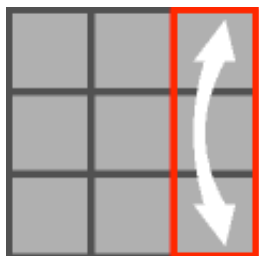# Rubik's Domino

Circa 1981: I was at a K-mart waiting in line to buy a handful of commodities, and there they were... an entire shelf of Rubik's Dominoes. There were about 100 of them on sale at the reasonable price of $2 each. I thought, "Nyet! $2 is still way too much for this puzzle." Famous last words; nowadays a Rubik's Domino will easily fetch at least $100 on e-bay.
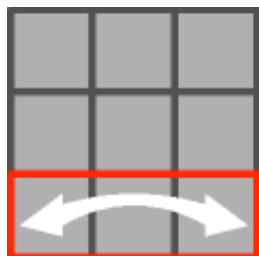

Notation:

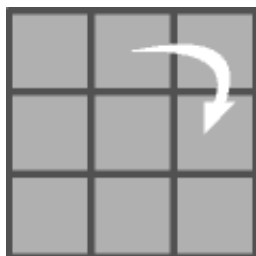| **R**	**B**	**F+**	**F2**	**F-**

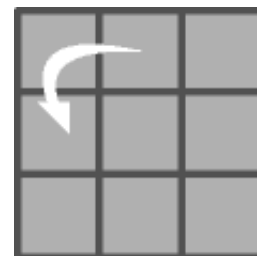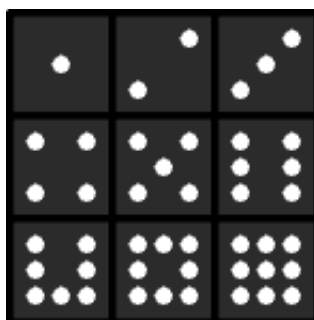| Flip the RIGHT column half-way around | Flip the BOTTOM row half-way around | Rotate the FRONT face 1/4 of a turn clockwise | Rotate the FRONT face half-way around | Rotate the FRONT face 1/4 of a turn counter-clockwise |

I. Solve the White Pips (dark background)

A Rubik's Domino is basically a Rubik's Cube minus the "equator". Here are the *laws of the Domino*:

- The center tiles (with 5 pips) cannot move at all; all they can do is spin in place. Therefore, the center

tile defines what color the entire face is suppose to become.
- A corner tile can move around and jump between faces, but will always end up in one of the 8 corner locations. Note how each corner (white or black, scrambled or solved) has an odd number of pips.
- An edge tile can also move around and jump between faces, but will always end up in one of the 8 edge locations. Note how each edge tile always has an even number of pips.

Solve the white pips (with the dark background) counting from *left-to-right*; in other words 1-2-3 for the top row, 4-5-6 for the middle row and 7-8-9 for the bottom row.

---

1. Solve the #2 tile

Hold the puzzle so that you are looking at the face with 5 white pips at the center. This side will be the front face for awhile.

	If the #2 tile is already on the **front face**, then merely rotate the front face until the #2 tile is at the top row.		However, if the #2 tile is on the **bottom face**...
	...then **flip** whatever row or column that tile happens to be on.		Once the #2 tile is on the front, **rotate** the front face so that the #2 tile is at the top row.

2. Solve the other edge tiles

Knock Down:		Move Up:	
If an edge tile is already on the front face,	...then **knock it down**, by flipping over whatever row or column it happens to be on. Afterwards, move	If (or once) an edge tile is on the back, then rotate the back face until the edge tile	...and then flip the row or column of that tile to **move it**

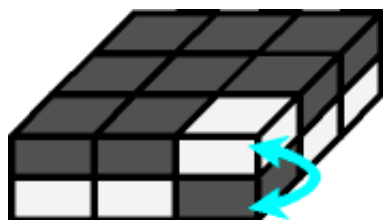| but at the wrong spot...	it up to its correct spot during the next step.	is directly below its destination...	**up** to its correct location.

