

# The Inventor Of Rubik's Cube



**Instructions:** Watch a short video about the man who invented Rubik's Cube. Finish the activities.

**A. Before You Watch:** Complete the sentences. Discuss and compare.

1. I think I could solve the Rubik's Cube in \_\_\_\_\_ minutes.
2. The inventor of Rubik's Cube must be \_\_\_\_\_.
3. A similar puzzle game to Rubik's Cube is \_\_\_\_\_.

**B. While You Watch:** Answer and complete the sentences.

1. Erno was born in \_\_\_\_\_.
2. He began his career in \_\_\_\_\_.
3. There are \_\_\_\_\_ small cubes.
4. After a month, Erno cracked the \_\_\_\_\_.
5. It was simple to \_\_\_\_\_.
6. It became a best \_\_\_\_\_ toy.
7. After 40 years, Rubik's Cube has seen a \_\_\_\_\_.

**C. After You Watch:**

 **Answer & Discuss:**

1. Why do you think so many people love the Rubik's Cube?
2. What do you think the world record is for solving Rubik's Cube (in seconds)?
3. What other games like Rubik's Cube do you like to play? Do you have one you might invent?





There are 43 quintillion possible combinations. Now imagine you have no websites, no books and no one to show you how to solve it because you invented it. But you didn't invent the Rubik's Cube. This guy did.

My name is Erno. I was born here in this beautiful city of Budapest.

It was 1974. 30 year-old Erno Rubik was just beginning his career in academia.

I was lecturing design and architecture. Very similar in age with the students. I was very ambitious to find new ways to teach them, especially about space and three dimensions. I made a cube, as a teaching game and for my son to learn something from it.

Once the physical cube was put together, Erno began hunting for its secrets.

And the question was not - is it possible to solve it but the question was - is it possible to find a method to do that?

There are 26 small cubes. it looks the same but in the structure of the cube they have different rules. Erno racked his brain. First strategy - twisting and turning the cube in his hands and his head to unlock his creation.

After I started to understand the nature of the structure and the movements, I found the way for a solution. It's not that straight away.

And after a month he cracked the code. But the story doesn't end there.

I had the feeling of the potential of the object. I found it very simple to manufacture. And the result of that, it can be an object which is available for everyone.

In 1980 Erna would finally bring his cube to the world and from there it took off, becoming one of the best-selling toys of all time.

Because of the content of the cube the world discovered is not a gadget, it's something that is more valuable, has a long life.

And after almost 40 years, Rubik's Cube has seen a comeback with hundreds of competitions every year, across the world.

For Erno, the cube that bears his name is more than just a toy. It's a reminder to never give up. There is always a way for a solution. There is always a way to find something else, something new, something different or find the result of your work. If today is not, everything is good, it doesn't mean tomorrow cannot be better. It depends on you.

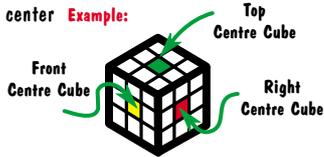
# Solving Rubik's Cube



## Twisting Hints

The easiest way to solve RUBIK'S Cube is layer by layer, starting at the top. It is very difficult to solve face by face, and with billions of combinations, nearly impossible to solve by trial and error.

Always hold RUBIK'S Cube in the same orientation while completing a layer. Remember the colors of the top center **Example:** Front Centre Cube, Top Centre Cube, Right Centre Cube, and the center cube facing you.

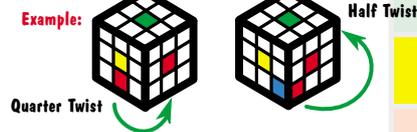


**RUBIK Fact:** 43 quintillion is 43 million million million. There are only about 30 million seconds in a year. You would need over a thousand million years, looking at a thousand patterns every second, to see all the combinations possible with RUBIK'S Cube.

## Twisting Hints

Opposite colors never appear on the same cube piece. For example, no cube piece will have both BLUE and GREEN, which are opposites, in its color scheme.

RUBIK'S Cube is solved using quarter twists and half twists. You can twist clockwise, by turning to the right, or counterclockwise, by turning to the left.



Whenever you twist a layer out of position, perform the opposite move to twist it back into position.

## Twisting Hints

Sometimes you'll perform a series of twists to get a single cube into position. Doing that will often get other cubes out of position. Repeat the series of twists backwards to restore the cube.

Think in mirror images when positioning edge cubes. Two quarter-twists of two touching faces turn an upside-down edge cube right side up.

