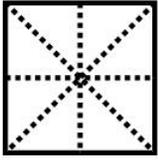


Explore: Radial Pattern Design



Grade Level: 4 – 6

Time: 1.5 hour workshop (divide into two shorter sessions as needed)

BRIEF DESCRIPTION

This project is an exploration into radial pattern design reflecting on community and local environment.

SPECIFIC OBJECTIVES:

- Students will understand geometry in context of an art pattern design project.
- Students will learn to discuss their radial pattern designs using both math and visual arts vocabularies such as: arc, concentric, balance, repetition, contrast, angle, symmetry, radial pattern, intersect, bisect, acute angle and obtuse angle.
- Students will identify visual imagery unique to students' community, their environments and culture, and translate those elements to patterns designs.

ART AND DESIGN HISTORY CONNECTION:

What is Radial Design? What are examples in various cultures?

- Tibetan sand mandalas: Tibetan Monks create a Mandala (literally, circle in Sanskrit) is of Hindu origin, but is also used in Buddhist context, to refer to various tangible objects. In practice, mandala has become a generic term for any plan, chart, or geometric pattern which represents the cosmos metaphysically or symbolically, a microcosm of the universe from the human perspective. More info on Mandala: http://en.wikipedia.org/wiki/Sand_mandala



Tibetan Monks by Paolo Massa CCA

- Mayan Calendar:
<http://www.flickr.com/photos/theirl/2164085293/sizes/m/in/photostream/>,
http://en.wikipedia.org/wiki/Maya_calendar



Mayan Calendar by Theirl (Flickr): (CC BY-SA 2.0)

- Contemporary example of radial pattern design:



Shaldon: Hubcap Teepees in Ireland by Chris Downer (CCA)

ESSENTIAL QUESTIONS & THEMES:

As students discuss the below themes and brainstorm ideas, assign a student to write down class ideas and thoughts on a large piece of paper or on a board. Please photograph and share these via Flickr or Picassa or email me (corinne@okadadesign.com)

Ask and show samples of radial pattern design:

- What is this? (show Tibetan mandala) What does this pattern represent to these monks?
- What is this? (show Mayan Calendar) What does this pattern represent here?
- How would you define radial pattern design?
- What are examples of man-made radial pattern designs? (i.e. hub caps)
- What are examples of radial pattern designs in nature? (i.e. spider web)

Themes: Cultural Celebrations/Festivals/Community Events, Neighborhood and Environment, Transportation/Journey, Geography

Students discuss the above themes:

- Students describe how communities vary in land use, population density, architecture, services, and transportation.
- Students describe the social and cultural life in their region and neighborhoods and interactions among people (celebration, festivals, community events, etc.).

