

MUSEUM
AS→LEARNING
RESOURCE

CARNEGIE
MUSEUM OF ART

VISUAL ARTS,
MATH

Title: Math in the Wilderness, Parts I & II

Teacher-in-Residence: Jessica Sawchuk

Grades: 9–12

Subjects: Visual Arts, Math

Goals:

- Students will gain an understanding of composition and why it is important for telling a powerful story through their artwork. They will be able to apply these ideas in upcoming projects, when photographing their emotional landscapes. They will recognize the overlap between math and visual arts.
- Students will create a drawing or painting of a landscape using their skills and their understanding of what makes a strong composition in order to tell a story and create an experience for the viewer.

Objectives:

- Students will learn that they can understand the things in nature that result in pleasing responses in visual art more deeply, learning about what draws viewers in and considering why.
- Students will learn how to interpret design fundamentals from the artist's perspective, as well as the mathematical principles that are connected to them. We will validate the patterns, symmetry, and laws that overlap between these two disciplines and understand how they connect with our emotions and our responses to visual imagery in nature and artwork.
- Students will learn that they can create meaning in a landscape or a cityscape by applying the ideas of Symbolist artists and the mathematical concepts that affect meaningful composition.

PA Standards:

- Arts and Humanities [9.1.12.A](#)
- Arts and Humanities [9.1.12.B](#)
- Arts and Humanities [9.1.12.C](#)
- Arts and Humanities [9.1.12.E](#)
- Arts and Humanities [9.1.12.F](#)
- Arts and Humanities [9.2.12.A](#)
- Arts and Humanities [9.2.12.C](#)
- Arts and Humanities [9.2.12.E](#)
- Arts and Humanities [9.2.12.I](#)
- Arts and Humanities [9.3.12.F](#)

Common Core Standards:

[Math CC.2.2.HS.C.9](#)

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National Core Art Standards:

Anchor Standard 1: Generate and conceptualize artistic ideas and work.

Anchor Standard 2: Organize and develop artistic ideas and work.

Anchor Standard 3: Refine and complete artistic work.

Anchor Standard 4: Select, analyze, and interpret artistic work for presentation.

Anchor Standard 5: Develop and refine artistic techniques and work for presentation.

Anchor Standard 6: Convey meaning through the presentation of artistic work.

Anchor Standard 7: Perceive and analyze artistic work.

Anchor Standard 8: Interpret intent and meaning in artistic work.

Anchor Standard 9: Apply criteria to evaluate artistic work.

Anchor Standard 10: Synthesize and relate knowledge and personal experiences to make art.

Anchor Standard 11: Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

American School Counselor Association Student Standards: Mindsets & Behaviors for Student Success:

- [B-SS 4](#)
- [B-SS 1](#)
- [B-LS 2](#)

Vocabulary

- Fibonacci sequence
- the golden mean (the golden rectangle)
- the rule of thirds fractals
- design, graphic design
- composition
- proportion
- beauty
- aesthetics
- theory
- perspective
- symmetry
- pattern
- horizon line
- vanishing point
- ruler
- linear perspective
- depth
- illusion

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- three-dimensional
- landscape
- Symbolism
- emphasis
- space
- form
- shape
- value
- foreground
- middle ground
- background
- diminutive
- atmospheric
- color scheme
- golden spiral
- aesthetics

Artworks Used:

Gustave Doré, *Deer in a Pine Forest (Vosges)*

(*Biches dans une forêt de sapins [Vosges]*), ca. 1865

<https://collection.cmoa.org/objects/8e66c624-8e1b-4968-8b78-6af3acce6505>

Materials Needed:

- sketchbooks
- pen or pencil
- copies of reflection sheet
- Vihart video (see PowerPoint)
- Lateralus video (see PowerPoint)
- articles (see PowerPoint)
- sketchbooks
- camera or phone
- acrylic paint
- watercolor
- colored pencils
- charcoal
- pastels
- brushes
- ruler
- gluesticks

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- printer

Steps:

Introduction:

- Explain some of the connections between science and math and aspects of composition—why certain arrangements and patterns are naturally appealing to the human eye and mind.
- Have students create an illustration or drawing of what happens next in Gustav Doré painting or another Symbolist painting and consider the mathematical links to aesthetics and emotional responses to their composition.

Main Activity:

Day 1:

- Listen to Tool, “Lateralus” (see PowerPoint). Reflect.
- Read Vihart’s article about the golden spiral (see PowerPoint) and reflect.
- Introduce the mathematical formulas that are linked to aesthetics, followed by a demonstration and activity in collaboration with students.
- Review the Symbolist landscapes and information about composition presented in the second part of the PowerPoint.
- Complete reflection sheet for the videos.
- Complete reflection sheet for the article.