**Example:**



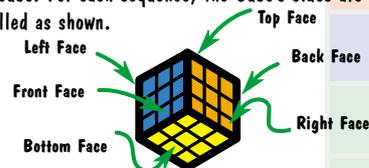
First Quarter Twist

Second Quarter Twist

Edge Cube in Place

## RUBIK'S Cube Sequences

The next pages offer specific sequences of moves to be used after completing the top layer. These sequences help solve the middle and bottom layers of the cube. For each sequence, the Cube's sides are labelled as shown.



Hold RUBIK'S Cube so the side you want to affect is the Bottom Face. (The cube pieces in the Top Face will return to their original positions at the end of the sequence.) Select a sequence, and do the moves in order. The arrow symbols used to guide these moves indicate the turning directions. For each indicated face (Front, Right, Back, etc.) move one fourth turn in the direction of the arrow.



In these sequences you are moving the colored edge/corner pieces in the pictures. After the sequence, all other pieces (except the unmarked uncolored pieces on the bottom) will return to the same position they were at the start of the sequence.

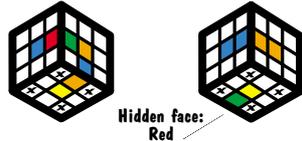
## RUBIK'S Cube Sequences

Note: Use "Edge Mover #1 and #2" to help solve the middle layer of the cube.

### Edge Mover #1

Front ◁; Bottom ◁; Front ◁; Bottom ◁; Front ◁;  
 Bottom ◁; Bottom ◁; Front ◁; Bottom ◁; Front ◁;  
 Bottom ◁; Front ◁; Bottom ◁; Bottom ◁

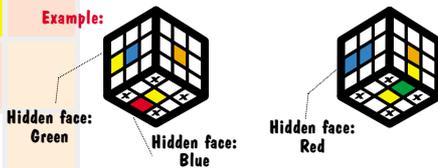
Example: From this . . . . . to this.



### Edge Mover #2

Front ◁; Bottom ◁; Front ◁; Bottom ◁; Front ◁;  
 Bottom ◁; Bottom ◁; Front ◁; Bottom ◁; Front ◁;  
 Bottom ◁; Front ◁; Bottom ◁; Bottom ◁

Example: From this . . . . . to this.



## RUBIK'S Cube Sequences

### Two Corner Swap (To swap position of two bottom corners.)

Right ◁; Bottom ◁; Right ◁; Front ◁;  
 Bottom ◁; Front ◁; Right ◁; Bottom ◁;  
 Right ◁; Bottom ◁; Bottom ◁

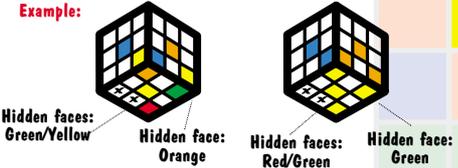
Example: From this . . . . . to this.



### Three Corner Shuffle (To change orientation, but not position, of bottom corners.)

Right ◁; Bottom ◁; Right ◁; Bottom ◁;  
 Right ◁; Bottom ◁; Bottom ◁; Right ◁;  
 Bottom ◁; Bottom ◁

Example: From this . . . . . to this.



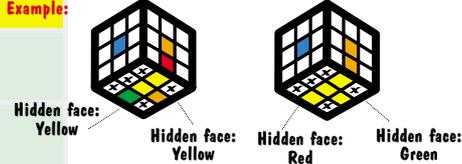
## RUBIK'S Cube Sequences

Note: Use the following two sequences to help solve the bottom layer of the cube.

### Edge Flipper Left

Left ◁; Right ◁; Front ◁; Left ◁; Right ◁;  
 Bottom ◁; Bottom ◁; Left ◁; Right ◁; Front ◁;  
 Left ◁; Right ◁

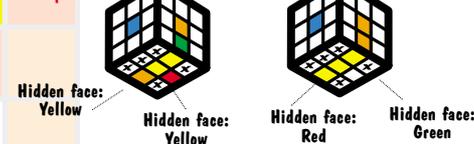
Example: From this . . . . . to this.



### Edge Flipper Right

Front ◁; Left ◁; Back ◁; Left ◁; Back ◁;  
 Front ◁; Bottom ◁; Back ◁; Bottom ◁; Back ◁

Example: From this . . . . . to this.

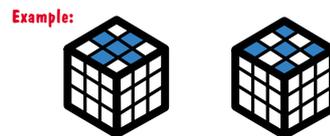


## RUBIK'S Cube Games

Before solving the Cube, try playing these RUBIK'S Cube games. By twisting the faces and flipping and twirling the cubes, you may be able to figure out your own unique methods for solving RUBIK'S Cube.

### Cross Up

Make a cross with five cubes of the same color. Now make an X.



