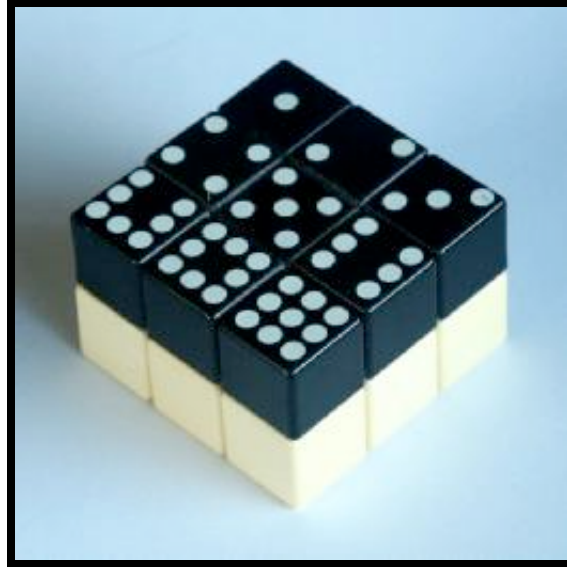


# Rubik's Domino



This is like a 2x3x3 Rubik's cube. The sides which are 2x3 can obviously only do half turns. The top and bottom layer have different colours, and the pieces are simply numbered 1-9 with dots.

In the solved position, the top layer is simply numbered from left to right, from top to bottom using the numbers 1 to 9. The bottom layer piece below each numbered piece in the top layer should have the same numbers. This means that if you look at the bottom face, the pieces are ordered in mirror image, i.e. numbered from right to left, top to bottom. You can see that this must be the intended solved position because the number 7 pieces are reflections of each other.

The Magic Domino was patented by Ernő Rubik on 29 March 1983, [US 4,378,116](#).

If your browser supports JavaScript, then you can play the Domino by clicking the link below:

[JavaScript Domino](#)

## The number of positions:

There are 8 corners and 8 edges, giving a maximum of  $8! \cdot 8!$  positions. This limit is not reached because the orientation of the puzzle does not matter. This leaves  $8! \cdot 8! / 4 = 406,425,600$  positions.

## Links to other useful pages:

[Cyril Castella's page](#). A French solution.

## Notation:

Let the 4 sides be denoted by L, R, F, B (left, right, front, back), and the top and bottom by U and D (up, down). Clockwise quarter turns of the top and bottom layer are denoted just by the letter U or D, half turns are denoted by U2 and D2, and anti-clockwise turns by U' and D'. A turn of one of the sides is simply a single letter. Sometimes a whole sequence in brackets is followed by a 2 or 3, indicating that the sequence as a whole is to be repeated two or three times.

## Solution 1:

**Phase 1:** Solve the top layer corners.

- UFL - If not in the U layer, turn a side to get it there and hold the domino so that it is in the correct corner.
- UFR - If in U layer but not correct then do B to put it in D layer. Rotate D until it is at DBR and then do R.
- UBR - If in U layer but not correct then do B to put it in D layer. Rotate D until it is at DBL and then do B.
- UBL - If not correct then rotate D until it is at DBL and do BDBD'B.

**Phase 2:** Solve the bottom layer corners.

- Use one of the following:
  - Swap DBL and DBR. Do RF (D'FDR)<sup>2</sup> D'.
  - Swap DFL and DBR. Do (FD<sup>2</sup>RD)<sup>2</sup> RD<sup>2</sup>FD'.

**Phase 3:** Move the edge pieces to their correct layer.

- Turn U/D to get a position where you can use one of the following:
  - Swap DL-UR. Do R (D<sup>2</sup>F)<sup>3</sup> R.
  - Swap UF-DF and UR-DR. Do (FR)<sup>3</sup>.
  - Swap UF-DF and UB-DB. Do FRLBRL.

