arranged in an "X" pattern, set up so that the sun is aligned perfectly during the summer and winter solstices. Holt also drilled small holes, mapping the stars of four constellations: Draco, Perseus, Columba, and Capricorn—one in each cylinder.

Like all Land art, *Sun Tunnels* is site specific; it responds to and changes with nature. The sun and moon are the only light sources and the viewer’s experience with the large-scale installation changes depending on weather, time of year, time of day, and even where you stand. Geography, specifically that of Utah’s west desert, is equally important to this installation. The concrete tubes act as viewfinders that frame precise images which, in Holt’s words, “bring the vast space of the desert back to human scale.”

Nancy Holt (1938–2014, American)  
**Sunlight in Sun Tunnels, 2012**  
inkjet print  
Purchased with funds from the Paul L. and Phyllis C. Wattis Endowment for Works on Paper  
UMFA2013.1.1

If you could install the *Sun Tunnels* anywhere in the world, where would you choose? Would you arrange them in an "X" pattern, or something else? Why do you think Holt made these tunnels so large? What size would you make your tunnel installation?

# **Tunnel Vision Diorama—STEAM**

Laura Decker

## **Overview**

This STEAM lesson has students make a diorama that explores their own landscape.

## **Objectives**

Using *Sunlight in Sun Tunnels* and *Sun Tunnels* as inspiration, students will:

1. Use artwork to discuss the implications of the Earth's rotation in terms of seasons, sunlight, night sky.
2. Gather inspiration from nature.
3. Use perspective and engineering skills to construct a 3D book from a 2D drawing.
4. Learn practical applications of math and science skills.

**Intended Audiences/Grade Levels** grades 3–6 (extensions **K–2**; **7–12**)

**State Core Links** STEAM (see State Core Links at the end of this lesson plan)

**Duration** 4–5 one-hour sessions

## **Materials**

1. Images of *Sunlight in Sun Tunnels* (UMFA2013.1.1) and *Sun Tunnels* by Nancy Holt
2. Paper
3. Photocopier
4. Optional: compass, ruler
5. Toilet paper roll or other circular tube
6. Construction paper or tag board
7. Pencil, colored pencils
8. Scissors
9. Glue stick

## **Vocabulary/Key Terms**

- Perspective** drawing a scene so that objects in it seem to have depth and distance
- Foreground** the part of a picture that is closest to and in front of the viewer
- Middle ground** the part of a picture in the middle
- Background** the scenery or ground that is behind a main figure or object

<b>Ground plane</b>	foreground, middle ground, or background; a position in space
<b>Ecosystem</b>	a system made up of a community of living things interacting with their environment
<b>Radius</b>	a line, or measurement, extending from the center of a circle
<b>Diameter</b>	a line segment through the center of a circle
<b>Concertina</b>	side pieces of a tunnel book that hold the whole thing together

### **Activity**

**Part One:** Close looking (20-30 minutes): pull up an image of Nancy Holt's *Sunlight in Sun Tunnels*. Discuss with students:

- What do you see?
- What colors? Patterns? Shapes?
- This image is made up of a lot of smaller photographs that have all been pieced together.
- Why would the artist take multiple pictures of the same thing?
- What kind of landscape can you see in this image? Is it the same in each individual photograph?
- What time of day is it? What time of year is it?
- This is a photograph of an artwork by Nancy Holt called *Sun Tunnels*.
- Why might the artist name her artwork *Sun Tunnels*?
- What do you think this is made out of? How big is it?

Talk as a class about the movement of the sun.

- Have you ever used binoculars, a telescope, microscope, or even just looked through a tube? Have students make a circle with their hand and look through it with one eye. Nancy Holt made *Sun Tunnels* like a tube and wanted you to think about looking through a small hole when you look at *Sun Tunnels*.

Show additional images of *Sun Tunnels* for context, size, material, etc. See additional resources or you can find a variety of pictures online.

