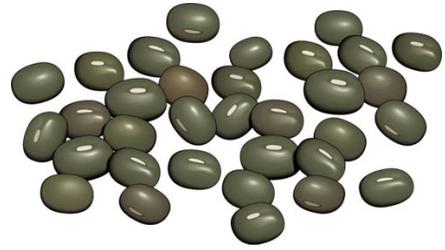


1-2 Nim



Topics: logic, patterns, addition, counting, subtraction, divisibility and remainders

Materials: Counters (tiles, beans, pennies, etc.)

Players: two

Recommended Grades: 2-8

Common Core Standards: MP1, MP2, MP3, MP5, MP7, MP8

You can take one or two counters from the pile on your turn. How do you take the last one?

Why We Love 1-2 Nim

1-2 Nim is fun, challenging, and rewarding for a wide range of ages. Done right, it can engage everyone from Kindergarten to upper elementary kids, and connect to basic counting, and arithmetic up to division. Completely unlocking the game is an exciting and powerful achievement for a student.

How to Play

1-2 Nim is a two-player game. You start with a pile of counters of a certain number. On your turn, remove one or two counters from the pile. You must take at least one counter on your turn, but you may not take more than two. Whoever takes the last counter (or counters) is the winner.

Example Short Game

We start with 8 counters in the pile. Player 1 takes one counter, leaving 7. Player 2 takes two counters, leaving 5. Player 1 takes one counter, leaving 4. Player 2 takes one counter, leaving 3. Player 1 takes one counter, leaving 2. Player 2 takes two counters, leaving 0 and winning the game by taking the last counter.

Variations

1. Change the number of counters in the starting pile.
2. 1-2-3 Nim: players may take one, two, or three counters per turn.
3. Poison: players take turns placing counters on a 10-frame. The person who fills up the 10-Frame loses.

Questions

The Central Question:

How can you win 1-2 Nim every time? What would a perfect strategy look like?

Good questions for the teacher to ask students:

- Would you like to go first or to allow me to go first? Why?
- What move should I make?
- How did you win that game?
- What do you think I will do if you take two counters?
- Would you like to take back your move?
- What have you noticed about this game?

Possible student conjectures, true and false, that may arise

- Whoever goes first wins.
- Whoever goes second wins.
- Odd vs. Even determines your strategy.
- It doesn't matter what you do until there are less than six counters in the pile.

Challenge Questions for students who have figured out the game, some challenge questions:

- How would you win if you start with a pile of 20? 30? 100? 217?
- How would the above questions apply to the 1-2-3 Nim and Poison variations of this game?

Tips for the Classroom

- When demonstrating 1-2 Nim, narrate the game out loud.
- If kids want to play three-player, keep in mind that we discourage it. Normally trying out different numbers of players is a great impulse. However, in Nim it leads to spoilers, who can't win, but can choose who does win.

About this Game

Adapted from Math For Love (www.mathforlove.com)