Unit Plan Sample: Mathematics Topics

		Title of Unit Plan:	Symmetry
Grade Level:	3-5th	Subject Area:	Mathematics
School Name:		Time Frame to Complete Lessons:	2-3 days (w/art)

Stage 1: Desired Results

Established Goals: (Standards)

CS.M.K6.GS1 Demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry, and reasoning.

CS.M.K6.DS2 Respond to the beauty, harmony, proportion, radiance, and wholeness present in mathematics.

CCSS. 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure 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.

Understandings:
- Beauty can be found even when working with mathematical constructs.
- Using sets of questions can help us more deeply investigate concepts.

Essential Questions:
- How can we measure Beauty?
- Where can we find beauty in mathematics?
- Where is unity and wholeness of symmetry found in God's creation?

Students will know….
- That some objects are symmetrical and others are asymmetrical.
- To identify and create lines of symmetry.
- Recognize unity, harmony, proportion, radiance and wholeness in geometrical creations.

Students will be able to…

Stage 2: Assessment Evidence

Performance Task(s):
- Students will be able to find and create symmetrical objects of beauty, proportion and wholeness (ideas: snowflake, simple mandalas, butterfly, heart).

Other Evidence:
- Symmetrical/Asymmetrical Worksheet.
- Philosophical Questioning Worksheet.

Stage 3: Learning Plan

Learning Activities: Selected

Day 1: Use "A Symmetrical World" (See Resources) as a hook to introduce students to symmetry. Do not show them the title, but ask what can they find similar about each of the images shown. Select two or three of the images to help focus student answers to the mathematical concept.

Alternative to the video: Slideshow or cut magazine images depicting symmetrical objects such as a sunflower, honeycomb, peacock, etc. Ask students what they see similar about the images.

Using a circle, square, and triangle, (or image from the video) show students how to use a straight-edge to draw a line of symmetry. Place a mirror on the line of symmetry to divide the image in half, then ask the students what they see (whole image).

Introduce the mathematical definition of "symmetry" referring back to the images. Select some non-examples to help define the word "asymmetric". These non-examples might include a pair of scissors with two different size finger holes, the United States flag, or a glove.

Pair students up and have them look throughout the room to identify items that are both symmetrical and asymmetrical. Identify items in both categories on the worksheet and draw lines of symmetry. In large group ask: Are there more of one than the other? Why are these objects in one category and not the other?

Day (or Lesson) 2: Re-play video on symmetry. Ask students if they think these images are beautiful? Use philosophical questions below in a discussion of Beauty.

Prepare a worksheet (See Resources below) with the outline of a circle, an octagon, a trapezoid, a square, a rectangle and an oval. Have students draw a line of symmetry through each shape.

Help students create mandalas or fold paper snowflakes to demonstrate symmetry.

Note: Lessons and activities can be divided as needed and as age appropriate.

Additional Lesson plans and student Resources:

Homeschoolmath.net Line Symmetry Worksheet.
http://www.homeschoolmath.net/teaching/g/symmetry.php

Vocabulary and Definitions:

Symmetry: an object is symmetrical when it can be halved or turned in such a way that it fits exactly onto itself. There are two types of symmetry: reflection and rotation.[1]

Asymmetric: A plane or solid that is not symmetric.

Teacher Resources:

McDonald, P. (2014). *A symmetrical world*. Retrieved from https://www.youtube.com/watch?time_continue=3&v=KMC_1dVtd4c

http://illuminations.nctm.org (resources for teaching math – worksheet for line of symmetry)

---

[1] Large, T. (2006). *The Usborne Illustrated Dictionary of Math.* London, England: Usborne Publishing Ltd. See page 42.

Educating to Truth, Beauty, and Goodness. Retrieved from The Cardinal Newman Society
https://cardinalnewmansociety.org/catholic-curriculum-standards/appendix-a/
Spitzer, R. (2011). *Ten universal principles: A brief philosophy of the life issues.* San Francisco, CA:
Ignatius Press. pp. 135 – 137 on Beauty.
Pauley, C. & Spitzer, R. (2012). *Principles and Choices: Identity and Values. Book One*. pp.20-17.
High school textbook that introduces the five transcendentals of Truth, Beauty, Goodness/Justice,
Love, and Unity. See www.healingtheculture.com.

