Geometric Beadwork

Fast Facts

Curriculum Area: Mathematics
Grade Level: Grade 4
Suggested Duration: 60 minutes

Stage 1 Desired Results

Established Goals

Montana Content Standards for Mathematics

Geometry (4.G.3) Recognize a line of symmetry for a two-dimensional figure, including those found in Montana American Indian designs, as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Indian Education for All Essential Understandings Regarding Montana Indians

Essential Understanding 3 The ideologies of Native traditional beliefs and spirituality persist into modern day life as tribal cultures, traditions, and languages are still practiced by many American Indian people and are incorporated into how tribes govern and manage their affairs.

Additionally, each tribe has its own oral histories, which are as valid as written histories. These histories pre-date the "discovery" of North America.

Understandings

- the importance of dance to some Native American people
- the variety of geometric concepts applied to regalia
- the definition of regalia: Magnificent attire; finery

Essential Questions

- How is dance an important part of some Native Americans' culture?
- What mathematical terms can be used to describe the designs on regalia?
- How many lines of symmetry does your figure have?
- What makes lines of symmetry or a reflection appealing to the eye?

Students will be able to…

- acknowledge that dance is an important tradition of some Native Americans' culture.
- identify lines of symmetry. (4.G.3)
- identify a reflection.

Students will know…

- how to identify lines of symmetry and reflections on regalia and other forms of art.
- how to design beadwork on paper.
- how to form lines of symmetry.
- how to form a reflection.

Stage 2 Assessment Evidence

Performance Tasks

Students will design a piece of "beadwork" on graph paper and be able to identify at least two lines of symmetry and one reflection, in which every point of the geometric figure is moved the same distance in the same direction. They will also answer the fourth Essential Question on the back of the paper.

Other Evidence

Check for understanding after reading the book by asking a variety of questions. You may start by asking if anyone has ever been to a Powwow and generate some talk on regalia.

Stage 3 Learning Plan

Learning Activities

Read *Jingle Dancer* by Cynthia Leitich Smith to the class to bring about awareness of powwows.

Check for understanding after reading the book by asking a variety of questions. You may start by asking if anyone has ever been to a pow wow and generate some talk on regalia. Then ask the following Essential Questions: How is dance an important part of some Native Americans' culture? (each tribe has its own unique traditions they are still able to express today through dance); What mathematical terms can be used to describe the designs on regalia? (e.g. symmetrical, reflections, translations).

Go to the Smithsonian Institute Identify by Design Web site. Throughout the web site there are several different designs that show symmetrical bead work. Click on a few photographs and look at each one individually. Display using a projector if possible. If no projector is available, print several pictures to pass around the class or have a community member share some regalia or other beadwork with the class.

Discuss lines of symmetry and identify any translations you may find. When discussing the patterns, be sure to use the appropriate term for the outfits, "regalia."

Hand out graph paper. Using a projector or document camera show the students how to count over from the top to find the middle box. Start with one color there, and then design off of that, using that as your starting point. Design a simple example for them to get started (example below).

Have the students begin their own designs. The students can be very creative, just remind them that they need to show two lines of symmetry and one reflection. When finished, have them bring the paper to you and show you where their lines of symmetry are and their reflection, which answers the third Essential Question (must be able to show you at least two lines). Have it worth four points; one point for each line of symmetry, one point for a reflection, and one point for answering the fourth Essential Question on the back of their paper (e.g. they are even).

Materials/Resources Needed

Smith, Cynthia Leitich. **(Muscogee Creek) *Jingle Dancer*.** Illustrated by Cornelius Van Wright and Ying-Hwa Hu. New York, NY: Morrow Junior Books, 2000. ISBN 0-688-16241-X

Internet access with projector or document camera OR printed pictures of regalia OR a community member that has access to beadwork or regalia.

Graph paper

Coloring tools

Smithsonian Institute Identify by Design tradition, change, and celebration in native women's dresses

Definition of regalia

Montana Content Standards and IEFA Essential Understandings Regarding Montana Indians

Montana Content Standards for Mathematics – Grade 4

Essential Understandings Regarding Montana Indians

Geometric Beadwork Example