3. Solve the corners

Now it's time to introduce yourself to the *very first move* you have to memorize:
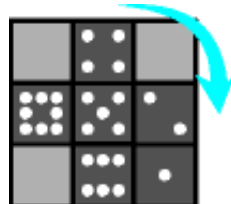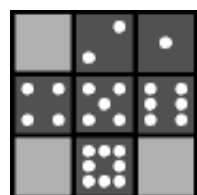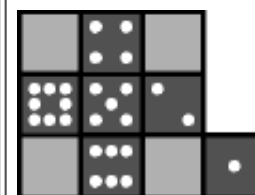
R F+ B F- R

What the move does:

It swaps the lower-right corners from front to back and visa-versa. It also wreaks havok on other tiles on the back-side, but we do not care about their particular fate for now (as long the other front-side corners remain intact).
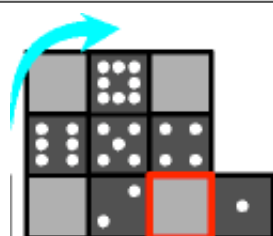
Knock Down:

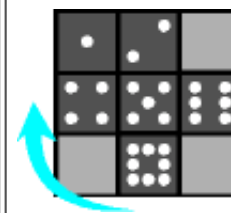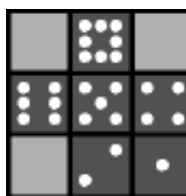|		Do the move:	
A corner tile is already on the front side, but at the wrong spot.	Rotate the front face until that tile is at the *lower-right*.	**R F+ B F- R**	Now the corner tile is **knocked down** to the back face. Follow the next step to move it up.

Move Up:

	Do the move:		
A corner tile is on the back face. **SET UP:** Rotate the back face so that the tile *to-go* is at the *lower-right*.	**R F+ B F- R**	Now that the tile is **moved up** to its	...rotate the front face until all solved tiles are where they're suppose to be, just to

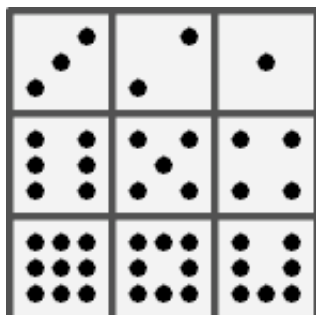| Rotate the front face so that the *vacant* tile is also at the *lower-right*. | | proper location... | they're suppose to be, just to get your bearings straight. |

Solve the White Pips **Solve the Black Pips**

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Rubik's Domino

II. Solve the Black Pips (light background)

Flip the entire puzzle over to the other side, the side with the black pips. This will be the new front face for the rest of the solution. Solve the black pips (with the light background) counting from *right-to-left*; in other words 3-2-1 for the top row, 6-5-4 for the middle row and 9-8-7 for the bottom row.

Why is this side solved backwards? Because you have to solve both sides so that the matching number of pips are "back-to-back" for each tile. If you had X-ray vision, you could easily see that the tiles of the solved side (which is now the new back face) are at a mirror-imaged state.

1. Solve the #1 tile
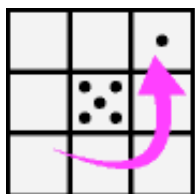
Because all the black pips are already on the new front side, there are no more *knock-downs* or *move-ups* to worry about. Anyway, to solve the **#1 tile**:

Merely rotate the front face until the #1 tile is at the **upper-right**.

Throughout the rest of the solution, make sure that the **#1 tile** is always at the **upper-right** before solving another tile.

