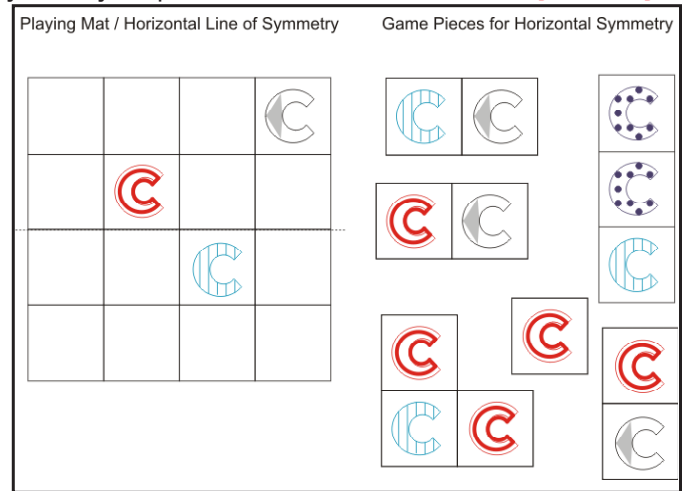




- **1 point:** last team to finish round correctly
  - **2 points:** next to last team to finish round correctly
  - **Continue adding 1 point** for each team that correctly finished the round, so the team that finished the round correctly first has the most points.
6. Write down the teams' scores for the round on a piece of paper or on the board, to refer to it later.

### ROUND 2: HORIZONTAL SYMMETRY

1. Each team should have a copy of the Horizontal Symmetry Round Sheet (shown below). This round also includes two parts: a playing mat and game pieces. Each team must cut out the game pieces before starting.
2. Before teams start, go over the basics of horizontal symmetry. A picture has **horizontal line symmetry** if a straight horizontal line can be drawn to create two halves that are mirror images of each other.
3. There is a Horizontal Line of Symmetry on the playing mat with three letter Cs already drawn. **The goal is to arrange the remaining game pieces on the board so that the two halves of the playing mat are mirror images of each other.**
4. After explaining the goal, give students 10 minutes to complete the round. Again, when a team finishes, they should yell "Done!" As the teams complete their challenges, record the order in which they finish.
5. Once all teams have completed their challenge, have students sit without touching their game, so that you, the Club Leader, can check each game using the answer key. Give teams points based on how they did:



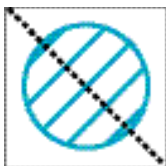
- **0 points:** team did not finish the round or finished round incorrectly
  - **2 points:** last team to finish round correctly
  - **4 points:** next to last team to finish round correctly
  - **Continue adding 2 points** for each team that correctly finished the round, so the team that finished the round correctly first earned the most points for that round.
6. Update the teams' scores for the round on your paper or on the board.

### ROUND 3: DIAGONAL SYMMETRY

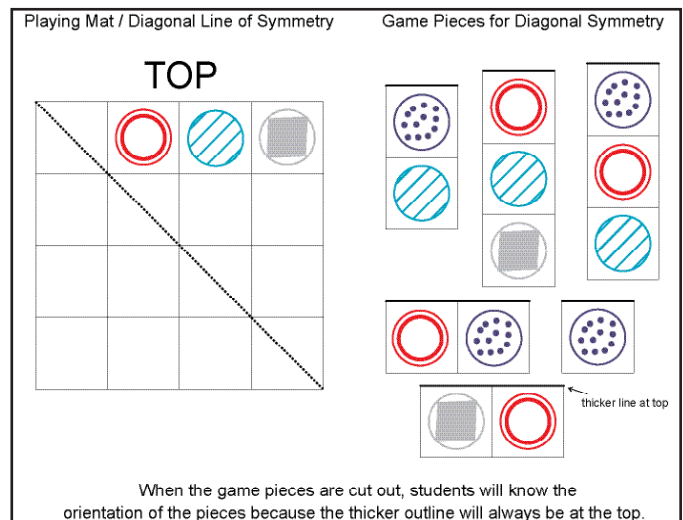
1. Each team should have a copy of the Diagonal Symmetry Round Sheet (shown at right). This round also includes two parts: a playing mat and game pieces. Each team must cut out the game pieces before starting.

Note: Students should be careful when cutting out the pieces, to make sure they do not accidentally cut off the thicker line at the top of each piece.

