Lesson Plan: Leonardo da Vinci and the Mathematics of Proportions

Subject: Mathematics (with integration of Art History)
Grade Level: High School
Duration: 2 class periods (90 minutes each)
Standards: MA.912.GR.1, MA.912.GR.4, MA.912.GR.5

Mathematics:

- MA.912.GR.1: Prove and apply geometric theorems to solve problems.
- MA.912.GR.4: Use geometric measurement and dimensions to solve problems.
- MA.912.GR.5: Make formal geometric constructions with a variety of tools and methods.

Objectives

- Students will understand the concept of proportions and ratios.
- Students will apply their understanding of proportions to analyze art.
- Students will explore how Leonardo da Vinci used mathematics to enhance his artwork.
- Students will create their own art piece using da Vinci's principles of proportions.

Materials

- Examples of Leonardo da Vinci's artwork (e.g., "Vitruvian Man", sketches, and paintings).
- Rulers and measuring tapes.
- Drawing paper and art supplies.
- Calculators.
- Access to the internet and projection equipment for presentations.

Day 1: Understanding Proportions in Mathematics and Art

Introduction (15 minutes)

- Begin with a brief overview of Leonardo da Vinci as a polymath who excelled in art, science, and mathematics.
- Introduce the concept of proportions and how they are used in various fields, including art.

Direct Instruction (20 minutes)

- Explain the mathematical concepts of ratios and proportions, including real-life examples.
- Show how these concepts apply to art, specifically in creating realistic and visually appealing compositions.

Guided Practice (25 minutes)

- Analyze da Vinci's "Vitruvian Man" as a class, discussing the use of proportions and how da Vinci applied his understanding of mathematics to his art.
- Work through a few examples measuring proportions in copies of da Vinci's sketches and paintings.

Independent Practice (30 minutes)

- Students will select an artwork by da Vinci and analyze the use of proportions within it. They will measure specific elements and calculate the ratios used.

Day 2: Applying Proportions in Creating Art

Review and Introduction (15 minutes)

- Quick review of the previous day's lesson.
- Introduce the day's activity: creating an artwork or sketch using da Vinci's principles of proportion.

Activity Preparation (15 minutes)

- Discuss the importance of planning and measuring before drawing.
- Students sketch their ideas, planning how to incorporate proportions.

Activity Execution (45 minutes)

- Students work on their art pieces, applying the concepts of proportions and ratios.
- Encourage students to think about the geometry and symmetry in their compositions.

Closure and Discussion (15 minutes)

- Students share their work with the class, explaining how they applied proportions.
- Discuss the challenges and insights gained from trying to apply mathematical concepts to art.

Assessment

- Participation in discussions and activities.
- Analysis of da Vinci's artwork focusing on proportions.
- Completion and presentation of their art piece using learned concepts.

Extension Activity

- Explore how other artists and architects use mathematics in their work.
- Integrate technology by using digital tools to create art based on mathematical principles.
- Using Vitruvius' proportions, students measure portions of their body in reference to their height. In this activity, the student will explore the legitimacy of Vitruvius' theory by measuring and calculating their own proportions and comparing them to those used to sketch the "Vitruvian Man."
- Students can use various media available to create a life-sized "Vitruvian Teen." Students can be creative and use personal style.