**Phase 4:** Solve the edge pieces of the bottom layer.

- Rotate the whole domino to get to a position where you can use one of the following:
  - Swap DF-DR. Do: FU' FU<sup>2</sup> RF U<sup>2</sup> FR U'F.
  - Swap DF-DB. Do: (R D<sup>2</sup>)<sup>3</sup>.
  - Swap DF-DB, DL-DR. Do: FRLB U FRLB D'.
  - Swap DF-DR, DL-DB. Do: FBD F RL B RL D'BF.
  - Cycle DL->DF->DR->DL. Do: FD'(F R D<sup>2</sup> R)<sup>2</sup> DF.
  - Cycle DL->DB->DR->DF->DL. Do: RL D FB U F RL BL D<sup>2</sup>R D<sup>2</sup>R.
  - Cycle DL->DF->DB->DR->DL. Do: RD FB DFD' FB D'RD<sup>2</sup>.

**Phase 5:** Solve the top layer edges.

- Turn over the domino.
- Repeat phase 4.

## Additional notation:

This solution uses M to denote a turn of the middle layer that lies between the R and L faces. Furthermore, a small letter r denotes turning the R face together with the middle slice, i.e. it is just MR.

## Solution 2:

This fast solution was devised by Stefan Pochmann.

**Phase 1:** Solve bottom layer edges.

- If there is an edge in the top layer that belongs in the bottom layer, then
  - Turn the top layer so that the piece lies at the correct side, directly above where it belongs. Note that 2 belongs in the B face, 4 in the L face, 6 in the R, 8 in the F face.
  - Turn that side face, putting the edge piece into position.
- Repeat step a as often as you can.
- If not yet all bottom layer edges are correctly solved, turn a side face to bring any incorrect bottom layer edge to the top, and go back to step a.

**Phase 2:** Solve the bottom layer corners.

- a. If there is a corner in the top layer that belongs in the bottom layer, then
  1. Turn the top layer so that the corner lies directly above where it belongs.
  2. Put the corner in place using one of the move sequences below:
    - 1 at the BL corner: L U L U' L
    - 3 at the BR corner: R U' R U R
    - 7 at the FL corner: L U' L U L
    - 9 at the FR corner: R U R U' R
- b. Repeat step a as often as you can.
- c. If not yet all bottom layers are correctly solved, you could use one of the sequences from step a to displace one of the incorrect bottom layer corners, and then do step a proper to solve it.  
Alternatively, you could use one of the following sequences to swap two corners:
  1. Swap diagonally FR, BL corners: (L U') (R U R U' R U) L
  2. Swap adjacent FR, FL corners: (R U2) [U'D] (R U R U' R) [UD'] U2 R

**Phase 3:** Solve top layer corners.

- a. Turn U to put as many corner pieces correct as possible.
- b. If two corners need to be swapped, then turn U so that one of the corners is at FR, the other at the BL or BR. Then do one of the following:
  1. Swap adjacent FR, BR corners: (R U R U' R) [U'D] (R U' R U R U') [UD']
  2. Swap diagonal FR, BL corners: (R U') (R U' R U R D' R U R U' R D R)
 Then turn U to put the corners in position again.

**Phase 4:** Solve the edge pieces of the top layer.

- a. Examine the edges to see how they should be moved to put them in their correct places. Turn the whole puzzle to hold it in a position where one of the following sequences will solve it:
  1. F->B->L anti-clockwise 3-cycle: rU (R D R U)2 rD
  2. B->F->L clockwise 3-cycle: rU' (R D' R U')2 rD'
  3. F-B, L-R opposite swaps: M U M U2 M U M
  4. B-R, F-L adjacent swaps: M U M F M F U' M
  5. F-R adjacent swap: (R U)2 (R U2)2 R U R U' R
  6. F-B opposite swap: (R U2)3
  7. F->R->B->L anti-clockwise cycle: (R U r U r) (R U R U R) (r U r U R)
  8. F->L->B->R clockwise 4-cycle: (R U' r U' r) (R U' R U' R) (r U' r U' R)
  9. F->B -> R->L zig-zag 4-cycle: (U r U r) (R U R U' R) (r U' r U)

**Nice sequences:**

- a. Mirror both faces: R U (RL F)2 U F L U2 R F U2 F
- b. Mirror top face: R F U' F U2 R (U F)2 U2 R U' F R

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