2x2 Tutorial: Beginner

Introduction

Harder Than It Looks

The 2x2 cube is a set of 8 corner pieces which move around a central mechanism. These pieces can arranged in 3,674,160 different ways, but the cube is never more than 11 turns away from being solved. Solving the cube that efficiently requires a lot of memorization, so in this tutorial we will learn to solve it less efficiently with only a little memorization.

The "trick" to solving the cube is the use of algorithms, or specific sequences of turns. Algorithms do certain things to the pieces of the cube without disrupting other parts of the cube. The more algorithms you memorize, the more tools you have to solve the cube efficiently. This basic method of solving the 2x2 cube uses only three algorithms.

Notation

Before we dive into the first step, you need to be familiar with basic cube notation. We use capital letters to show which side of the cube to turn: Front, Back, Right, Left, Up (top), or Down (bottom).

- A lone letter (e.g. R) represents a turn 90º clockwise (while looking at that face).
- If there is a prime mark following the letter (e.g. R'), it represents a turn 90º counterclockwise.
- If there is a "2" following the letter (e.g. R2), it represents a 180º turn.

See my notation page for more details.

Spoiler Alert!

We will use three algorithms to solve the 2x2 cube:

A. (RUR'U')
B. (RU2R'U') (RU2L'U) (R'U'R)
C. (RUR'U) (RU2R')

Notice that these algorithms only turn the R, U, and L faces.

Here are the four steps in this method, along with the algorithm used in each.

1. Bottom side (A)
2. Bottom layer (B)
3. Top side (C)
4. Top layer (B)

Let's begin!

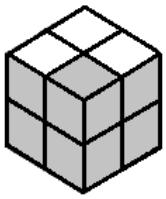
Bottom Side

The first step is the most instinctive and intuitive step: we are going to solve a side.

(For those of you familiar with a layer-by-layer approach, I really do mean a side, not a layer. We will position the layer in the next step.)

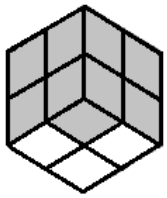
The First Three Pieces

Let's start with the white pieces because they are easy to see. Solving three of the four white pieces is usually not so bad. The goal is to get something like this:

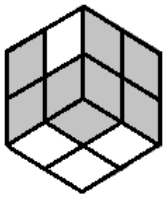


Position the Last White Piece

Once you get three white pieces on a side, turn the cube so that that side is on the bottom.

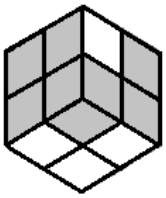


Look to see where the last white sticker is. If the white sticker is in the top layer, spin the top until the sticker is over the unsolved bottom corner.



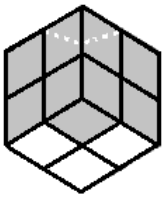
Sticker faces front

or



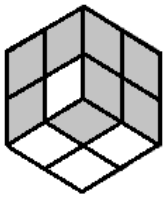
Sticker faces right

or



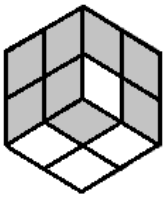
Sticker faces up

If the white sticker is in the bottom layer but facing sideways, that's OK too. Just turn the cube so that the unsolved corner is in the front right of the cube, as below.



Sticker faces front

or

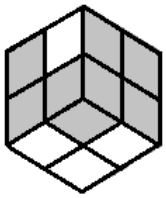
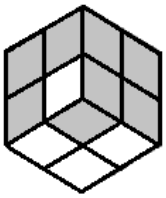
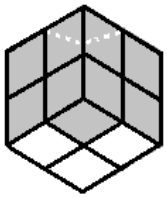
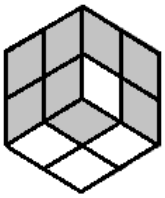
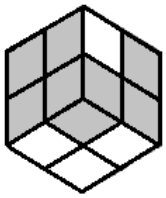


Sticker faces right

Solve the Last White Piece

When your cube looks like one of these five pictures, you can solve the white side with this algorithm: (RUR'U'). In the cubing community, this algorithm is called Sexy Move. Keep repeating that algorithm until the white sticker has joined its three friends on the bottom of the cube. You won't need to use it more than five times.