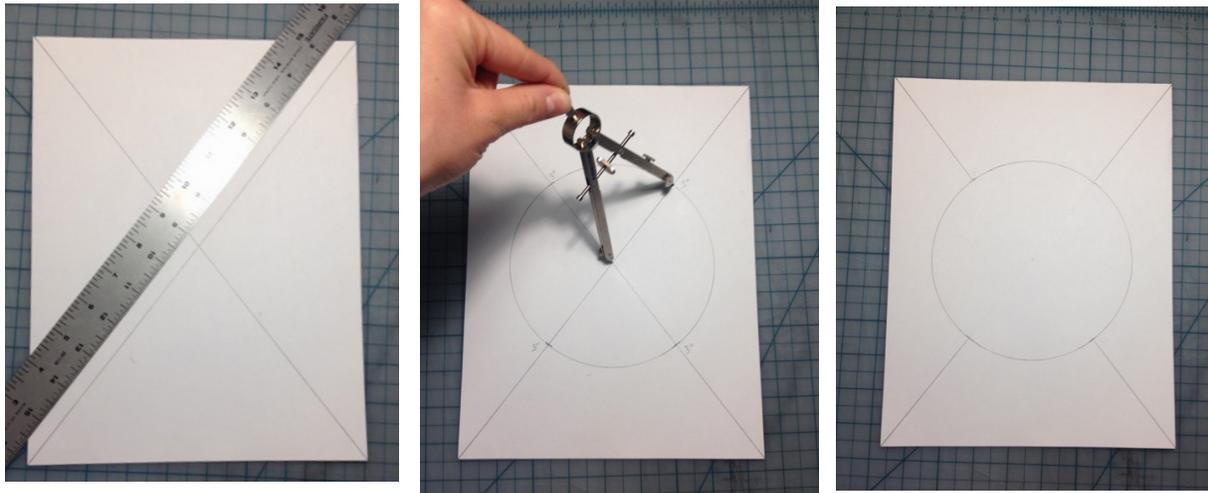
You can also use *Sunlight in Sun Tunnels* to discuss constellations.

- Nancy Holt drilled holes in the *Sun Tunnels* to represent four different constellations: Draco, Perseus, Columba, and Capricorn. Show images of these constellations. Can you find the constellation on this Sun Tunnel? Which one is it? (This tunnel shows Draco)

**Part Two:** Sketching with narrowed vision. (15-30 min depending on age and time)

Have students draw a circle in the middle of a piece of paper. First plot the center of the page using a ruler or straight edge to draw diagonal lines connecting corners. Determine how big you want your students' circle to be (probably at least 5" diameter). Have them measure the radius along all four lines, mark it, and use a compass to make a perfect circle. Make a few photocopies of each students' circles or have them repeat the exercise a few times.

- **K-2 or limited time: preprint circles for each student.**



Go outside and have students spend a few minutes looking at their surroundings.

- *Optional: Have students quickly sketch what they see on a regular piece of paper.*

Give each student a toilet paper tube or another round tube to look through.

- How is it different to look through a small hole than looking at the whole landscape?

Have students look through the tube to find an interesting composition that explores depth (foreground, middle ground, background), textures (trees vs. cement), natural elements, manmade elements, etc. Draw what they see through the tube onto their paper, trying to stay within the circle. Quicker students can make several drawings, and more detail-oriented students can focus on the details in their drawings. *Optional: take colored pencils to include color in their drawings.*

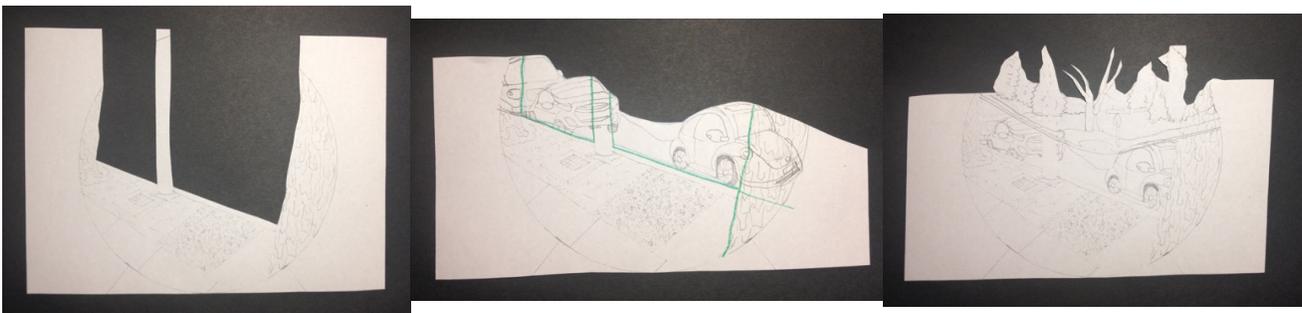
- **Wrap up:** Why did you choose to draw what you did?



