

Pyraminx Crystal



The Pyraminx Crystal is a dodecahedron shaped puzzle by Uwe Mèffert. It is similar to the [megaminx](#) in that it has twelve pentagonal faces that can turn, but the cuts lie slightly deeper. The cut of a face cuts go through the centres of the adjacent faces.

The number of positions:

This is exactly like the megaminx. There are 30 edge pieces with 2 orientations each, and 20 corner pieces with 3 orientations, giving a maximum of $30! \cdot 20! \cdot 2^{30} \cdot 3^{20}$ positions. This limit is not reached because:

- only even permutations of edges are possible (2)
- only even permutations of corners are possible (2)
- only and even number of flipped edges are possible (2)
- the total twist of the corners is fixed (3)
- the orientation of the puzzle does not matter (60)

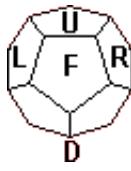
This leaves $30! \cdot 20! \cdot 2^{27} \cdot 3^{19} / 60 = 1,677,826,942,558,722,452,041,933,871,894,091,752,811,468,606,850,329,477,120,000,000,000$ or approximately $1.68 \cdot 10^{66}$ positions.

Links to other useful pages:



[Uwe Mèffert's pages](#). He produces and sells many puzzles.

Notation:



Hold the puzzle with one face on top, and one directly adjacent face towards you. The top face will be denoted by the letter U, the adjacent front face by F. The faces to the left and right of them, will be denoted by L and R. The bottom face, directly opposite the U face will be denoted D. A clockwise turn of any of these faces by 1/5th of a turn is denoted by the respective letter. An anti-clockwise turn by the letter followed by an apostrophe (i.e. U', F', L', R', or D').

Solution:



Phase 1: Solve the corners in the U layer

- Choose one corner piece as your reference point. This piece will be considered to be already solved. Hold the puzzle so that this piece lies at the UFC corner (the corner where the U, F, and L faces meet).
- Find the corner piece that belongs to the right of the solved corner, at the UFR location. Bring the piece to the spot directly below the UFR location and do R to put it in place. If it needs to be twisted, then do R F' R' F R once or twice until it matches colours with the previous corner.
- Do U (or turn the whole puzzle) so that there is a solved corner at UFC and an unsolved one at UFR.
- Repeat steps b and c until four corners of the U layer are solved.
- Find the corner piece that belongs at the UFR location. Bring the piece to the spot directly below the UFR location, and do R F' R' F to put it in place. If it needs to be twisted, then do R F' R' F twice, or four times until it matches colours with the previously solved corners.



Phase 2: Solve the edges in the U face

- Find an edge piece that belongs in the top face, but does not already lie in the top face somewhere.
- Hold the puzzle such that the piece belongs at the UF location
- Bring the edge to the location at the bottom right of the front face, but with the U colour in the front face.
- Do R L' R' L to put the edge in place.
- Repeat a-d for each unsolved U edge not in the U face.
- If a U edge piece already lies in the U face but in the wrong position or orientation, then you can use the same step d to insert any other edge in its place. This displaces the edge from the U face so that you can then use a-d to insert it in the correct place. Repeat until the U edges are solved.

Turn over the puzzle so that the solved face is on the bottom.



Phase 3: Solve the lower equator corners.

These are the 5 corner locations adjacent to the solved bottom layer.

- Find a corner piece that belongs in the lower equator.
- Bring it to its correct location. Do not worry about its orientation. This is easy to do without disturbing previously solved pieces.
- To twist a lower equator corner, hold the puzzle such that the twisted corner is the one at the bottom of the F face, and then do F F U' F F. Repeat if necessary, until the corner is correctly oriented.
- Repeat a-c for all lower equator corners.



Phase 4: Solve the upper equator corners.

- a. Find a corner piece that lies in the U face but belongs in the upper equator.
- b. Turn U to bring it to the spot directly above its correct location. Hold the puzzle so that the corner is at UFR and its intended location just below it.
- c. Do R' F R F' to insert the corner. If it needs to be oriented, then do R' F R F' twice or maybe four times, until it is in place and correctly oriented.
- d. Repeat a-c for all upper equator corner pieces in the U face.
- e. If an upper equator corner already lies in the equator but in the wrong position, then you can use the same step c to insert any other corner in its place. This brings the corner up to the U face so that you can then use a-d to insert it in the correct place. Repeat until the upper equator edges are solved.



Phase 5: Orient the U corners.

- a. See what colour the top face should be by determining the colour that the 5 unsolved corners have in common. The next steps will orient the corners to bring that colour to the top face.
- b. Turn the U layer so that one of the incorrectly oriented corner pieces lies at the UFR location.
- c. Do R F' R' F twice, or if necessary four times, to twist the corner at URF correctly.
- d. Repeat steps b-c until all the U corners are correctly oriented.