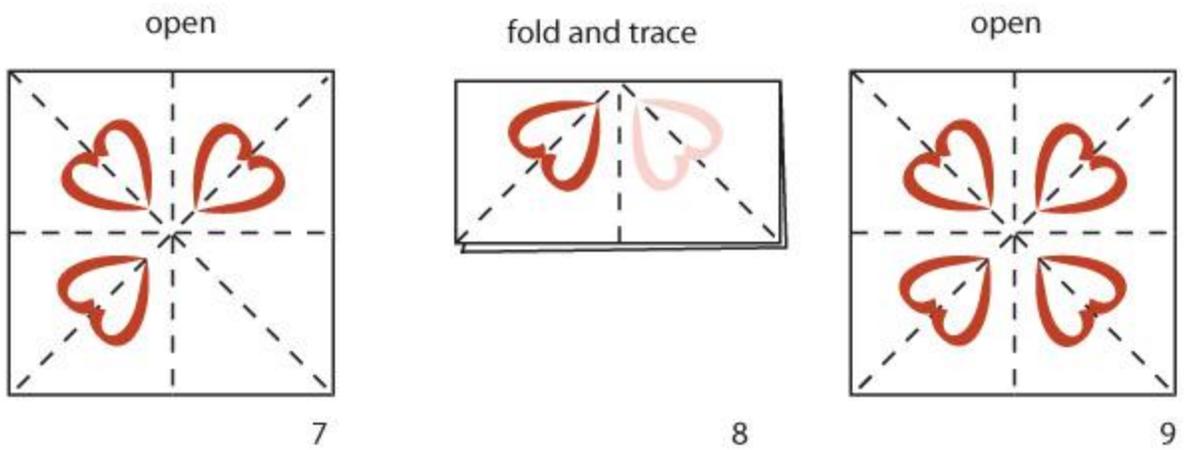
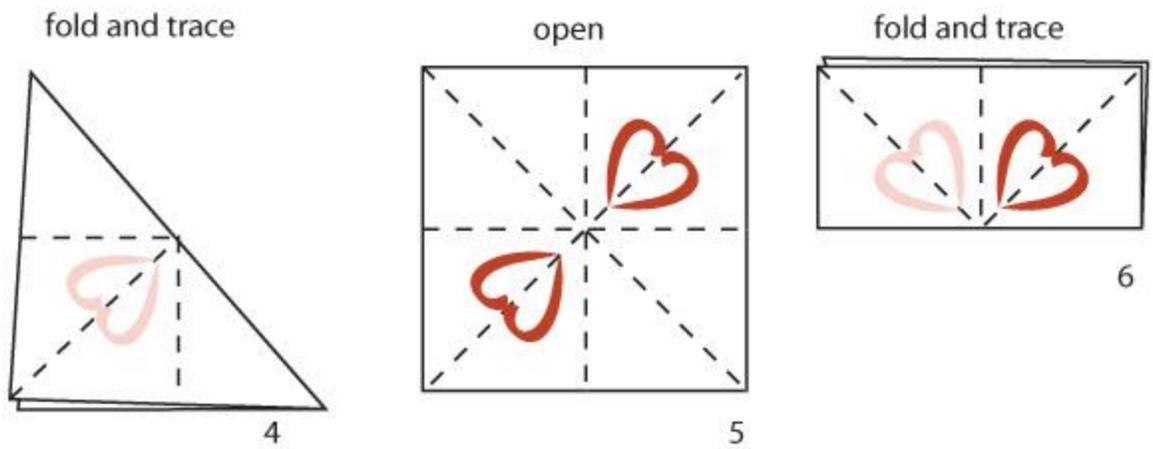
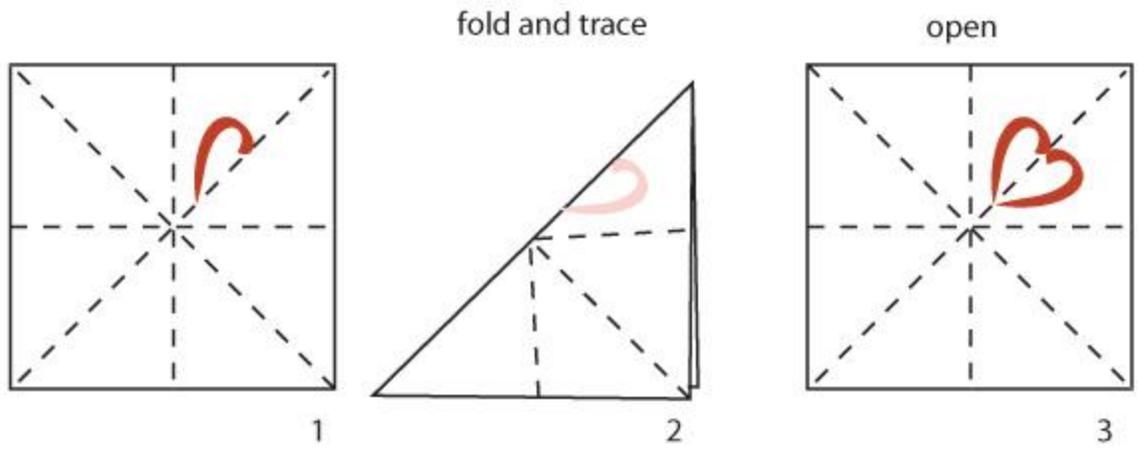
Ask and show samples:

- What particular elements make their community visually unique?
- [Mapping Identity Diagram](#)
- What are the common patterns used in their town's or neighborhood's architecture both indoor/outdoor?
- What are the most common colors and patterns used in traditional arts and crafts specific to their culture/s? i.e.; fabrics, carpets, pottery, clothes, households, etc.