**Part Three:** Tunnel Book: Students will translate their circle drawings into a 3D book.

**Perspective:** foreground, middle ground, background.

- Discuss foreground, middle ground, and background (ground planes). Objects in the foreground look bigger than objects in the middle ground. Objects in the background look the smallest. This is perspective.
  - Line up chairs across the length of the room to demonstrate.
  - Choose three students who are the same height. Have one stand in the front of the room, another in the middle of the room, and the third at the very back of the room.
  - Demonstrate on the projector or doc cam with an image of telephone poles receding in space. Have students explain which are in the foreground, middle ground, and background.
- Photocopy students' drawings (have them choose their favorite if they drew more than one). Make a few copies to accommodate mistakes and enlarge or shrink them depending on the size of the book you are making. Help students figure out the foreground, middle ground, and background in their drawings and explain that the ground planes aren't necessarily straight across lines, but conform to the objects.

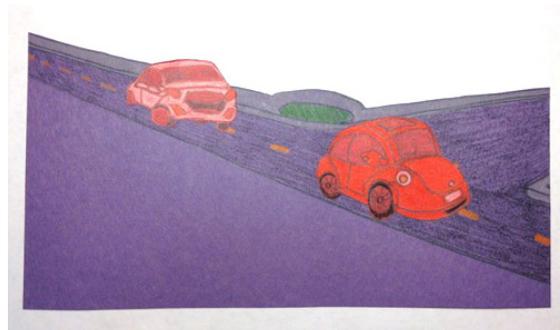


**Customize the design:** tell students they will be making their drawing into a 3D book, but they have to think about how they want to depict the scene.

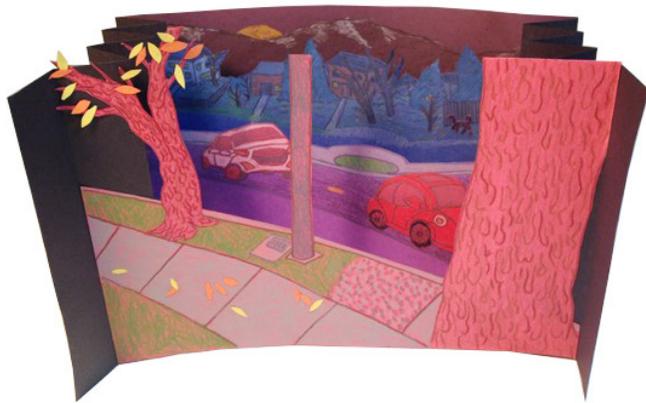
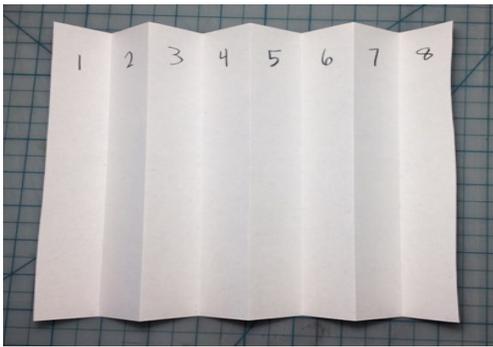
- Choose time of day and time of year.
  - Where in the sky is the moon or sun? What shape is it?
  - Think about the ecosystem or area in which you live. What kind of weather will you show in your book? Is there snow on the ground, is it really hot and dry, is it rainy?
  - Did you draw any animals, plants, or people? How do they look at this time of day and time of year? (ex: Trees don't have any leaves in the winter, people wear coats in the winter, some animals have camouflage for different seasons.)
- Think about colors.
  - Think about and describe the colors you will use.
  - *Optional: Colors are different at different times of the day and year. Ex: objects appear to be darker and bluer at night. Grass is really green in the spring, and might be browner in the summer when it's really hot.*

**Construct the tunnel book:** Let students choose from a variety of colors of construction paper or manila tag board. Pre-determine how many layers of foreground, middle ground, and background (ground planes) you want students to use—we recommend multiples of four. Ex: four layers would be one layer of foreground, one layer of middle ground, one layer for background, and one layer at the very back for the sky. Eight layers could be two layers of each.

- Make the panels: Have students reference their circle drawings and transfer their ground planes to the different pieces of construction paper or tag board. Translating a circular drawing to a rectangular piece of paper might be tricky for younger students. You can give them a piece of paper with a rectangular hole cut out to have them choose a rectangular composition from their circular drawing. Or, they can continue the drawing using their imaginations. They should look up images online for reference if needed.
  - Review fractions: Start by having them draw a line  $\frac{1}{4}$  of the way up the paper (demonstrate on the board or doc cam for younger students). Then have them draw only the foreground on their paper and explain that it should only go up to about the  $\frac{1}{4}$  line on the paper. Students should cut around their shapes to leave only the foreground on the paper.
  - Repeat for middle ground ( $\frac{1}{2}$  way up the page) and background ( $\frac{3}{4}$  way up the page) on separate pieces of paper.
  - The sky will be the last piece and will take up the whole page.
  - K-2: Rather than having students redraw their scene onto the panels, they can cut out separate pieces (like trees or mountains) and glue them onto panels.



