## Common Core State Standards Connections

### Standards for Mathematical Practice (Elementary, Middle and High School)

The Standards for Mathematical Practice build on two major educational foundations. First, the process standards from the National Council of Teachers of Mathematics (NCTM): problem solving, reasoning and proof, communication, representation and connections. And, second, the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding, procedural fluency, and productive disposition.

<table>
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<tr>
<th>Mathematical Practices</th>
<th>Championship Chess Correlations</th>
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| Make sense of problems and persevere in solving them. | CC: Analyze the relationship of the board and pieces as you follow the rules of Pawn Games to a winning solution.  
CC: Apply simple Pawn Game strategies to a game situation.  
CC: Visualize the board and the moves to produce a concrete diagram or chessboard set up.  
CC: Manipulate the chessboard and pieces to solve a visual or 2-D problem. |
| Reason abstractly and quantitatively. | CC: Achieve checkmate given specific pieces and/or specific squares on the chessboard.  
CC: Manipulate—rearrange, reorganize or transform the pieces on the chessboard to find the solution. |
| Construct viable arguments and critique the reasoning of others. | CC: Follow the rules chess and the assumptions of “correct” play in order to find and explain your answer.  
CC: Track possible moves step-by-step “backwards” to see how the final position occurred: retrograde analysis.  
CC: From observation of patterns and an understanding of the basic rules, determine and support your solution.  
CC: Illustrate possible solutions to the puzzle on the chessboard; then, manipulate the pieces to show how the position could have occurred and why it is the only correct solution to the problem. |
| Model with Mathematics. | ▪ Apply what you know to make assumptions and approximations to simplify a complicated situation—deductive reasoning.  
▪ Map relationships using tools such as diagrams and tables.  
▪ Analyze relationships to draw conclusions. | CC: Apply a basic understanding of the moves and rules of chess to determine the answer to 1-, 2- or 3-step problems.  
CC: Visualize or manipulate pieces and moves to illustrate how the pieces work together within the space of the chessboard and solve a problem.  
CC: Determine the correct move (or the last move) on a chessboard based on the relationship of the pieces to each other, to the space on the chessboard and to the basic rules of the game. |
| Use appropriate tools strategically. | ▪ Use visualization, pencil and paper diagrams and concrete models. | CC: Hypothesize an answer through visualization and check your hypothesis with chessboard diagrams and/or the chessboard and its pieces. |
| Attend to precision. | ▪ Communicate precisely to others, using clear definitions to explain reasoning.  
▪ Use labels to clarify and illustrate correspondence of the description with the solution. | CC: Use algebraic notation to follow and rationalize the strategy used to solve a problem.  
CC: Label moves so that others can follow the step-by-step moves on the chessboard. |
| Look for and make use of structure. | ▪ Look closely to discern a pattern or structure.  
▪ Step back for an overview and shift perspective. | CC: Analyze the chessboard to determine a pattern of movement or to take tactical or strategic advantage, looking for structures such as Pawn chains or checkmate patterns.  
CC: Solve problems that require “thinking backward” (retrograde analysis) or predicting upcoming events (strategic thinking) based on positions on the chessboard or on the space of the chessboard. |
| Look for and express regularity in repeated reasoning. | ▪ Use repetitive patterns to solve problems. | CC: In a series of problems with similar objectives, apply similar steps for solutions: assume “correct” first moves; relate successful tactical moves to multiple problems; reflect, translate and rotate (flip, slide and turn) pieces or patterns of movement. |