

SYMMETRY AND BALANCE IN ART AND MATH

Of the many connections between mathematics and art, none is stronger than the shared concept of symmetry. Mathematicians find symmetry pleasing in geometry, physicists find it pleasing in the study of motion, poets appreciate it in the play of words, and artists employ it in the creation of beauty. This lesson, designed to accompany the teaching of geometry, examines mirror (line) symmetry and its effects on the viewer.



Painting No. 4 (A Black Horse), 1915
Marsden Hartley, American
Oil on canvas
39 1/4 x 31 5/8 inches (99.7 x 80.3 cm)
The Alfred Stieglitz Collection, 1949
1949-18-8

Thou shalt remain, in midst of other woe
Than ours, a friend to man, to whom thou say'st,
'Beauty is truth, truth beauty,—that is all
Ye know on earth, and all ye need to know.'
—John Keats, "Ode on a Grecian Urn"

Curricular Areas

English – Language Arts

Grade Level

For grades 7–9, with modifications for elementary and high school

Common Core Academic Standards

- [CCSS.Math.Content.4.G.A.3](#)
- [CCSS.ELA-Literacy.SL.7.1](#)
- [CCSS.ELA-Literacy.SL.7.1c](#)
- [CCSS.ELA-Literacy.SL.7.1d](#)

Art Images Required

Click on the titles below to view high-resolution photographs on the Philadelphia Museum of Art website. Images that are available in the ARTstor Digital Library are indicated by an ID number or search phrase. Entering that number or phrase into the ARTstor search bar will direct you to the corresponding image in that database.

- [Cushion Cover](#), early 17th century (Ottoman Empire, c. 1300–1919), Turkey
ARTstor search: 1876-1523
- [Handkerchief](#), c. 1855–60, Belgium
ARTstor search: 1889-34
- [Yaqui Church](#), 1983, by Edna Andrade
ARTstor search: 2003-56-1

For more information, please contact Division of Education and Public Programs: School and Teacher Programs by phone at 215-684-7580, by fax at 215-236-4063, or by e-mail at educate@philamuseum.org.

PHILADELPHIA MUSEUM OF ART

- [Point on Point](#), 1931–34, by Sophie Taeuber-Arp
ARTstor search: 1952-61-120
- [Painting No. 4 \(A Black Horse\)](#), 1915, by Marsden Hartley
ARTstor search: 41822000925501

Lesson Process

1. Direct students through the following exercise: Put both of your hands on your desktop, with thumbs touching. Imagine a straight line drawn vertically, between your two thumbs. Note how the image of your hand on one side of the line is a mirror image of the image of your hand on the other side of the line. This image is called mirror, bilateral, or line symmetry (referring to the vertical line between your thumbs.)
2. Look at the Turkish *Cushion Cover*. Made in the early seventeenth century, this textile shows line symmetry. Imagine the line that shows this symmetry. If you draw a line horizontally through the middle of the cover, would that also be symmetrical? Explain.
3. Now look at the *Handkerchief* from Belgium made during the mid-1800s. Does this show line symmetry? How many lines could you draw that would reveal two symmetrical sides? This handkerchief shows four-line symmetry. (NOTE: Students typically see two lines, the vertical and the horizontal. Actually, there are four, since the two diagonal lines also create symmetrical sides.)
4. Artists can use symmetry to provide a pleasing image, without necessarily making everything in the painting symmetrical. Compare the following two paintings and discuss how the artist uses (or decides not to use) symmetry, and the effect it has on the viewer of the work. View Edna Andrade's *Yaqui Church* and Sophie Taeuber-Arp's *Point on Point*. Notice how the purposeful break from symmetry draws your attention.
5. Summarize the effects of symmetry with an examination of *Painting No. 4 (A Black Horse)* by Marsden Hartley. Be sure to discuss both symmetry and non-symmetry.

Assessment

1. DISCUSSION: How does the concept of symmetry appear in music, architecture, poetry, and nature? Usually, we find symmetry appealing; can the lack of symmetry also be appealing?
2. Formative assessment through ongoing discussion and/or written response to discussion questions.
3. Summative assessments:
 - Find images of two or three objects selected to show mirror symmetry. Describe these forms of symmetry in the objects selected.
 - What is the effect of the artist's use of symmetry? Use two of the images discussed earlier to examine the effect of symmetry on an audience.
 - Design the package for a product (cell phone, candy bar, etc.) where the design is basically symmetrical, but uses a break from symmetry to draw attention.

PHILADELPHIA MUSEUM OF ART

Enrichment

1. Use any of the images listed below to continue your discussion of symmetry:
 - o [Face Vessel](#), c. 1860–70, attributed to Thomas J. Davies Pottery
ARTstor search: 1904-36
 - o [Woman's Kimono \(Kosode\)](#), late 19th century (Meiji Period, 1868–1912), Japan
ARTstor search: 1985-79-1
 - o [The Ascension of Saint Mary Magdalene](#), c. 1500, by Master of the Johnson Ascension of Saint Mary Magdalene
ARTstor search: PMA.cat.75
2. Find examples of symmetry and the purposeful break from symmetry in other disciplines, such as poetry, music, or architecture.