2. Before teams start, go over what it means to be symmetrical for this round. A picture has **diagonal line symmetry** if a straight diagonal line can be drawn to create two halves that are mirror images of each other.



3. Explain that, just as with the letters M and C, the letter O should remain upright for the game, as determined by the thick line at the top of each piece. Explain that in cases where the Line of Symmetry goes through a square, the letter O in the square will match itself, so there will not be another piece to match with it (example at left).



When the game pieces are cut out, students will know the orientation of the pieces because the thicker outline will always be at the top.

4. There is a Diagonal Line of Symmetry on the playing mat with three letter Os already drawn. **The goal is to arrange the remaining game pieces on the board so that the two halves of the playing mat are mirror images.**
5. After explaining the goal, give students 15 minutes to complete the round. Again, when a team finishes, they should yell "Done!" As the teams complete their challenges, record the order in which they finish.
6. Once all teams have completed their challenge, have students sit without touching their game, so that you, the Club Leader, can check each game using the answer key. Give teams points based on how they did:
  - **0 points:** team did not finish the round or finished round incorrectly
  - **3 points:** last team to finish round correctly
  - **6 points:** next to last team to finish round correctly
  - **Continue adding 3 points** for each team that correctly finished the round, so the team that finished the round correctly first earned the most points for that round.
7. Update the teams' scores for the round on your paper or on the board. The Symmetry Champion Team is the team with the highest total score (adding all three rounds together).

After completing the game, have students discuss their strategies for figuring out which pieces go in which squares of the playing mat. The answer key includes numbers showing the order in which the pieces were set on the playing mat.

### **DO MORE WITH THIS ACTIVITY**

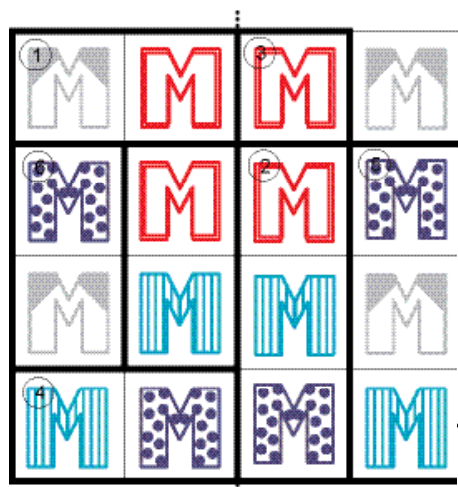
Here are some ways you can do more with this activity:

- Ask students to create their own symmetry games, using the Blank Symmetry Sheets. You can set as many or as few parameters on them as you want. For example, you can let students choose the size of their puzzle board, the orientation of their line of symmetry, the items they are placing in the boards, whether it should be created on the computer, etc. At the next meeting you can have another championship to see who created the most difficult game to solve.
- Pair up with a different group of students (either at your school/organization or a different one) and play a larger Symmetry Championship using these rounds and any rounds your club members created.

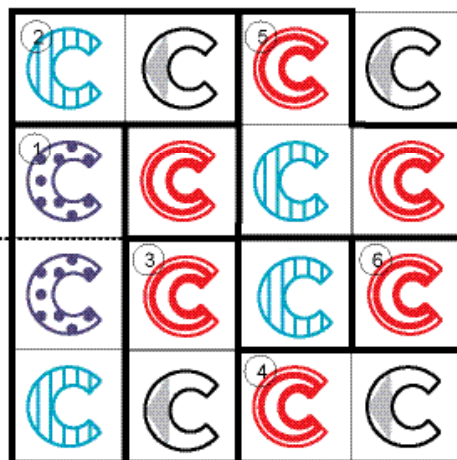
.....