For the more ambitious among you, I am also including a shortcut algorithm for each of these five cases.

					
(RUR'U') #	5	4	3	2	1
Shortcut	(URU'R')	(RU'R'U) (RU'R')	(RU2R'U') (RUR')	(RUR'U') (RUR')	(RUR')

When the bottom of the cube is all white, you are ready to move on to the next step.

Bottom Layer

Turn the cube so that white is on top. Next we will look along the sides of the top pieces for "matching corners" – adjacent corners that have the same color on the same side.

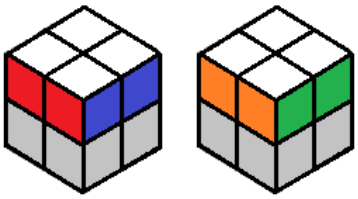
In this example, there are red matching corners.

Matching Corners

If there are matching corners, turn the cube (or simply turn the top layer) so that the matching corners are on the left side. Then use this algorithm:

(RU2R'U') (RU2L'U) (R'U'R)

This algorithm makes the two right corners trade places, so now you should have a solved layer on top:



(front) (back)

No Matching Corners

Sometimes there will be no matching corners.

If there are no matching corners, simply use the above algorithm with white on top. This will give you matching corners. Do the algorithm once more as described above.

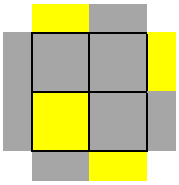
Once the entire layer is solved, turn the cube so that white is once again on the bottom, and proceed to the next step.

Top Side

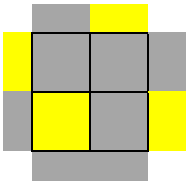
Next we will make the top side all yellow.

With the white side on the bottom, look at where the four yellow stickers are. Other than the solved case, there are seven possible cases, shown below.

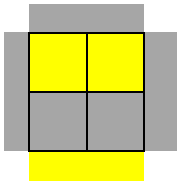
Sune



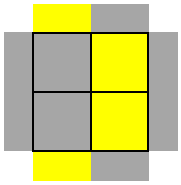
Anti-Sune



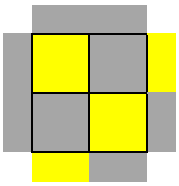
Headlights



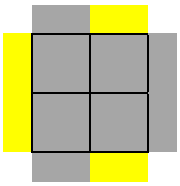
Blinkers



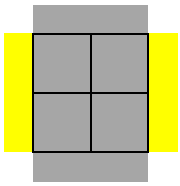
Bowtie



Pi



Double Headlights



Fortunately, we can use one algorithm to solve all of them: (RUR'URU2R'). This algorithm is called the Sune, and it solves the Sune case.

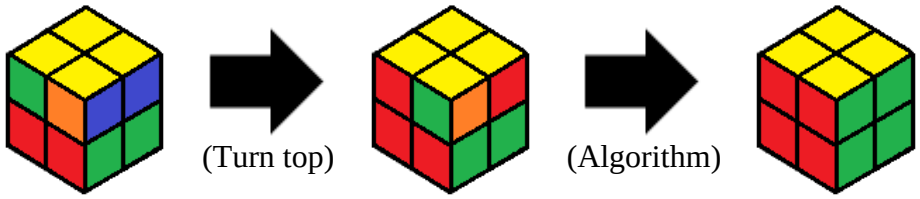
If you encounter one of the other six cases, face the top in the direction shown, then do the Sune. This will give you a Sune or Anti-Sune case which you can then solve using the Sune.

When the top side is all yellow, we are ready to complete the top layer.

Top Layer

With the top all yellow, we will look along the sides of the top pieces for matching corners, just like we did in the second step.

If you have matching corners, turn the top so that they align with their color on the bottom layer. Put the matching corners (now a whole side) on the left side of the cube, then use our old friend, the corner-switching algorithm: (RU2R'U') (RU2L'U) (R'U'R)



If there are no matching corners, simply use the algorithm to make some as before.

Congratulations! You're done!

Want to get faster? My 2x2 intermediate tutorial shows you how to solve the cube more efficiently.