RAFT IDEAS

Topics: Polygons, Area, Perimeter, Tessellations

Materials List
- ✓ 20 Cardstock strips approx. 5 cm x 20 cm (2" x 8")
- ✓ Tape

This activity can be used to teach:
Common Core Math Standards:
- Classifying Shapes (Grade 4, Geometry, 2)
- Volume (Grade 5, Measurement and Data, 3 & 5)
- Triangles (Geometry, Grade 5, 5; Grade 6, 1)
- Two and three-Dimensional shapes & objects (Geometry, Grade 6, 4; Grade 7, 6)
- Problem Solving and Reasoning (Mathematical Practices Grades 4-7)

A Honey of a Shape
The Logical Shape of a Honeycomb
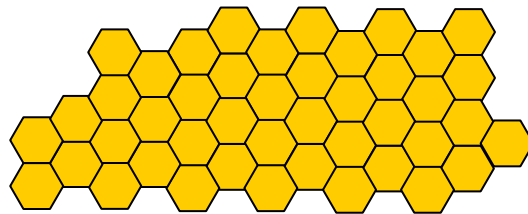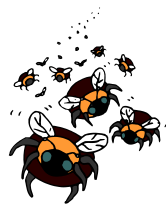
Explore nesting shapes in this activity that shows why the hexagon appears so often in nature, including honeycombs, soap bubbles, and mud cracks.

To Do and Notice
1. Begin by using the cardstock strips to create 10 triangular prisms.
2. Fold the cardstock strips in ½ and then fold each end to the ½ way fold to create 4 sections.
3. Fold each strip into a triangular prism by overlapping 2 of the sections and securing the shape together with tape.
4. Tape the prisms together by nesting them, leaving no spaces between the triangles.
5. Next, use the remaining 10 strips to create 10 hexagonal prisms.
6. Fold the cardstock strip in ½ , fold each end to the ½ way fold, then fold each section in ½ to create 8 sections.
7. Fold each strip into a hexagonal prism by overlapping 4 of the sections and securing the shape together with tape.
8. Tape the hexagonal prisms together by nesting them, leaving no spaces.
9. Compare the 2 created assemblies. Note that the perimeters of the triangles and hexagons are the same. Notice that the triangular prism version is stronger, but the hexagonal version provides the most space in each compartment and takes up the most volume using the least amount of material.
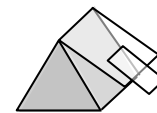
The Content Behind the Activity
Three regular polygons tessellate, or nest together leaving no open space: equilateral triangle, square, and hexagon. Their angles divide into 360° evenly, 60°, 90° & 120° respectively. Of these shapes, the hexagon is the "closest" to a circle, encompassing the greatest area with the least perimeter length. For this reason, tessellating hexagons appear often in nature, not only in honeycombs built by bees, but also in cracking mud, some fracturing rock, and soap bubbles. While it might seem as though bees are amazing mathematicians, the honeycomb shape is actually a manifestation of the building process. The bees create chambers, then get inside and bump against the sides, which fills in any spaces and creates the efficient, and tessellating, hexagonal compartments.
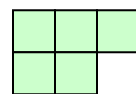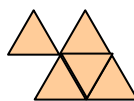
Hexagon:
A = 2.598a^2, in which *a* is one of the sides

Web Resources (Visit www.raft.net/raft-idea?isid=109 for more resources!)
- Hexagonal nesting - http://www.nps.gov/depo/kidsactivities/insertcopy.pdf
- Teacher designed math courses – https://njctl.org/courses/math

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