REQUIRED MATERIALS:

- Tracing paper (8" x 8" squares)
- Pencil, colored pencils, regular markers

STEP BY STEP RADIAL PATTERN DESIGN:

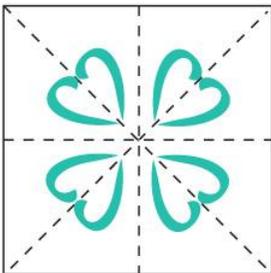
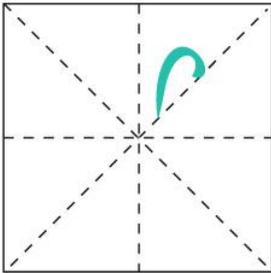


LESSON PLAN PROCEDURE:

1. Making the guidelines: Fold your square into a triangle. Fold your triangle into a smaller triangle. Open up your paper and lay it flat, then fold it in half into a rectangle. Fold this rectangle in half into a square, then lay paper flat again.
2. Create a radial pattern tile: You will notice that your square piece of paper is now creased showing eight triangles. Choose one triangle (1/8) of your tracing paper and create a pattern in that area. Students' pattern design could consist of simple images, shapes, words, etc. that is inspired by the 4 themes that are already discussed: the patterns can represent their community, transportation, the environment around them, forms and elements that are found in their native traditional arts, or colors and materials used in their neighborhood's buildings. Sketch your idea using pencil in one triangle (1/8) of your tracing paper. Then use colored markers (preferred) to color your pattern designs. Be sure not to create a design that crosses over into the other triangles near it.
4. Trace pattern to neighboring triangle creating 1/4 of radial repeat: Fold paper in half in a triangle so that drawing side is towards the outside and so that you can trace your pattern on neighboring triangle. In this way you are creating a mirror reflection of initial design on the same side of the paper.
5. Trace pattern onto another 1/4 of paper. Open up paper to see design. Now fold paper in half as a triangle so that you can trace the design onto the other side of the paper. Once you have traced, you will now have 1/2 of your pattern design created.
6. Trace pattern onto remaining 1/2 of paper. Open up paper and lay flat. (be careful not to smear colors as marker on tracing paper takes a while to dry). Now fold paper in to a rectangle to trace onto last remaining two 1/4 sections.

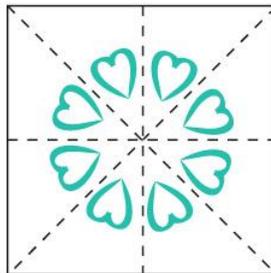
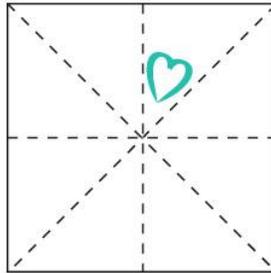
Sample of two ways to mirror reflect below:

Half a heart in a 1/8 section will result in...



4 hearts radially repeating.

A whole heart in a 1/8 section will result in...



8 hearts radially repeating.

VISUAL EXAMPLES:

7. Each student reflects in writing on the meaning of their pattern designs on [Radial Pattern statement](#).

ADAPTATION AND EXTENSION:

Students could create pattern designs representing other aspects of their cultures: food, vegetation, habits, folk music, words of wisdom, mythology, or family and friends.

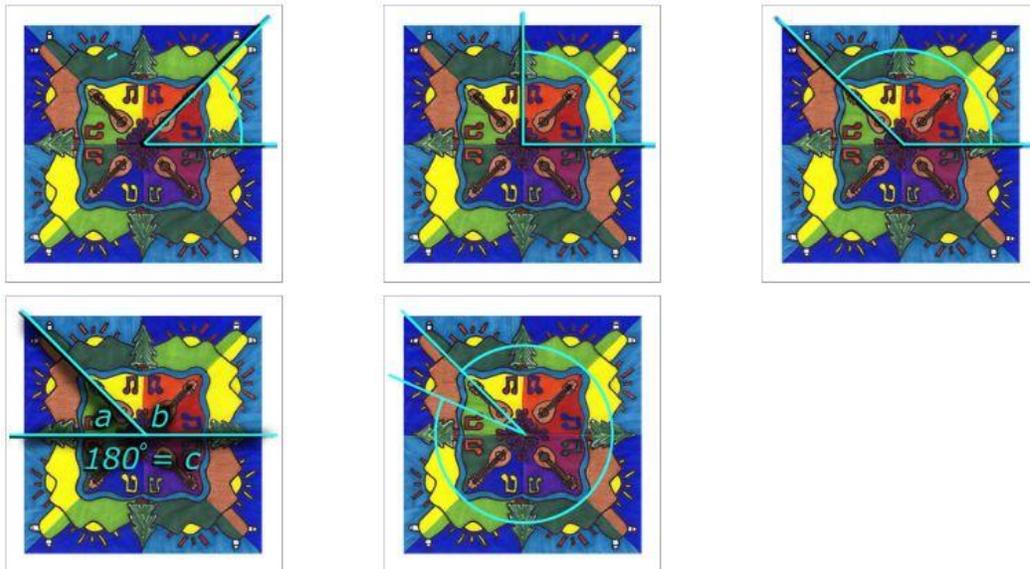
Students visit the Math Forum website to learn more about pattern design and math:

<http://mathforum.org/geometry/rugs/symmetry/> and The Four Basic Symmetries:

<http://mathforum.org/geometry/rugs/symmetry/basic.html>

CLOSURE:

- Students present and share their pattern designs.
- They discuss reasons and ideas behind their choices.
- Students identify angles in their created patterns.



Acute Angle, Right Angle, Obtuse Angle, Supplementary Angle, Reflex Angle

ASSESSMENT:

Did student create accurate radial pattern designs? Did student use correct math and visual arts vocabulary in explaining their pattern design in class discussions? Did student use appropriate imagery representing their community? Did student create a neat and careful pattern design? Did student complete design in timely manner? [Radial Pattern Rubric](#)

NOTE TO THE TEACHER:

- Teacher may use the Slot Shelters Project reference image file for showing this lesson plan's required image examples. Teachers may access the file from Slot Shelters website from Downloads page or from link above under "Art and Design History Connections".
- Teachers are requested to bring in the required examples from the students' unique environment/neighborhood and culture for the part, ESSENTIAL QUESTIONS and THEMES
- Tracing papers must be measured and cut into squares. It is preferable that teachers do this process prior to lesson.
- [Radial Pattern statement](#) forms should be printed in advance. 1 form per student.
- Student Project Statement and the Student's Pattern Design on the tracing paper is photographed or scanned. Finally, the art is uploaded to picassa album or a flicker account or shared online with Corinne Takara via a predetermined format.

ESSENTIAL VOCABULARY:

Pattern: the repetition of an element (or elements) in a work of art.

Radial Pattern: Visual elements (shapes, words, images) are distributed around a central point and often radiate from it.

Repetition: Tessellation or tiling of the plane: is a pattern of plane figures that fills the plane with no overlaps and no gaps. One may also speak of tessellations of parts of the plane or of other surfaces.

Symmetry: An exact matching of form and arrangement of parts on opposite sides of a boundary, such as a plane or line, or around a central point or axis.

Contrast: Fine Arts & Visual Arts / Art Terms) (in painting) the effect of the juxtaposition of different colors, tones, etc.

Balance: A harmonious or satisfying arrangement or proportion of parts or elements, as in a design

Geometric, (Mathematics): of, relating to, or following the methods and principles of geometry Or consisting of, formed by, or characterized by points, lines, curves, or surfaces a geometric figure

Geometric, (Fine Arts, Design or Ornamentation): composed predominantly of simple geometric forms, such as circles, rectangles, triangles, etc.

Arc: A segment of a circle.

concentric, Having a common center.

Radial: Of, relating to, or arranged like rays or radii.

Angle: The figure formed by two lines diverging from a common point.

Parallel: a. Of, relating to, or designating two or more straight coplanar lines that do not intersect. b. Of, relating to, or designating two or more planes that do not intersect.

Bisect: to cut or divide into two parts, especially two equal parts.

Vectors: Also called polar vector, a variable quantity, such as force, that has magnitude and direction and can be resolved into components that are odd functions of the coordinates. It is represented in print by a bold italic symbol: \mathbf{F} or \vec{F} Compare

Radius: a. A line segment that joins the center of a circle with any point on its circumference. b. A line segment that joins the center of a sphere with any point on its surface. c. A line segment that joins the center of a regular polygon with any of its vertices.

Supplementary angles: two angles whose sum is 180° .

Lesson plan created by Corinne O. Takara. Lesson revision assistance by Pantea Karimi.

Workshop adapted from Takara's Radial Pattern Design lesson from [You Are Here Banner Project](#).

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