Cross - Curricular Connection
Art: Creating mandalas, snowflakes, masks.
     Design a paper quilt with squares divided into equal parts.

symmetry

Symmetry is having one side that exactly mirrors the other.

A line of symmetry divides a symmetrical shape in half.
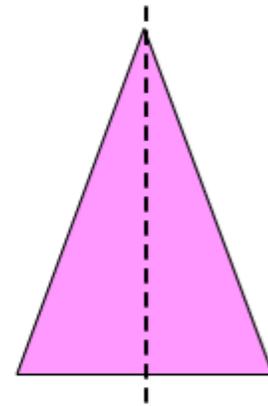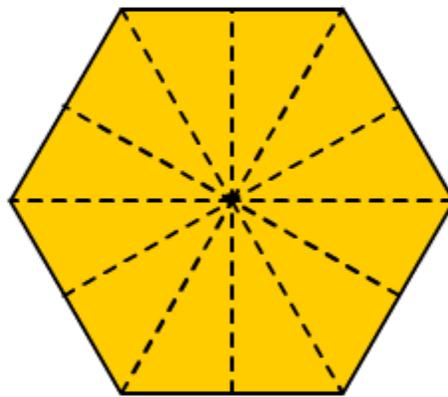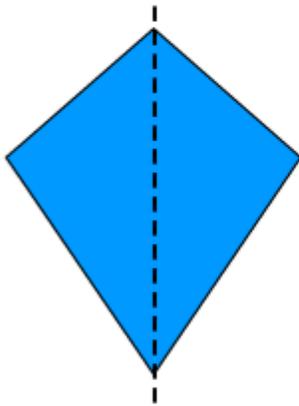
An object may have more than one line of symmetry.

SHAPE

✗ ✓ ✓ ✗ ✓

Permission for use granted by author October 13, 2017
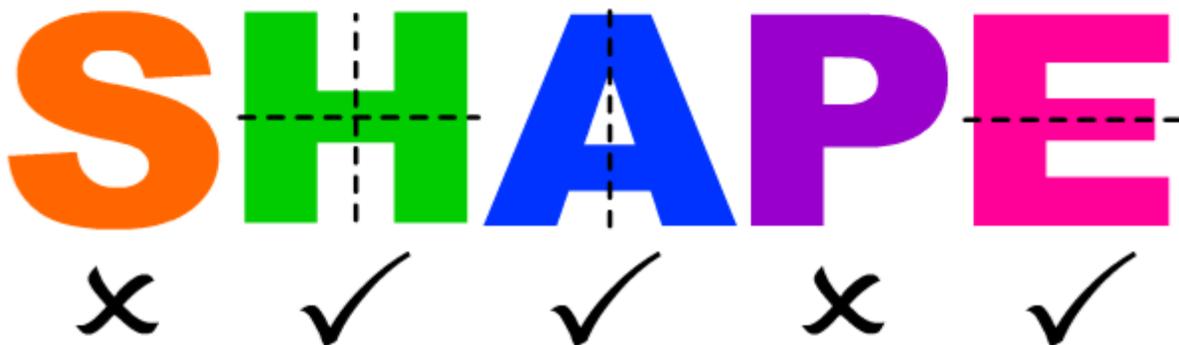
Symmetrical	Asymmetrical
Draw a picture of the object and its line of symmetry.	Draw a picture of the object
1.	1.
2.	2.
3.	3.
4.	4.

Explain why an object is symmetrical and not symmetrical.

Transcendental Taxonomy
Inquiry Questions on Beauty

Are these images beautiful? Why or why not?

Are the non-examples as beautiful? Why or why not?

Are some things more beautiful than others? How so?

How does this beauty affect us?

Beauty is something that has unity, harmony, proportion, wholeness and radiance of form.

Where is there wholeness and proportion in these images?

How does this reveal God's graciousness, presence, and transcendence? What images specifically show this to us?

How do we imitate this creation of beauty?

How do we feel when we make something beautiful?