Students will practice using relative position terms using Rubik’s Cubes and math manipulatives. Students will also become familiar with the movement of a Rubik’s Cube.

**Common Core Standards:**
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

**Objectives:**
1. Learn and practice common algorithms that will help students learn to solve the 2x2 Rubik’s Cube.
2. Develop familiarity with the properties of a Rubik’s Cube.
3. Practice using position terms that are relative to a Rubik’s Cube.

**Materials:**
2x2 Rubik’s Cube

**Background Knowledge:**
In order to solve a Rubik’s Cube, students need to have a good understanding of the terms right, left, top, up, down, front and back. Students should have an understanding of patterns and a pattern unit.

**Procedure:**

**Before class:**
Decide whether your students will work one-on-one or in partners with their Rubik’s Cube.

**With students:**

1. Give each student or partner group a 2x2 Rubik’s Cube. Allow students 2-3 minutes to become familiar with the Cube. Students should practice gently rotating the faces of the Cube.
2. Begin by reviewing the names for each face of the Rubik’s Cube. Call each face aloud and have students show you how to rotate the face clockwise and counter-clockwise/inverse.
3. Model how to perform the first algorithm by showing students how to move the Cube; (see page 2)
4. Have students rotate the faces of their Cube correctly by following along with you as you model turning the Cube.
5. Have students repeat the algorithm 3-5 times.
6. Stop and discuss what is happening with the cube. Students should notice that some colors start to line up next to each other as they perform the algorithm.
7. Also discuss that the repeated movement in this algorithm is a pattern. This is one example of how patterns can be used to solve problems.
8. Have students design their own algorithm they can practice on the Cube. Do not be concerned about the solving of the Cube.
9. Emphasize to students that their pattern unit should have 4 movements (as seen above). Have students label and draw the arrows for their algorithm.
10. Allow students time to trade and practice their algorithms with a partner.

Notes to Teacher: For students who may have difficulty drawing and/or labeling the moves, you can provide them with a set of illustrated and labeled moves. Students can cut out the moves that they would like to use and arrange them into their pattern unit.

Pattern Moves: