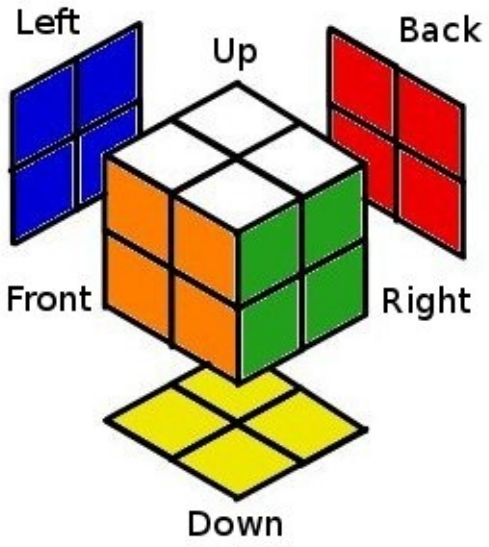
MATH154 F2013 Dr. Dietz, American University

Solving the 2x2x2 cube: Stage One

Prerequisite knowledge: In class prior to this first stage, students learned to solve the cube using the Javascript app at Jaap Scherphius's website which implements the so-called "God's Algorithm", giving the quickest solution. (http://www.jaapsch.net/puzzles/javascript/cube2j.htm) Specifically, the students at this point know that F means to turn the front face clockwise 90 degrees, F' means to turn the front face counterclockwise 90 degrees, and F2 means to turn the front face 180 degrees. Similarly, U, U', and U2 are for the upper (top) face. Also, R, R', and R2 are for the right face. The solutions created by this app leave the BLD corner (Back Left Down corner) unmoved, since only the right, up, and front faces move. This will not be the case for our solutions.

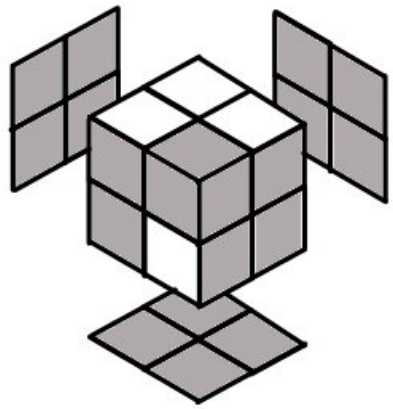


For Stage One, we will solve one layer, shown here in white. In Stage Two, we position the remaining 4 corners, and in Stage Three, we rotate them correctly. Please note that a corner may be in the proper location, but only one of three rotations is correct for the corner.

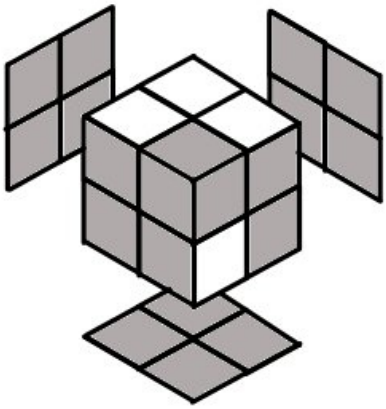
Please take note: The following diagrams are not "steps". They are various situations you may encounter, not in any particular order! Your goal is to learn how to manipulate the cube to get the top layer into its correct order. These are hints to help you.

The first two diagrams show the most common situations you will have to deal with together with routines to deal with them. I call those "elevator" routines. The next two diagrams show non-ideal situations and their associated routines. I call them "kicking" routines, because they kick you out of a bad situation into a better situation where you can then use an "elevator" routine.

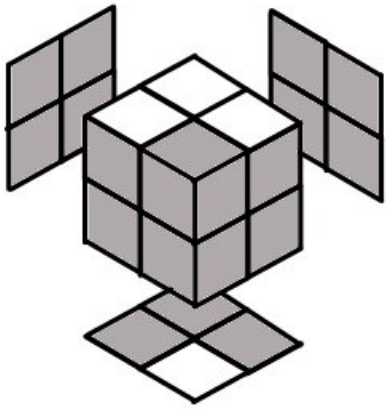
White stickers indicate where the already-solved white stickers are, or where we are attempting to place them. We first attempt to position the cube and/or rotate the Down face until the corner to be placed in the Right-Up-Front position is located in the Right-Down-Front position. I call this Right-Front edge the "elevator". In other words, we start with the white corner we wish to correctly place at the bottom of the elevator, and we wish to bring it up the elevator.



D' R' D R - an elevator routine

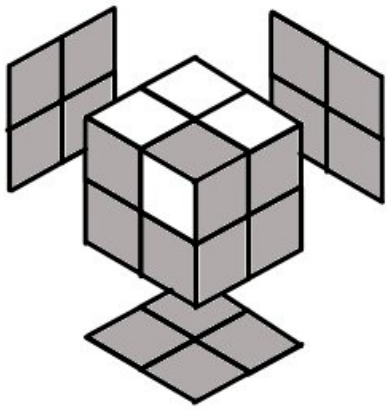


R' D' R - the other elevator routine



In this case, the white sticker is on the bottom. We don't like this, so we move it to another place and then try again using:

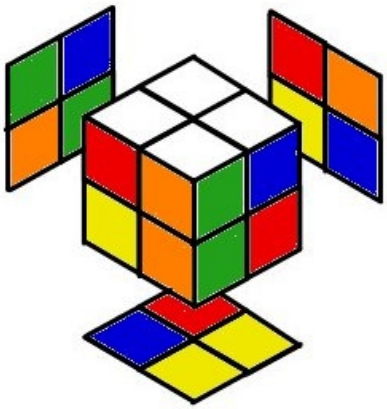
R' D2 R - a kicking routine



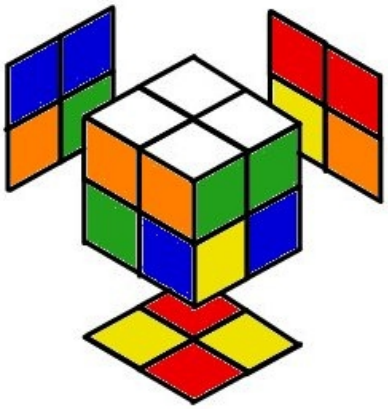
In this case, the corner we wish to place is already where it belongs, but the rotation is incorrect, with the white face not on the top. (There are two ways this can occur, only one of which is shown.) We kick the piece down to the lower level using:

R' D' R - another kicking routine

Note, the symbol D' means to turn the down face counterclockwise.



Most beginners attempt to solve one face as shown in this diagram. This is a fun exercise, but unfortunately, it doesn't help us on our search for a solved cube. Notice that there is one white face, but the individual pieces do not together comprise a complete layer.



This diagram shows a correctly solved top layer. Notice the consecutive blues, reds, oranges, and greens.

Note: In order to start this process, you may arbitrarily choose any one corner and declare it to be solved! Then, this corner has three neighbors, any of which can be the next piece you place. Choose the easiest one you find! Or, if you prefer, choose a favorite corner and always start on it.

One tip is to "name" the 8 corners. Here are my names:

Red-White-Blue	USA
Red-White-Green	Candy Cane, or Strawberry (with leaf attached)
Orange-Green-White	Juicy Orange (with leaf attached)
Blue-Orange-White	BlueOrange (after the company BlueOrange)
Red-Yellow-Blue	Primary Colors
Blue-Yellow-Orange	Gas Station
Orange-Green-Yellow	Citrus Fruits
Red-Yellow-Green	Stoplight