



TULSA GIRLS'
MATH CIRCLE

Tulsa Girls' Math Circle

Parity I

Supplies: 7 cups per team 5 "coins" per team Penny and dime for each team
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1. Parity game with 7 cups. Three upside-down (bottom up), four right-side up (bottom down). The order doesn't matter. We will turn over two cups at a time by these rules:
 - a. Two bottom-up cups should both be overturned and placed back on the table bottom-down.
 - b. Two bottom-down cups should both be turned bottom-up.
 - c. A pair with a bottom-up and a bottom-down cup should be placed back bottom-down and bottom-up respectively.

The object of the game is to get all seven cups bottom-down.

2. You have 5 two-color disks. They are all yellow on one side and red on the other. Your friend lays out the 5 disks with the red side up on all five. She then hides the disks and makes 4 flips (flip = turning any disk over once; the same disk can get flipped more than once, as long as there are 4 flips total). Your friend shows you 4 of the disks. Can you predict if the hidden disk is red side up or yellow side up?
3. Penny and Dime Magic Trick:
 - (1) Place one coin in each hand.
 - (2) Multiply the value of the coin in your left hand by any odd number.
 - (3) Multiply the value of the coin in your left hand by any even number.
 - (4) Add together the results from steps (2) and (3).
 - (5) Predict which hand your friend's penny is in based on their sum.

For all these games, can you explain WHY your conclusion has to be true?