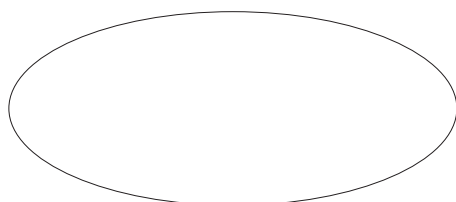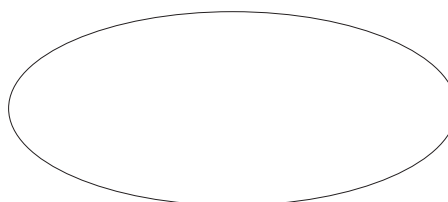# PUPPIES AND KITTENS

A number of Puppies and another number of Kittens are in two pens. Two players take turns making one of three possible moves: taking any number of puppies, or any number of kittens, or the same number of each. So, for example, if there are 8 puppies and 6 kittens, a player could take 4 puppies in one turn, or 2 kittens, or 3 puppies and 3 kittens.

One player decides the starting number of puppies and kittens and the other player decides who goes first. The winner is the player who takes the last animal remaining.

Puppies   Kittens

Challenges
1. For any starting number of puppies and kittens, is there an optimal strategy so one player is guaranteed to win?
2. How might a player visualize the winning strategy for this game?

QUEEN'S MOVE

In this game, a single Queen is on a chessboard. She may make three possible moves:
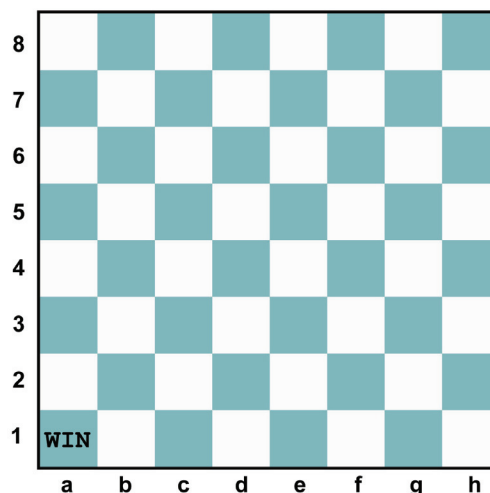- Any number of spaces to the left
- Any number of spaces downward
- Any number of spaces on the downward-left pointing diagonal

One player decides the starting square for the Queen, and then the other player decides which player moves the Queen first. Two players take turns using these moves, and whichever player moves the Queen to the bottom-left square wins.
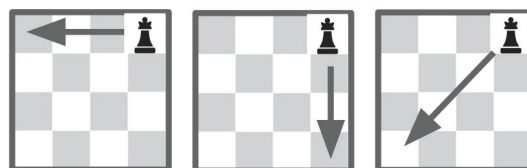
Challenges
1. Can you find a winning strategy for one of the players?
2. Play multiple games with a partner where the Queen starts on the following squares: C2, C5, G8, E8.
3. Identify starting squares for which it is better to be the first player to move the Queen, and squares for which it is better to be the second.
4. How does the game change if instead of a Queen, you and your partner are moving a Rook or a King?