*Answer Keys:*

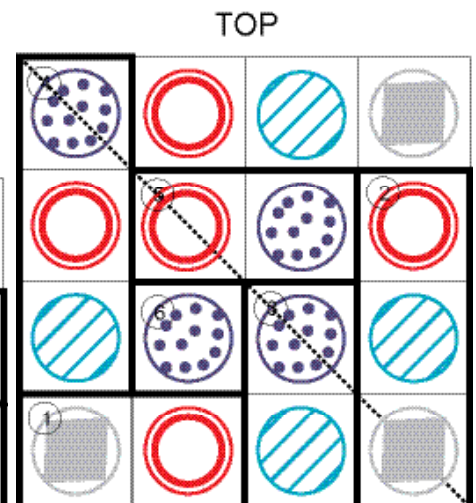
Round 1: Vertical Line Symmetry



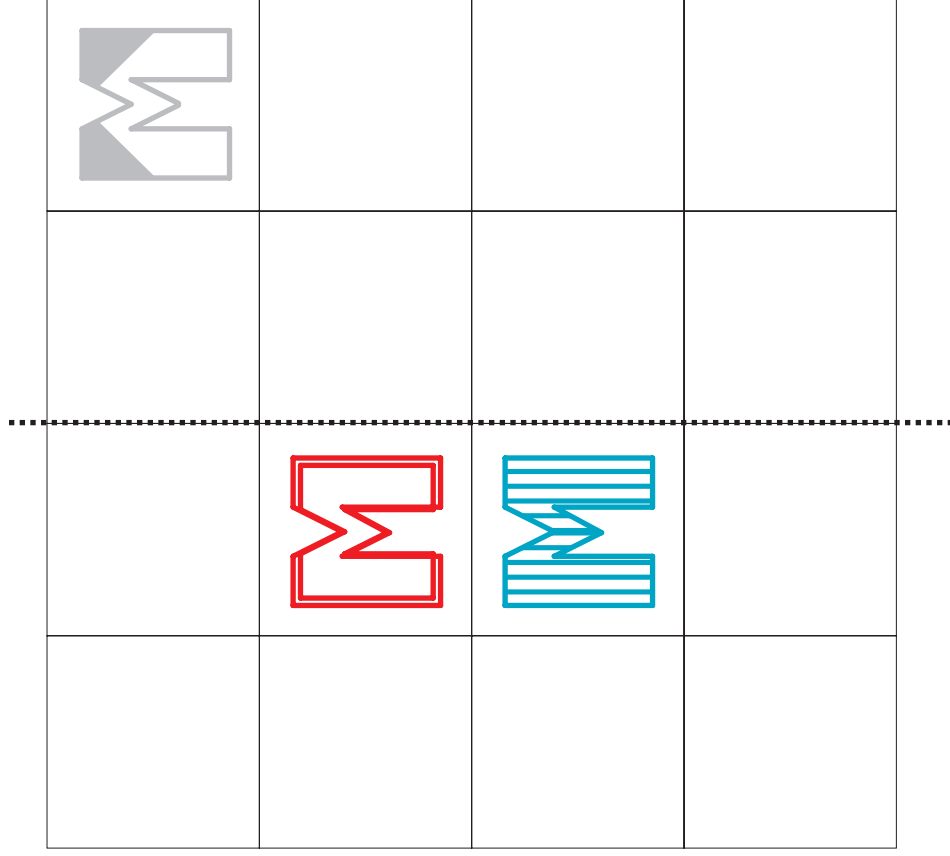
Round 2: Horizontal Line Symmetry