Day 2:

- Exploration of mathematics and art with math teacher (guest).
- Introduce Symbolism.
- Reflect on the Doré painting.
 - Key questions: Where do you see yourself in this image? Why? What is going to happen next?
- Photo expedition and group discussion of peer work.
- Group critique of work.
- Students will write a story or poem about the work and a chosen peer’s work.

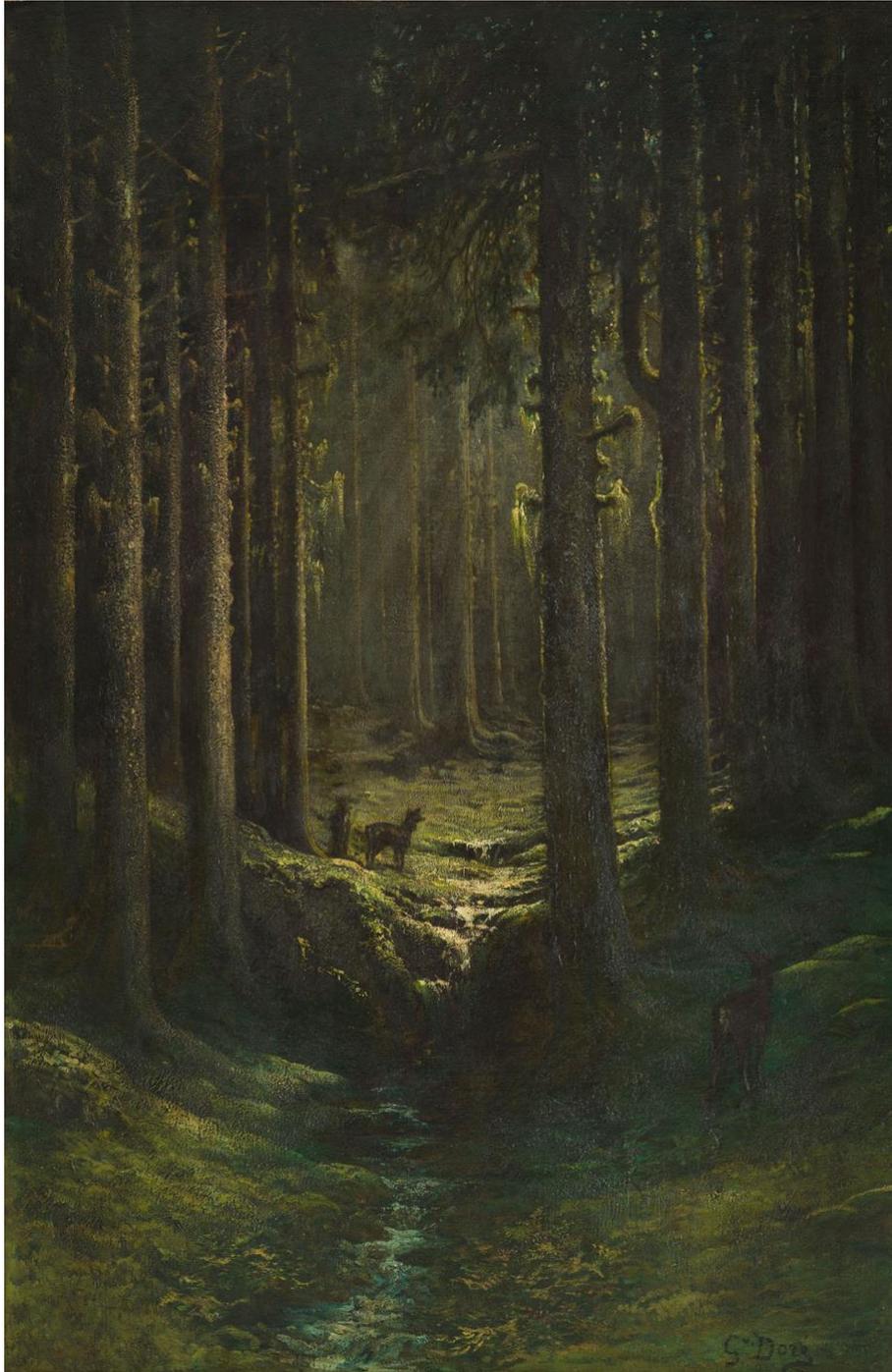
Assessment:

- A rubric will be used to set criteria and guidelines and to evaluate the project.
- Teachers will provide guidance through active working.
- Students will critique work throughout the lesson and at the end of project.
- Students will keep weekly journals for process reflection and check-in.

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