

Mathematical Games, Part 1

Chapel Hill Math Circle –Sept. 10, 2016

Station # 1: The Game of Stix

This is a game for 2, 3 or 4 players. You'll need a special set of 55 playing cards and 5 sticks. Shuffle the deck and deal off one card – put it face up in the middle – it is the set up card. Arrange the sticks to match the pattern on the set up card. Deal each player five cards, face-down. The remaining cards form the draw pile. Each player picks up their cards and looks at them. The first player plays by moving one stick to make the new stick pattern match the pattern on one of their cards OR a reflection or rotation of the pattern on one of their cards. If they are able to do that, then they put that card face up on top of the set up card. If they are unable to do so, then they draw a card from the draw pile. Then play passes to the person on their left. The goal is to get rid of all your cards first. This game can be trickier than you think it would be. For that reason, first time players might want to play with open hands. Everyone puts their cards out for all to see. This way, players can help each other. Remember, reflections and rotations of patterns are considered equivalent.

Station # 2: Penny Takeaway

Two players take turns moving. If there are an odd number of students, three students can work together.

Students: try to find a winning strategy. To describe a winning strategy, you have to explain what the winning player should do in order to win, no matter what the opponent does. Once you find a winning strategy, challenge the teacher at your table to a game!

One, Two, Three, Four, Takeaway

There are 25 pennies on a table. On each turn, a player can take any number of pennies between 1 and 4. A player loses if he or she is unable to move (because there are no pennies left).

Try the same game, but starting with 24 pennies, or other starting numbers of pennies.

Extra Game: One, Two, Four Takeaway. There are 25 pennies in a pile. A player can take 1, 2, or 4 pennies on each turn. A player loses if he or she cannot continue (no more pennies left). Try other starting numbers of pennies.

Station # 3: Lame Chess

Two players take turns moving. If there are an odd number of students, three students can work together.

Students: try to find a winning strategy. To describe a winning strategy, you have to explain what the winning player should do in order to win, no matter what the opponent does. Once you find a winning strategy, challenge the teacher at your table to a game!

Lame Rook. On the top right square of an 8 by 8 chessboard there is a rook that can move either to the left or down through any number of squares. Players take turns moving the rook. A player loses if he or she is unable to move the rook (because it is already on the bottom left square). Consider various other initial positions of the rook.

Extra Game: Lame Queen. On the top right square of an 8 by 8 chessboard there is a queen that can move any number of squares to the left, or down, or along a diagonal runs leftward and downwards. Players take turns moving the queen. A player loses if he or she is unable to move the queen.