Mathematical Origami – IUSB Mini University

Syllabus

Day 1: Flat Folding Conjectures, Kite Base, Waterbomb Base, Inside and outside reverse folds
Day 2: The One-Cut Theorem, Fish Base, Bird Base, Rabbit ear technique, Wet folding technique
Day 3: Magic Pinwheels, Sonobe Cubes
Day 4: Discovering Platonic Solids, Other Sonobe Polyhedra, PHiZZ Modules
Day 5: Curvature in PHiZZ constructions, Building a dodecahedron, Simple animals and action toys

Instructor

Amanda Serenevy is a mathematician who became interested in mathematical origami when she and her husband folded Sonobe polyhedra for their wedding reception. She is currently finishing her PhD dissertation on the mathematics of neurons in the hippocampus. Amanda has been active in math outreach for many years and enjoys sharing her love for mathematics with students of all ages.

Related Indiana Mathematics Standards

- Algebra and Functions 5.3.1: Use letters, boxes, or other symbols to represent any number in simple expressions, equations, or inequalities (i.e., demonstrate an understanding of and the use of the concept of a variable).
- Geometry 5.4.1: Measure, identify, and draw right angles, acute angles, obtuse angles, and straight angles using appropriate mathematical tools and technology. (This activity involves practice with measuring angles.)
- Problem Solving 5.7.1, 6.7.1, 7.7.1, 8.7.1: Analyze problems by identifying relationships, telling relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
- Problem Solving 6.7.2, 7.7.2, 8.7.2: Make and justify mathematical conjectures based on a general description of a mathematical question or problem.
- Problem Solving 5.7.4, 6.7.5, 7.7.6, 8.7.6: Express solutions clearly and logically by using the appropriate mathematical terms and notation. Support solutions with evidence in both verbal and symbolic work.
- Problem Solving 7.7.5, 8.7.5: Make and test conjectures by using inductive reasoning.
- Mathematical Reasoning and Problem Solving A1.9.8, A2.10.6, IM1.7.7, IM2.7.9, IM3.7.5: Use counterexamples to show that statements are false, recognizing that a single counterexample is sufficient to prove a general statement false.

- Mathematical Reasoning and Problem Solving G.8.3, IM2.7.2: Make conjectures about geometric ideas. Distinguish between information that supports a conjecture and the proof of a conjecture.
- Mathematical Reasoning and Problem Solving IM3.7.8: Construct logical arguments, judge their validity, and give counterexamples to disprove statements.

	Number Sense	Computation	Algebra/ Functions	Geometry	Measurement	Data/ Probability	Problem Solving
Flat Vertex Folds			5.3.1	5.4.1 (part)			(5-8).7.1; 5.7.4/ 6.7.5/7.7.6/8.7.6; (6-8).7.2; (7-8).7.5; G.8.3/IM2.7.2; A1.9.8/A2.10.6/ IM1.7.7/IM2.7.9/ IM3.7.5; IM3.7.8
One Cut Theorem			K.3.2; (1-2).3.4	3.4.1; 3.4.2; 3.4.6; 3.4.8/4.4.5; 8.4.1; 8.4.2; G.1.2; G.2.1/IM1.3.1; G.3.1; G.4.1; IM2.2.5			(K-2).6.1; G.8.1; G.8.4
Magic Pinwheels		4.2.5; 4.2.6; 5.2.1		(4-5).4.1; 4.4.3; 5.4.4; 6.44			(4-6).7.1
Sonobe Polyhedra		4.2.5; 4.2.6; 5.2.1		4.4.6; G.7.1/IM3.2.12; G.7.3/IM1.3.7			(4-6).7.1; (4-5).7.3/6.7.4; 5.7.9/6.7.11; DM.4.3
Platonic Solids				1.4.2; 1.4.3/2.4.2; 1.4.4; 2.4.1; 4.4.6; G.7.1/IM3.2.12			2.6.3; 3.6.8/ 4.7.9/5.7.8/6.7.10/ (7-8).7.11; (4-8).7.1
PHiZZ Constructions			(7-8).3.1; 7.3.5; 8.3.2; A1.5.3; (A1/IM1).2.1; (A1/IM1).2.2	G.7.1/IM3.2.12; G.7.3/IM1.3.7			(7-8).7.1