Integer Chess

Players: 2-4   Grade level: 3 & Up

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Game Board
4 Sets of 8 Pawns
Spinner

Introduction

Integer Chess is played on the coordinate plane, the "playground" of algebra! The coordinate plane is where algebraic concepts play out in graphical form, bringing meaning to much of algebra. The coordinate plane consists of horizontal and vertical integer number lines. *Integer Chess* provides a powerful environment in which it becomes almost second nature for students to locate points and make vector-like moves along the integer number lines. All moves in *Integer Chess* are based on the concept of vectors.

A vector consists of two components: magnitude (length) and direction. Magnitude (distance of a move in this game) is determined by the absolute value of a number. For example, -7 and +7 both have the same magnitude of 7. The player moves a pawn seven units in some direction on one of the number lines. Direction is determined by the sign. A positive 7 requires a move seven units up or to the right. A negative 7 requires a move seven units down or to the left.

Integer Chess is a game in the popular Power Learning™ series. Each move requires players to study, evaluate, and compare multiple options in search of the best move. Intensive practice in graphing and making vector-like moves results.

Integer Chess offers five game formats, each with a different emphasis and requiring different strategies.

Students in grades 3 and up can successfully use *Integer Chess*. It is particularly important that middle-grade students acquire fluency in coordinate plane graphing and making vector-like moves along its integer number lines. The value of these skills is underscored by these National Mathematics Standards from the National Council of Teachers of Mathematics (NCTM):

In grades 3-5 all students should:
- Explore numbers less than 0 by extending the number line and through familiar applications
- Make and use coordinate systems to specify locations and to describe paths
- Find the distance between points along horizontal and vertical lines of a coordinate system

In grades 6-8 all students should:
- Develop meaning for integers and represent and compare quantities with them
- Understand the meaning and effect of arithmetic operations with…integers
- Use coordinate geometry to examine special geometric shapes

National Council of Teachers of Mathematics. *Curriculum and Evaluation Standards for School Mathematics*. The National Council of Teachers of Mathematics, Inc. Reston, Virginia. 1989.

Instructions

General Instructions

1. To begin play, each person chooses a set of eight pawns of one color.
2. To determine order of play, spin and find the sum of the two integers. The highest sum plays first.
3. Players, in turn, place a pawn on the *Origin* space in the center of the board, then spin and move the pawn to the location indicated by the (x, y) ordered pair. For the ordered pair, (-2, +4), a player would first make the horizontal move left to -2, then make the vertical move up four spaces. The same procedure is used for entering all of the pawns.
4. After entering the first pawn, players in succeeding turns have four options.
   a. Enter another pawn into play, as above.
   b. Move a pawn in play to a new location using both *x* and *y* vector-like moves.
   c. Move one pawn already in play using the *x* value and a second pawn using the *y* value.
   d. Move only one pawn using either the *x* or *y* value; ignore the other value.

It is important for players to realize that each intersection is part of a row, column, and two diagonals. This intensifies the need for careful study of the consequences resulting from making moves.

Game Formats

Locations and Moves

Players may move pawns into *unoccupied locations* only. The winner is the first to arrange five pawns in the same row, column or diagonal.

Capture

To capture a pawn, the player moves his or her pawn onto the same space. The captured pawn is removed from play. In unusual cases, two pawns can be captured in a single turn by moving one pawn onto an occupied space using the *x* value and a second pawn onto another occupied space using the *y* value. The winner is the first to capture a total of six pawns, regardless of whose they are.

Refuge

The game board has four refuges, the 3 x 3 arrays of nine colored spaces in each corner. Players may move pawns into any unoccupied space in one or more of the four refuges. The winner is the first to move six of the eight pawns into refuges.

Hide and Seek

This format combines elements of *Refuge* and *Capture*. During each turn, players decide whether to enter a new pawn into play or move one or two pawns already in play. Players can safeguard pawns by moving them into refuges. From the refuges, they can pounce on and capture pawns outside of the refuges. The winner is the player with the most pawns remaining on the game board after a total of ten pawns have been captured by all players combined.

Hidden Treasure

The yellow pawns represent the eight treasure troves. The blue, red, and green pawns can be used by up to three players. To begin, place the eight yellow pawns randomly on the intersections of the coordinate plane. When a pawn lands on a treasure trove, the player claims it. The winner is the player retrieving the largest number of treasure troves.