It is now time to introduce yourself to *another move* that you have to memorize:
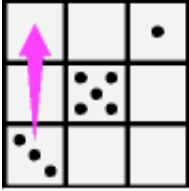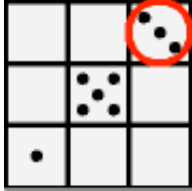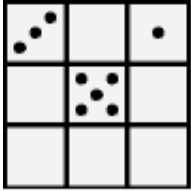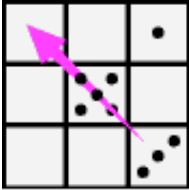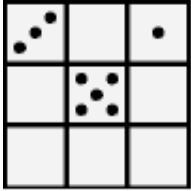
R F+ R F- R
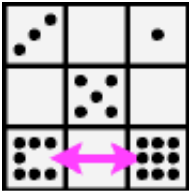**B F- B F+ B F-**
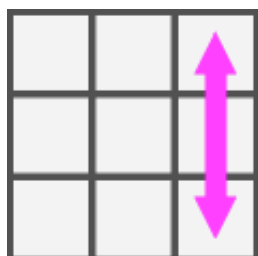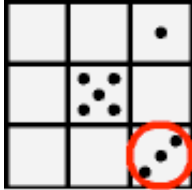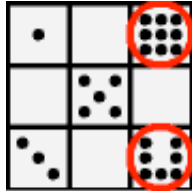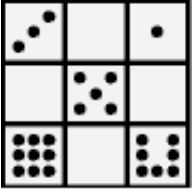

What the move does:

It swaps the two corner tiles on the right column, while leaving the other corners intact.

This move will be used in first 3 steps only, which are geared toward solving the **CORNERS**.

2. Solve the #3 tile

Case I:	Set up:		And then rotate the front face...
The #3 tile is at the **bottom-left** (adjacent corner).	Rotate the front face so that the #3 tile is at the *upper-right*.	**Do the move:** **R F+ R F- R B F- B F+ B F-**	...until the **3-1** tiles are on the top row (where they belong).
Case II:	Set up:		And then rotate the front face...
The #3 tile is at the **bottom-right** (opposite corner).	Rotate the front face so that the #3 tile is at the *lower-right*.	**Do the move:** **R F+ R F- R B F- B F+ B F-**	...until the **3-1** tiles are on the top row (where they belong).

3. Swap the other corners (if necessary)

|	Set up:		And then rotate the front face...
The last 2 corner tiles are on the bottom row, and need to be **swapped**.	Rotate the front face so that the #7 and #9 tiles are both on the	**Do the move:** **R F+ R F- R B F- B F+ B F-**	...until the **3-1** tiles are on the top row again

| | *right column.* | | | are on the top row again. |

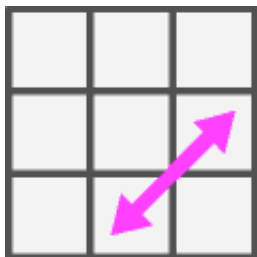It is now time to introduce yourself to *yet another and another move* that you have to memorize:

R F2 R F2 R F2
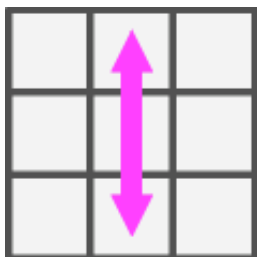
What the move does:

It swaps the two edge tiles on the middle column, while leaving all the other tiles intact.
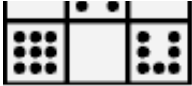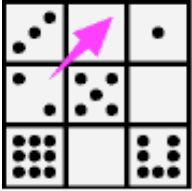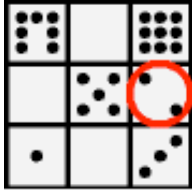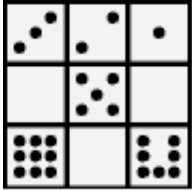
R F+ R F+
R F2 R F2
R F+ R F- R

What the move does:

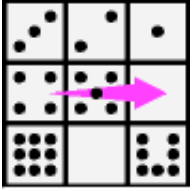It swaps the right-edge tile with the bottom-egde tile, while leaving all the other tiles intact.
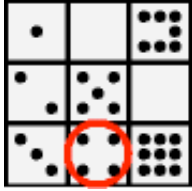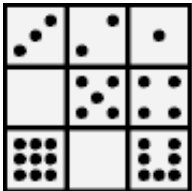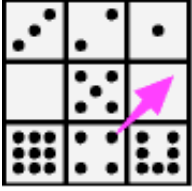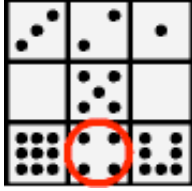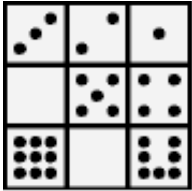
These moves will be used in last 3 steps, which are geared toward solving the **EDGES**.

