

Math Club Puzzles

UMass Boston – Fall 2021

Chase on a Cube

Three spiders are trying to catch an ant. All are constrained to the edges of a transparent cube. Each spider can move one third as fast as the ant can. Can the spiders catch the ant?

Hat Problem

Four people are trying to escape from a room. Guards have placed a hat on each person's head, and each hat is one of three colors: red, yellow, or blue. The four people are arranged at the vertices of a square, with an obstacle in the middle. Each person can see the hats on the heads of those on adjacent vertices of the square, but they cannot see the hat of the person diagonally across from them. They also do not know the color of the hat on their own head.

Each person must guess the color of the hat on their own head. If at least one person guesses correctly, they can all escape the room together. No communication is allowed once the hats are placed on their heads, but they can coordinate on a strategy beforehand. They also know how they will be arranged in the circle.

How can they be guaranteed to escape the room?