

PEG CAPTURE

GEOMETRY • LOGIC

- Using a coordinate system
- Game strategies

Getting Ready

What You'll Need

Geoboards, 1 per pair

Sticky dots, 10 per pair

Square paper markers, 10 each of 2 colors, page 95, and crayons

Overhead Geoboard and/or geodot paper transparency (optional)

Overview

In this game for two players, children use a coordinate system to name and locate Geoboard pegs. Then they play a game in which the object is to get four markers lined up horizontally, vertically, or diagonally. In this activity, children have the opportunity to:

- ♦ use ordered pairs to describe location
- ♦ use strategic thinking



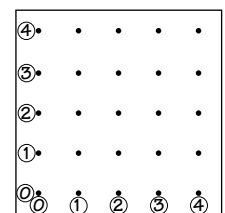
The Activity

Before introducing the activity, number the rows and columns of pegs on your Geoboard using sticky dots as shown.

You may want to play a game of Peg Capture with children before they begin On Their Own.

Introducing

- ♦ Display a Geoboard with row and column markers as shown. Explain that the location of every peg is indicated by two numbers, or an ordered pair of numbers.
- ♦ Write (2, 3) on the chalkboard and press a marker onto the corresponding peg.
- ♦ Do the same for (4, 0).
- ♦ Ask children to explain how you knew where to put the markers.
- ♦ Establish that, starting with the peg at (0, 0), the first number of an ordered pair tells how many pegs to count across. The second number tells how many pegs to count upward. Point out that a zero in an ordered pair means “no movement.”

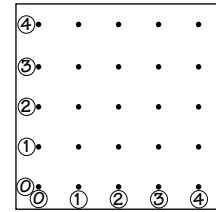


On Their Own

Play *Peg Capture!*

Here are the rules.

1. This is a game for 2 players. The object of the game is to get four markers in a row horizontally, vertically, or diagonally.
 2. Players use a Geoboard and sticky dots to make a game board as shown.
 3. Each player chooses a color of square paper markers. Players decide who will go first.
 4. Players, in turn, call out an ordered pair of numbers, then press a marker onto the matching peg.
 5. If a player thinks the other player made a mistake in placing a marker, he or she may challenge the other player's move. Together the players check the move. Whoever was wrong loses a turn.
 6. Play continues until someone captures four pegs in a row. If neither player can get four in a row, the game is a draw.
- Play several games of *Peg Capture*.
 - Be ready to talk about good moves and bad moves.



The Bigger Picture

Thinking and Sharing

Invite children to talk about their games and to describe some of the thinking they did.

Use prompts such as these to promote class discussion:

- ◆ Is there a best first move? If so, what is it?
- ◆ Do you have any other favorite moves? What are they? Are they good moves?
- ◆ Did you make any moves you wanted to take back? Why?
- ◆ Did you have a moment of surprise during the game? Try to describe that moment.
- ◆ Did anyone develop a strategy that will always work? Tell about it.
- ◆ What kinds of things did you think about when you planned your moves? How did you decide which pegs to capture?

Writing

Have children describe how to use an ordered pair to locate pegs on the Geoboard.

Extending the Activity

1. Have children use the same set of rules to play the game *Make a Square* in which they try to capture four pegs that form the corners of a square. Variations of this could be *Make a Rectangle*, *Make a Right Triangle*, *Make a Parallelogram*, and so forth.

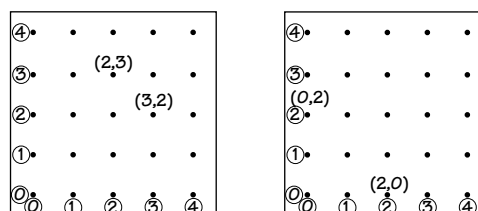
Teacher Talk

Where's the Mathematics?

Peg Capture gives children experience in working with one of the simplest, yet most powerful, ideas in all mathematics—coordinate graphing. This idea makes it possible to represent an algebraic concept geometrically. A simplified description of coordinate graphing is this: If a pair of perpendicular lines are imposed on a plane, the location of any point in the plane can be identified by its distance from each of the two perpendicular lines.

As they play *Peg Capture*, children can gain an appreciation of the value of using ordered pairs of numbers to identify locations. Although the pegs could be labeled in some other way, such as by letters or by numbers from 1 to 25, a system of ordered pairs of numbers has the beauty of efficiency and economy. This system is also easily expanded to a grid of any size.

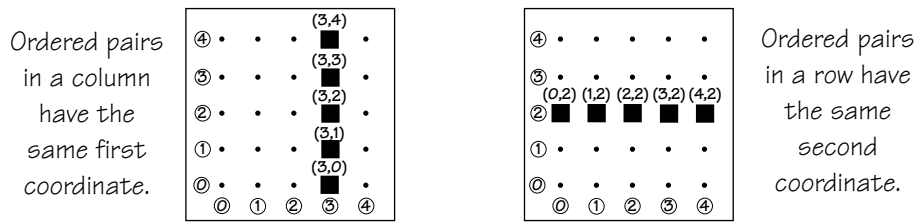
If children are new to this concept of coordinate graphing, they may experience some initial difficulty in using ordered pairs to name locations.



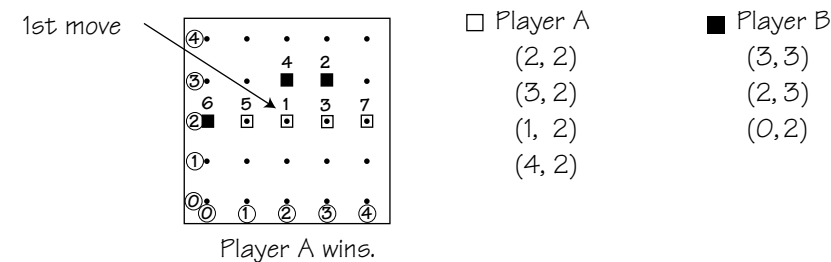
For example, they may reverse the order of the numbers or forget that the counting of the pegs in the rows and columns begins with 0 and not 1. Children may also have difficulty naming pegs where one of the coordinates is 0. Through practice, their ability to properly identify locations improves. In fact, children may start to see patterns in the numbers of the ordered pairs and in the location of corresponding pegs. For example, they may come to realize that all ordered pairs with the same first coordinate name pegs in the

2. Have children play several games of each of two other forms of *Peg Capture*—one in which the object is to place 3 markers in a row and the other in which the object is to place 5 markers in a row. Then ask them to compare the strategies for games involving 3, 4, and 5 markers in a row.

same column. Likewise, ordered pairs with the same second coordinate name pegs in the same row.



Children may make the connection that strategies for winning *Peg Capture* are similar to those for winning in the game of *Tic-Tac-Toe*. The main differences are that, in *Peg Capture*, the playing area is not confined to a three-by-three grid and that it is possible to win without having the line of markers go all the way across the game board.



As children look for winning strategies, they may come to realize that it is helpful to capture pegs near the center of the board early in the game. This strategy gives children opportunities to pursue moves in many directions while preventing opponents from easily blocking them. They may also discover that there is no particular advantage to going first or second.