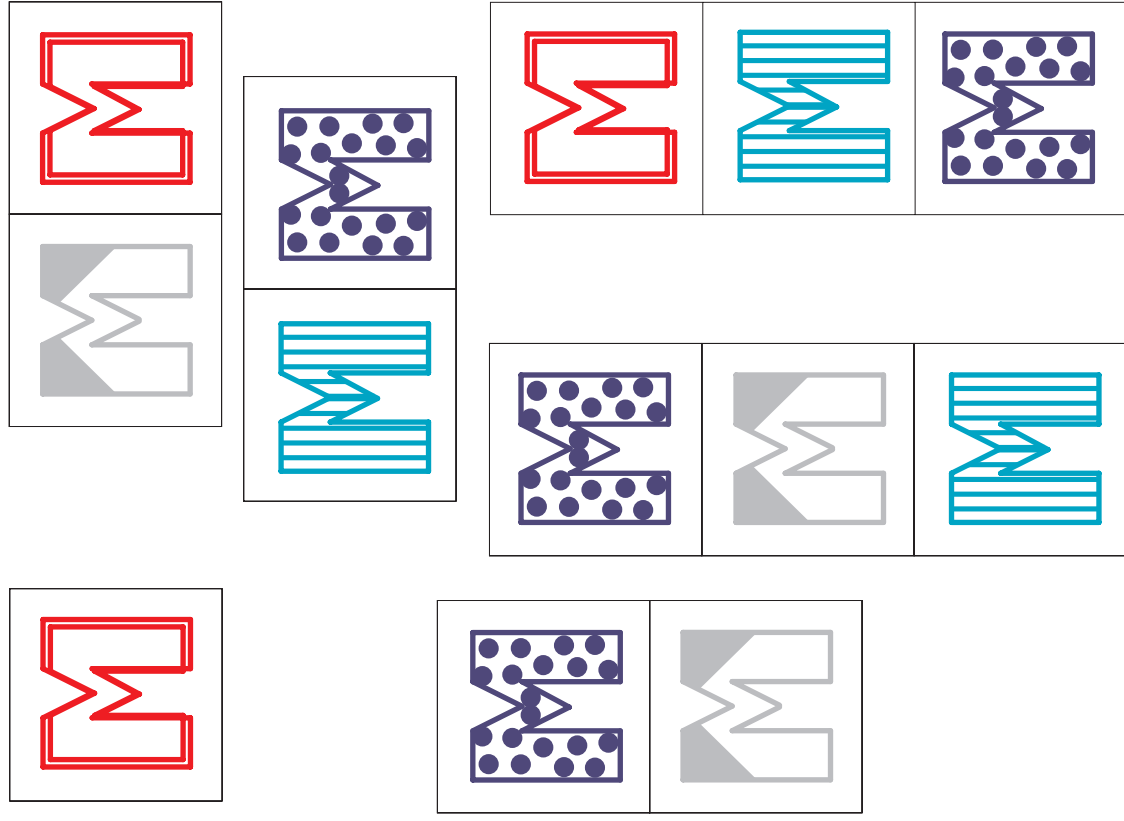
Round 3: Diagonal Line Symmetry



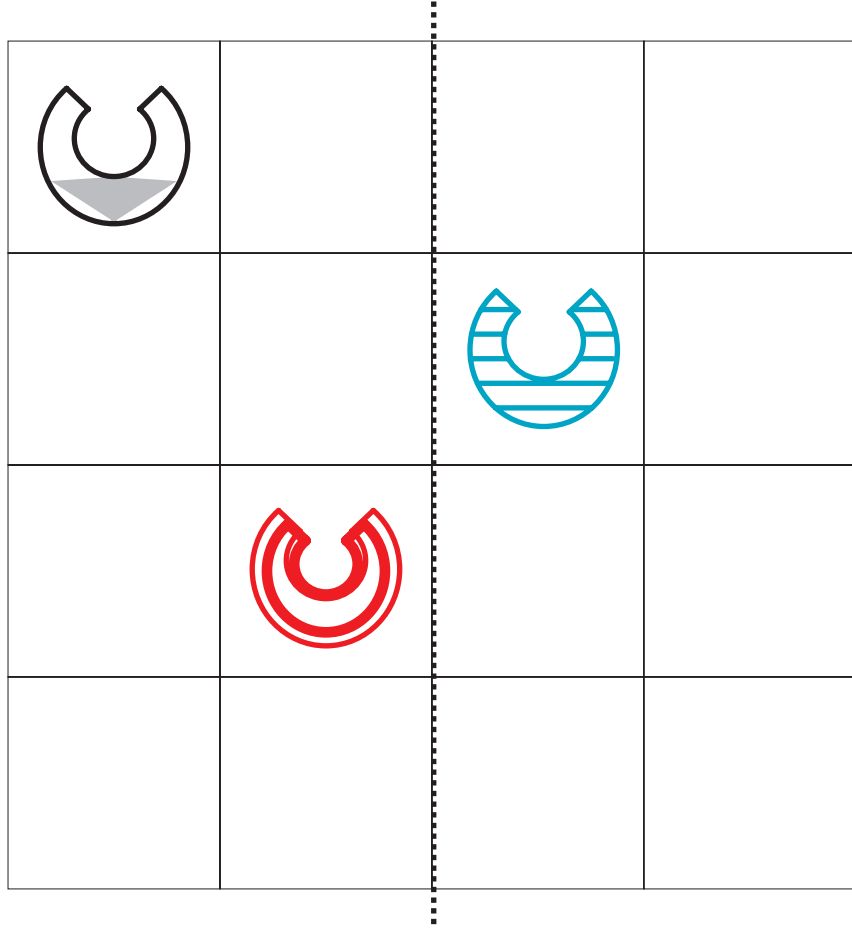
# Playing Mat / Vertical Line of Symmetry