## RUBIK'S Cube Games

### Double Cross Up

Make crosses on two, three, four or more faces of RUBIK'S Cube.

Example:



2 Crosses



3 Crosses

### Odd Corner

Put eight cubes of the same color together, so that only one corner cube is a mis-match.

Example:



## RUBIK'S Cube Games

### Face It

Arrange nine cubes into a solid-colour face.

Example:



### Four Corners

Put four corner cubes in their correct positions.

Example:



Try this way . . .



. . . or this way.

## RUBIK'S Cube Games

### Four Corners<sup>2</sup>

Move all eight corner cubes in their places.

Example:



## Solving RUBIK'S Cube

When solved, every face of RUBIK'S Cube is a solid color. Once you start turning, twisting and flipping, it's easy to mix up the colors. Not to worry – RUBIK'S Cube can be set right from any mixed-up combination. The following steps will help you solve the puzzle.

1. Choose a color, such as YELLOW, for the top face. Turn RUBIK'S Cube so that the center cube on the top face is that color.

Example:



**RUBIKFact:** One month of solid twisting. That's how long Erno Rubik took to solve his creation the first time. Before that, he wasn't even sure there could be a method of solving it.

**RUBIK Fact:** Some people can solve RUBIK'S Cube in 52 moves from any scrambled position.

## Solving RUBIK'S Cube

2. Make a cross on the top layer by moving the four **YELLOW** edge cubes into place. At the same time, make sure the second color on each edge piece matches the center cube on each side face. To put each cube in its correct position, first take it to the bottom layer, and then twist it into position in the top layer. Use quarter twists on a series of faces to reverse the orientation of a cube.

Example:



3. Still working with the top layer, place the correct corner cubes in position. First, select any corner as your target corner.
4. Find the cube that belongs in that position and position it directly below your target corner. With a series of twists of the right face and the bottom face, you can move the cube into position in the top face. If turning a face one way doesn't work, try the opposite move, using either a quarter twist or a half twist.



5. Position all the corners, one after the other. When all the top corners are in position, the top layer is solved.

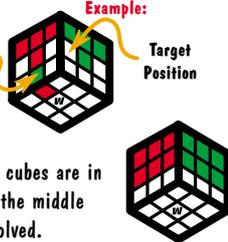
## Solving RUBIK'S Cube

6. Solve the middle layer on each face by putting in the correct edge cubes, one at a time. First try to solve the middle layer by creating move sequences of your own. If you need help, use the sample sequences *Edge Mover #1* and *Edge Mover #2* (See **RUBIK'S Cube Sequences** p.10) to accomplish this. If you accidentally disturb some cubes that are already in their correct positions, restore them with reverse twists before going on.

Example:

Cube to Be Moved to Target Position

Target Position



When all the edge cubes are in place, two layers, the middle and the top, are solved.

## Solving RUBIK'S Cube

7. Begin solving the bottom layer by positioning the corner cubes. First, move all four corner cubes to their correct spots. You can do this by using the *Two Corner Swap Sequence*. (See **RUBIK'S Cube Sequences** p.11) At this point, it doesn't matter whether or not their colors are properly turned to match each face, as long as all four corner cubes end up in the right locations.

**RUBIK Fact:** Theoretically the shortest path to solving **RUBIK'S Cube** from any scrambled position is as few as 22 twists. So far no one has succeeded in demonstrating this method.

## Solving RUBIK'S Cube

8. With all four corner cubes in place, use the *Three Corner Shuffle* (See *RUBIK'S Cube Sequences* p.11) to orient their colors, matching them up to the colors of the three faces they connect.

Example:



From this . . . . . to this.

9. Complete the bottom layer by placing the four edge cubes in their proper positions using the *Edge Flipper Sequences*. (See *RUBIK'S Cube Sequences* p.12)

When you finish, your *RUBIK'S Cube* is solved!



Now that you've solved the cube, race yourself. Go for your best time. Remember the best time ever is 22.95 seconds!

## RUBIK Website on <http://www.rubiks.com>

The RUBIK Internet Website is an international meeting point for both RUBIK'S enthusiasts and casual puzzlers.

The RUBIK Website is one of the best designed free entertainment pages on the Internet. There are over 20 pages of puzzles, competitions, free downloads, hints, solutions and bulletin boards. These appear in a well presented, easily accessible format. There is no frustrating wait for pages to download and appear.

We have teamed up with 'FreeZone' one of the largest young adult websites on the net. FreeZone will run and present the RUBIK Website. The Website will be regularly updated with fresh puzzles and competitions.

So dial up now. Note this URL for loads of brain teasing fun... <http://www.rubiks.com>