- Make the concertinas (side pieces that hold the panels in place) using the "wave-to-shore" analogy. The number of panels will determine the number of folds (you will multiply the number of panels by two). Give students two pieces of construction paper or tag board.
  - Review fractions again. For four panels, fold the paper into eighths. Discuss how  $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$ , therefore  $\frac{4}{4} = 1$ . And  $\frac{1}{8} + \frac{1}{8} = \frac{1}{4}$  therefore  $\frac{2}{8} = \frac{1}{4}$  and  $\frac{8}{8} = 1$ .
  - For eight panels, you will need 16 folds.
  - Make two concertinas for each tunnel book.
  - **7–12: Older students can use 12 or 16 layers. Or modify their concertinas to accommodate non-multiples of four.**
- Glue the panels into the concertinas (this example uses 4 panels):
  - Review even and odd numbers. Have students number each concertina fold 1–8. They will glue panels only to the EVEN folds, starting with the background and moving forward to the foreground.



**Wrap up:** Show and tell. Have students show their books and talk about why they made the decisions they made.

- Why did they use the colors they did?
- What time of day or night is it, can you tell by the placement of the sun or moon?
- What time of year is it?
- Does their book show depth and perspective?
- What was it like to make a 2D drawing into a 3D book?

### **Method(s) for Assessment**

**Formative:** Students should be able to participate in group discussions by building on each others' comments rather than simply restating those made by classmates. They should feel comfortable working independently.

**Summative:** Students demonstrate a knowledge of fractions, scientific concepts, and complete the diorama. At grade-appropriate levels, they are able to share the rationale behind their decision-making in regards to season, time of day, and other aesthetic decisions.

## **State Core Links**

### **Science**

#### **3rd Grade**

*Standard 1: Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.*

- Objective 1 Describe the appearance of Earth and the moon.
- Objective 2 Describe the movement of Earth and the moon and the apparent movement of other bodies through the sky.

#### **4th grade**

*Standard 5: Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.*

#### **6th grade**

*Standard 1: Students will understand that the appearance of the moon changes in a predictable cycle as it orbits Earth and as Earth rotates on its axis.*

- Objective 2 Demonstrate how the relative positions of Earth, the moon, and the sun create the appearance of the moon's phases.

*Standard 2: Students will understand how Earth's tilt on its axis changes the length of daylight and creates the seasons.*

- Objective 1 Describe the relationship between the tilt of Earth's axis and its yearly orbit around the sun.

*Standard 3: Students will understand the relationship and attributes of objects in the solar system.*

- Objective 1 Describe and compare the components of the solar system.
- Objective 2 Describe the use of technology to observe objects in the solar system and relate this to science's understanding of the solar system.

*Standard 4: Students will understand the scale of size, distance between objects, movement, and apparent motion (due to Earth's rotation) of objects in the universe and how cultures have understood, related to and used these objects in the night sky.*

- Objective 2 Describe the appearance and apparent motion of groups of stars in the night sky relative to Earth and how various cultures have understood and used them.

### **Technology**

#### **3rd–6th grade**

*Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.*

## **Engineering**

### **3rd–6th grade**

*Build dioramas.*

## **Art**

### **3rd–6th grade**

*Standard 1 (Making):The student will explore and refine the application of media, techniques, and artistic processes.*

*Standard 2 (Perceiving):The student will analyze, reflect on, and apply the structures of art.*

*Standard 3 (Expressing):The student will choose and evaluate artistic subject matter, themes, symbols, ideas, meanings, and purposes.*

## **Math**

### **3rd grade**

*3.NF.A Develop understanding of fractions as numbers.*

### **4th grade**

*4.OA.C Generate and analyze patterns.*

Objective      Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

*4.NF.B Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.*

Objective      Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples:  $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$  ;  $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$  ;  $2 \frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$ .

### **5th grade**

*5.NF.B Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*

*5.MD.B Represent and interpret data.*

Objective      Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

## Language Arts

### 3rd–6th grade

*Language Standard 1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.*

*Language Standard 2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.*

*Language Standard 3: Use knowledge of language and its conventions when writing, speaking, reading, or listening.*

### **Additional Resources**

- [http://umfa.utah.edu/land\\_art\\_suntunnels](http://umfa.utah.edu/land_art_suntunnels)
- <http://clui.org/ludb/site/sun-tunnels>
- film by James Crump—*Troublemakers: the Story of Land art*
- <http://www.theartstory.org/movement-earth-art.htm>
- <https://landarts.unm.edu>



Images of Sun Tunnels

