

# PATTERNS AND GAMES

## “Nim”

Two players play a game. There are two piles that each have 5 stones, and the players take turns.

**Rule 1:** On each person’s turn they must take away 1 or more stones. However, all stones taken must be from the same pile.

**Rule 2:** The person who takes the last stone wins.

QUESTION 1: Break into groups of two and play this game a few times. Can you figure out a strategy to win? Would you rather go first or go second in this game?

QUESTION 2: What happens if we change the number of stones so there are 6 in each pile? So there are 7 in each pile?

QUESTION 3: What if we changed the game so we had two piles that have an unequal number of stones? Would this change your strategy? Would you want to go first or second in this game?

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## “Twenty-One”

Two players play a game. We start by writing the number 0 on a piece of paper.

**Rule 1:** On each person’s turn, they may add 1, 2, or 3 to the existing number. A player is not allowed to pass or to add zero.

**Rule 2:** The first person to reach 21 (or more) wins.

QUESTION 1: Break into groups of two and play this game a few times. Can you figure out a strategy to win? Would you rather go first or go second in this game?

QUESTION 2: What happens if we change the winning number to 22? Would this change your strategy? Would you want to go first or second in this game?

QUESTION 3: What if we changed the game so you are allowed to add 1, 2, 3, or 4 on any turn? Would this change your strategy? Would you want to go first or second in this game?