

Wonderful Ideas

Nim

Information

Topics Involved: logical thinking, base two number system

Grades: second and up

Materials: twelve coins, chips, or other game pieces

Relation to NCTM K-8 Standards: this activity promotes students' abilities to: justify their answers and solution processes (p. 29); develop and apply a variety of strategies to solve problems, with emphasis on multistep and nonroutine problems (p. 75).

Type of Activity: two-person game

The Idea

Nim is an old and classic two-person game that is easy to learn and jam-packed with mathematics! Younger students will enjoy simply playing the game, while older students can delve into creating and analyzing the winning strategy.

According to Martin Gardner in his book, *Wheels, Life, and Other Mathematical Amusements*, Nim was named by Harvard mathematician Charles Bouton in 1901 when he published an article on the game. Unfortunately, he gave no explanation as to why he chose the name. Gardner suggests it may have come from a few sources: "nimm" is a German word meaning "to take," it is also an archaic English word meaning to steal, and, finally, if NIM is inverted, it spells WIN.

After students have had many chances to play, here are some questions you can pose:

- Do you have a strategy to win the game every time?
- What are good moves?
- What layout of the board guarantees you a win?

-How does your opponent's play affect your play?

-Should you go first or second?

Extensions

- there are many versions of Nim all having to do with taking away from an original number. See the April '90 issue of *Wonderful Ideas* for "Calculator Nim."
- change the rules so that the player who takes the last game piece loses.
- the game is easily altered; simply include more rows in the game or more game pieces in any row.

References

Gardner, Martin. *Wheels, Life, and Other Mathematical Amusements*. New York: W. H. Freeman and Company, 1983.

The strategy for Nim is discussed on page 11.

Nim Game Board

How to play:

- Set up twelve game pieces, as shown here, in three rows. The first row contains three pieces, the second has four pieces, and the last row has five pieces.
- The goal of the game is to be the player who takes the last game piece.
- During their turn, players can take any number of pieces, as long as the pieces come from the same row.
- Decide who goes first and alternate turns until the winner removes the last piece.

