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| LessonTitle: Polygons and Art | | Pre 7.7 |
| Utah State Core Standard and Indicators Pre-algebra Standard 4 Process Standards 1, 2, 4 | | |
| Summary | | |
| In this lesson, students create geometric art and identify geometric shapes within that art. They learn to inscribe regular polygons inside circles and use these shapes as the basis of the art. This activity is well worth the time it takes! | | |
| <p align="center">Enduring Understanding</p> <p>Drawing regular polygons is difficult because it's hard to get both the angles and the sides to be perfectly congruent. Inscribing the polygons within circles solves that problem. Creating geometric designs from these polygons yields a lot of valuable visualization practice.</p> | <p align="center">Essential Questions</p> <p>What can we learn about geometry by creating geometric art?</p> | |
| <p align="center">Skill Focus</p> <ul style="list-style-type: none"> • Creating regular polygons inscribed within circles. • Identifying characteristics • Using geometry to create art | <p align="center">Vocabulary Focus</p> | |
| Assessment Create a rubric for evaluating these projects. | | |
| Materials: Computers with Geometer's Sketchpad, compass and protractor or circle making tool. Directions sheet (see below), art example sheet (see below) | | |
| Launch | | |
| <p>Explore</p> <ul style="list-style-type: none"> • How can a circle help you construct regular polygons? • How do you reproduce the geometric art using polygons inscribed in circles? | | |
| Summarize | | |
| Apply | | |

Directions: Follow the directions on the direction sheet below. For doing the work and answering the questions, have students create a separate document on the computer or by hand.

The teacher will need to demonstrate how to use a circle to create regular polygons. Make certain that the centers of the circles are marked. Mark a point on the circumference. Then divide the 360 degrees of the circle into however many parts you want, three for a triangle, etc. Once the circle has been divided, then connect the points on the circle to create the regular polygons.

Use the Record of Geometry Terms from lesson 7.2 to help identify characteristics of the shapes created in the art.

Pre 7.7

Polygons and Art

Instructions

In this activity you will explore creating regular polygons and use what you learn to create some geometric art. After you complete the assignment and recreate some of the art from the handout , you will create your own art as a final project.

Note: This assignment could be done using Geometer’s Sketchpad or by hand using a circle maker tool and angle measuring instrument. In either case, create a document with your name and then respond to the questions separately on that document.

- 1) Try constructing an equilateral triangle with a ruler as your only tool? How about a pentagon? What are the problems you must deal with? How might you approach this task to avoid these problems? How could a circle help you?
- 2) Create five circles with at least 1 inch diameters. Be certain to mark the circle center. Figure out how to create a triangle inscribed within the circle. (The triangle points are on the circle circumference.) Show what you did!

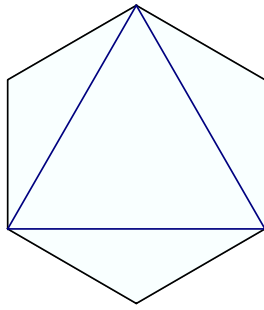
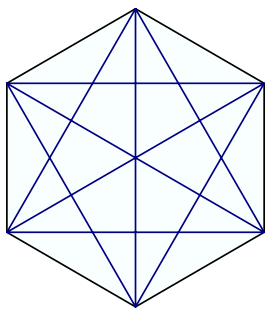
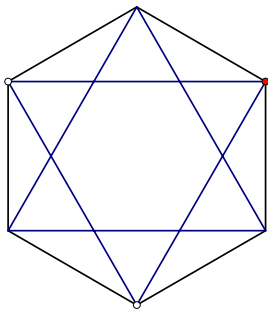
Now create a square, a pentagon, a hexagon, and an octagon inside circles. Show all your thinking and your work.

- 3) For this problem you can use the shapes produced in #2 above or if you are using the computer, you could reproduce. If using Geometer’s Sketchpad, copy and paste.
 - On all of the inscribed shapes, connect every point to every other point (see below).
 - Next, locate the shapes listed below.
 - Outline the shapes in a color or color them in,
 - Create a color key with labels for the shapes.

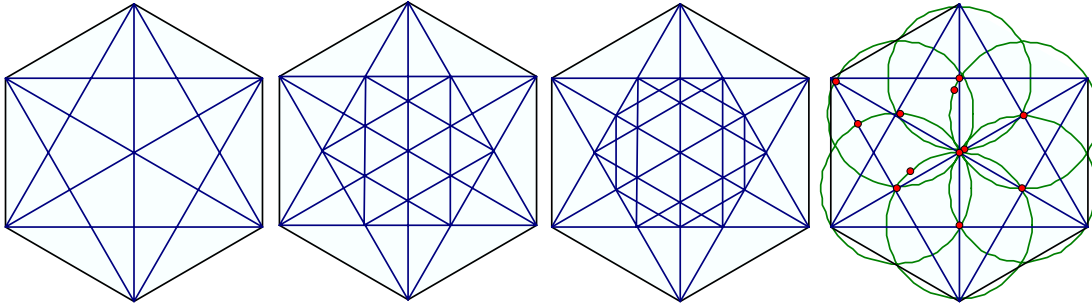
Triangles: 1) equilateral, 2) acute isosceles, 3) right isosceles, 4) obtuse isosceles, and 5) scalene.

Quadrilaterals: 1) parallelogram, 2) isosceles trapezoid, 3) a trapezoid which is not isosceles, 4) kite, 5) rectangle, 6) other quadrilateral

Other Polygons: Your own choosing.



- 4) Now have some fun creating some polygon art. Recreate 3 from the art handout.
- Begin by inscribing hexagons within circles.
 - Then connect each point with every other point.
 - You may wish to connect inner hexagon points (see example 3 below). Or you may wish to use overlapping circles (see below).
 - 4) Erase some lines and/or color in parts to recreate some of the drawings on the example sheet.



- 5) Create some of your own art using inscribed polygons. You may choose to create a large hexagon project or smaller hexagons. The art can be enhanced using colors or black and white.
- 6) Write about what you learned in the process of creating this art. You can write paragraphs and include drawings if you wish.
- What is the specific geometry you learned?
 - What did you learn about art and geometry?

Art Example Sheet

