Grundy’s Game

GOALS:
• To introduce the student into group work and inductive reasoning.
• To allow the students to make conjectures and test their validity.
• To introduce some mathematical notation (floor and ceiling notation)

Number of Players: Two
Materials: Counters, tokens, or alike.

Rules: Start the game with a pile having two or more counters (or objects). To make a move divide a pile into two unequal piles. In your first move you will divide the original pile into two unequal piles. Any subsequent move is done on any of the existing piles at that moment as long as the pile has two or more counters. For example, if after the second move there are three piles of sizes 2, 6 and 7, you can make a move on the pile of size 6 or the pile of size 7, but not on the pile of size 2. In this case the pile of 6 can be divided into piles of sizes 4 and 2 or 5 and 1 (3 and 3 is illegal!). Piles with 1 or 2 counters are unplayable.
The winner of the game is the player who makes the last legal move.

OBJECTIVE:
To find a strategy to win the game when you play on a pile with up to 10 counters.

WHAT TO DO:
First, have a pencil and paper available. Be aware of anything you do. If at some point you observe a pattern and want to make a conjecture, or you have a question about the game, write it down. Comment with the members of your group about it. Be relaxed, nobody is going to kick you if you disagree with others. Discuss it and discover whether your conjecture is true or false. Have fun.

1. Form groups of three or four people (This will be your first group in this class). Play the game with just six tokens to familiarize yourself with the rules of the game, do not even think how to win the game yet. Just become familiar with the rules. (3 minutes)

2. Now that you fully understand the rules of the game, play the game starting with three tokens. Then move up and play it with four, five and so forth up to ten tokens. Take notes about observations, questions, or conjectures about this game (I would like to see them)