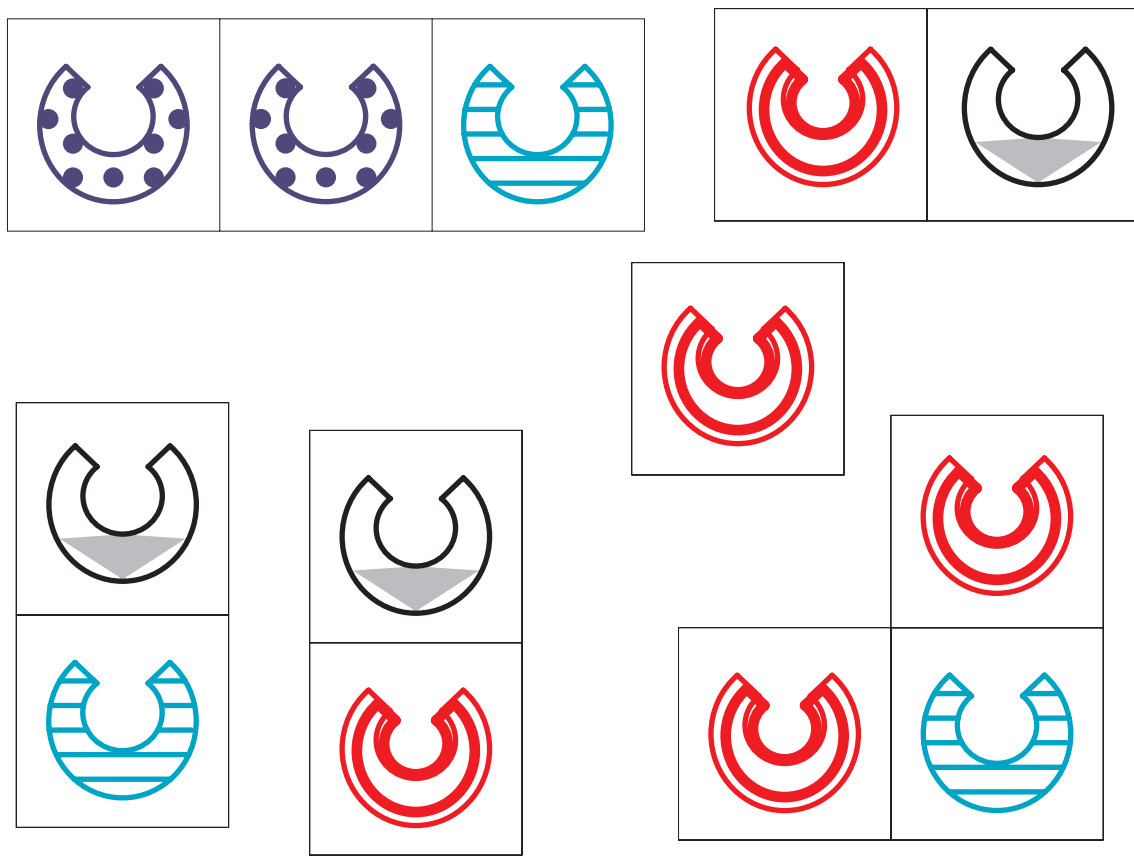
# Game Pieces for Vertical Symmetry



# Playing Mat / Horizontal Line of Symmetry

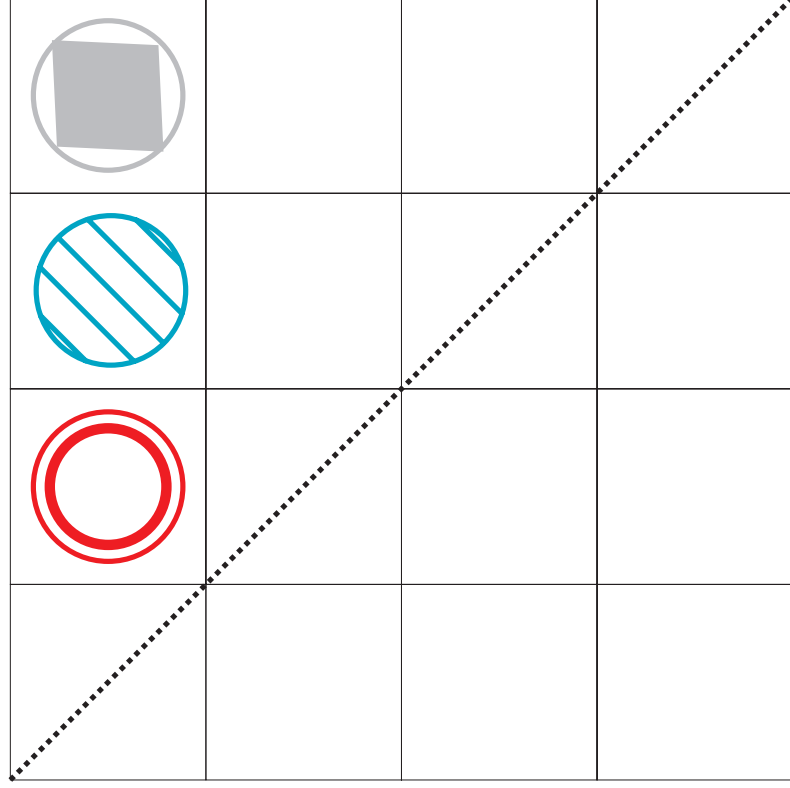


# Game Pieces for Horizontal Symmetry

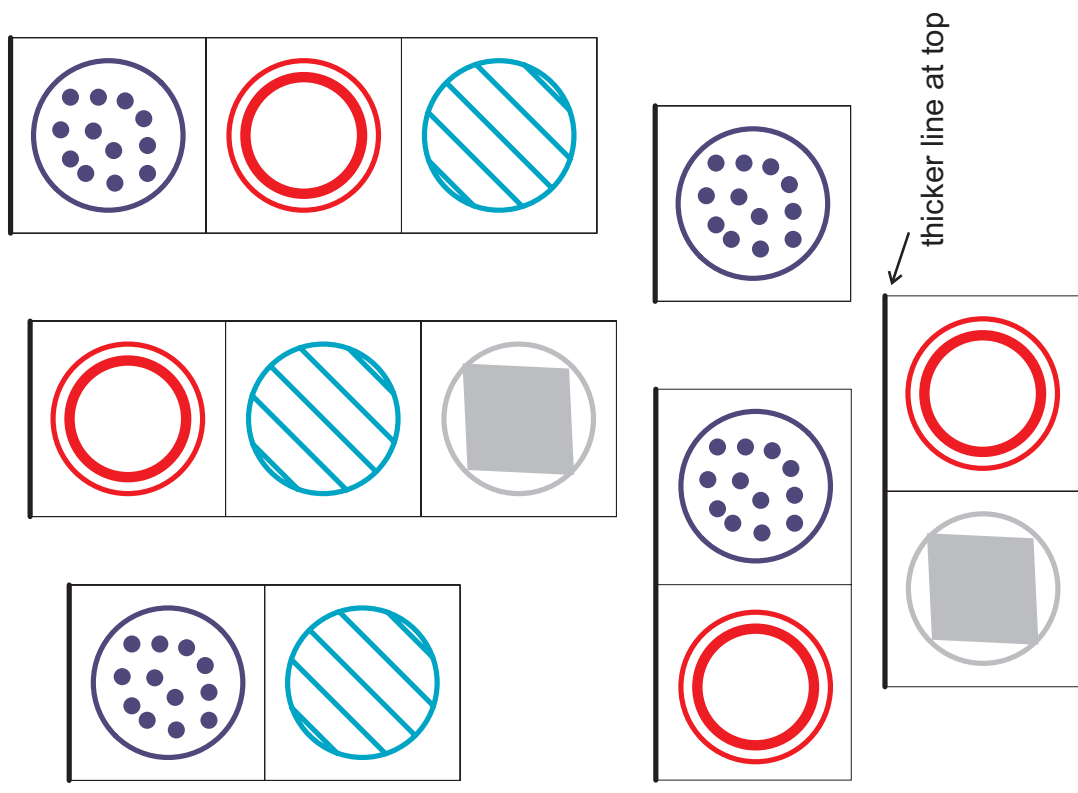


# Playing Mat / Diagonal Line of Symmetry

## TOP



# Game Pieces for Diagonal Symmetry



When the game pieces are cut out, students will know the orientation of the pieces because the thicker outline will always be at the top.