

Math in the Outdoors

Camp is a great place for girls and their leaders to have fun with math! In this session, we will play an animal population game, a candy sharing game, and a counting strategy game. We will figure out when it is possible to hike each trail in a camp exactly once. Finally, we will estimate the height of a tree, and calculate how much carbon dioxide the tree removes from the air.

1. Introduction
2. Candy Sharing Game. The candy sharing game has a simple rule for passing candy around the circle. We will experiment to figure out how to make the game stop, end in a steady state, or end in a cycle depending on the amount of starting candy, the number of people playing, and the initial distribution of candy.
3. Owls and Voles Game. There is a delicate balance between predators and prey in an ecosystem. In this activity, we will play the part of a family of barn owls and determine how many voles we can eat without destroying our food supply. Based on actual hunting rates, we will use our model to estimate the number of voles needed to support a barn owl family.
4. Euler Trails. Once upon a time there was a city called Konigsburg that had a branching river, an island, and seven bridges. The people of Konigsburg tried to find a walking route that would cross each bridge exactly once and then return to the starting place, but no one could do it. We will try several puzzles of this type and will figure out the mystery of the bridges of Konigsburg. We will adapt what we learn to figure out when it is possible to hike on all of the trails in a camp exactly once.
5. Global Air Conditioners. We have all heard that trees help to clean the air and cool the Earth, but how much difference does one tree make? We will learn to “weigh” a tree to estimate how much it cools our planet. Based on our calculations, we will determine how many trees we would need to plant each year to cancel out the global warming effects that come from the energy we use, the food we eat, and the products we buy.
6. Counting Strategy Game. We will play a simple counting game and work together to figure out a winning strategy.
7. Conclusion.

Amanda Sereney has been a Girl Scout for 25 years, starting as a Brownie in first grade. Through Scouting, she participated in many science and math related activities that inspired her to pursue an advanced degree in mathematics. She is now finishing the last chapter of her PhD dissertation on the dynamics of neuron networks in the hippocampus, which clarifies some of the mechanisms behind learning and memory formation. Amanda has published research on iterated matrix maps, and has additional research interests in geometric topology and mathematical origami.

Amanda has been active in math outreach for many years. She has organized math fairs, math badge days for Girl Scouts, and trainings for Girl Scout leaders and teachers. Amanda served as a teaching assistant and mentor for undergraduate math majors in the Summer Program for Women in Mathematics. During the 2002-2003 academic year, she and fellow graduate student Joyce Macabea obtained a grant to visit five universities with significant populations of minority students majoring in mathematics to tell the undergraduates there about research, graduate school, and careers in the sciences. She and her husband are currently founding the Riverbend Community Math Center, a non-profit organization serving north-central Indiana.

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