4. Solve the #2 tile
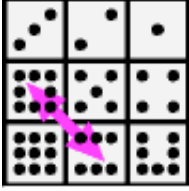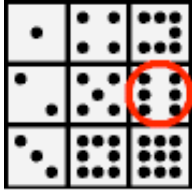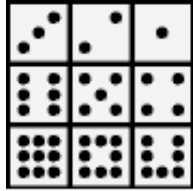
Case I:	Set up:	Do the move:	And then rotate the front face...
The #2 tile is at the **bottom row** (opposite edge).	Rotate the front face so that the #2 tile is at the *bottom row*.	**R F2 R F2 R F2**	...until the **3-2-1** tiles are on the top row (where they belong).
Case II:	Set up:	Do the move:	And then rotate the front face...
		R F+ R F+	

The #2 tile is at the **right column** (adjacent edge).	Rotate the front face so that the #2 tile is at the *bottom row*.	**R F2 R F2** **R F+ R F+ R**	...until the **3-2-1** tiles are on the top row (where they belong).
Case III: The #2 tile is at the **left column** (adjacent edge).	**Set up:** Rotate the front face so that the #2 tile is at the *right column*.	**Do the move:** **R F+ R F+** **R F2 R F2** **R F+ R F+ R**	And then rotate the front face... ...until the **3-2-1** tiles are on the top row again.

5. Solve the #4 tile

Case I: The #4 tile is at the **left column** (opposite edge).	**Set up:** Rotate the front face so that the #4 tile is at the *bottom row*.	**Do the move:** **R F2 R F2 R F2**	And then rotate the front face... ...until the **3-2-1** tiles are on the top row (where they belong).
Case II: The #4 tile is at the **bottom row** (adjacent edge).	**Set up:** Rotate the front face so that the #4 tile is at the *bottom row*.	**Do the move:** **R F+ R F+** **R F2 R F2** **R F+ R F+ R**	And then rotate the front face... ...until the **3-2-1** tiles are on the top row (where they belong).

6. Swap the other edges (if necessary)

	Set up:	Do the move:	And then rotate the front face...
The last 2 edge tiles need to be **swapped**.	Rotate the front face so that the #6 tile is at the *right column*.	**R F+ R F+ R F2 R F2 R F+ R F+ R**	...until the **3-2-1** tiles are on the top row again.

One final move:

Rotate one of the faces (either front or back) so that all the individual tiles are **back-to-back** with each other. In other words, make sure that the #1 tiles are back-to-back, the #2 tiles are back-to-back, etc. Afterwards you can declare yourself as "Lord of all Carcassonne".

Epilog:

I do not own a Rubik's Domino, and becuase they are horribly expensive anymore, you may not own one either. But you can solve one by manipulating a regular Rubik's Cube using the following restrictions:

- Choose a FRONT color, which in turn determines the BACK color. These 2 colors will simulate the FRONT and BACK faces of the Domino puzzle. You are allowed to flip the entire cube upside-down (so that the FRONT and BACK layer switch sides); but the equitorial layer must always remain as the equator.
- You are allowed to rotate any HORIZONTAL layer (FRONT or BACK) 1/4 of a turn; except for the equatorial layer itself... which you should ignore completely.
- You can only rotate any VERTICAL layer (LEFT, RIGHT, TOP or BOTTOM) 1/2 turn around. These sides simulate the "edges" that you flip around on a Domino puzzle.
- You must start off with a **solved** Cube, and are only allowed to *scramble* it afterwards using the same restrictions.

Solve the White Pips **Solve the Black Pips**

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