Phase 6: Position the U corners.

- a. Turn the U layer to put as many corners in their correct locations as possible, ignoring their orientation. Make note of which corner pieces are correct and which incorrect.
- b. Turn the U layer so that one of the incorrect corner pieces lies at the UFR location.
- c. Do R F' R' F three times, to remove that corner from the U layer. It has moved to the location below UFR.
- d. Look at the previously noted correct corner(s) of the U layer, and find the spot relative to them where the removed corner belongs. Turn the U face to bring that spot to the UFR location.
- e. Do R F' R' F three times, to insert the previously removed corner back at the URF location.
- f. The previous step also removed a corner from the URF location, and brought it to the location directly below URF. If that corner belongs in the U layer, then go to step d. If not, and the U layer corners are not yet correctly positioned relative to one another then go to step b.
- g. Finally turn the U layer to put all the corners in place



Phase 7: Solve the edges that are not in the U layer.

- a. Find an edge piece in the U layer that does not belong in the U layer.
- b. If it does not lie in the U face, i.e. it is one of the 5 horizontal edges in the U layer, then you first have to bring it to the U face. Do this by holding the puzzle so that the edge lies just below the UFR corner, and then applying the move sequence F' R' L R L' F.
- c. Find out where the edge piece belongs, and hold the puzzle so that this location is adjacent to the lower equator corner in the front face.

- d. Turn the U layer to bring the edge to the UF location.
- e. There are now six cases (3 possible destinations, 2 orientations).
 - 1. The edge belongs at the bottom right of the F face
 - a. The front side of the edge piece has the same colour as the F face.
Do the move sequence U U R L R' L'
 - b. The front side of the edge piece has a different colour to the F face.
Do the move sequence L R L' R'.
 - 2. The edge belongs at the bottom left of the F face
 - a. The front side of the edge piece has the same colour as the F face.
Do the move sequence U' U' L' R' L R
 - b. The front side of the edge piece has a different colour to the F face.
Do the move sequence R' L' R L.
 - 3. The edge belongs below the bottom corner of the F face.
 - a. The front side of the edge piece has the same colour as face below-right of the F face.
Do the move sequence D L R R L' R' R' D'.
 - b. The front side of the edge piece has the same colour as face below-right of the F face.
Do the move sequence D' R' L' L' R L L D.
- f. Repeat a-e for all edges in U layer that don't belong in the U layer.
- g. If not all the edges outside the U layer are solved, then you can use one of the sequences in step c to insert any edge from the U face in the place of an incorrect edge. This brings the incorrect edge up to the U face so that you can then use a-d to insert it in the correct place. Repeat until all the non-U-layer edges are solved.
- h. Turn the U layer to put its corners back into place



Phase 8: Solve the horizontal U layer edges.

- a. Find an edge piece in the U face that does not belong in the U face but belongs in a horizontal location of the U layer.
- b. If the edge piece does not lie directly on the opposite side of the U layer to the location it belongs, then hold the puzzle so that the edge piece is at the UF location and do R' L R L'. Repeat until the edge and its home location are opposite each other in the U layer.
- c. Look at the colour that the edge piece is showing in the U face. Hold the puzzle so that the F face is the face of that colour.
- d. If the edge lies at the back left, with its home location below the UFR corner, then do F' L R' L' R F.
If the edge lies at the back right, with its home location below the UFL corner, then do F R' L R L' F'.
- e. Repeat a-d for all edges in U face that belong in the horizontal U layer location.
- f. If not all the horizontal edges of the U layer are solved, then you can use one of the sequences in step d to insert any edge from the U face in the place of an incorrect edge. This brings the incorrect edge up to the U face so that you can then use a-d to insert it in the correct place. Repeat until all the horizontal U layer edges are solved.



Phase 9: Position the U face edges.

- a. If no U edges are in the right locations (ignoring orientation), then do R' L R L' once or twice to position at least one edge correctly.
- b. If only one U edge is in the right location (ignoring orientation), hold the puzzle so that the correct edge lies in the L face, and then do R' L R L' once or twice to position at least one more edge piece correctly.
- c. If exactly two non-adjacent U edges are in the right location (ignoring orientation), hold the puzzle so that

the correct edges lie in the L and R faces, and then do $R' L R L'$ once or twice to position the remaining edges correctly.

- d. If exactly two adjacent U edges are in the right location (ignoring orientation), hold the puzzle so that the correct edges lie in the L and F faces, and then do $R' L R L' U' U' L R' L' R U U$ once or twice to position the remaining edges correctly.

Phase 10: Orient the U face edges.

- a. Hold the puzzle so that a flipped edge lies at the UF location.
- b. Do the move sequence $R' R' L L D' D' R R L' L'$.
- c. Turn the U face so that another flipped edge lies at the UF location.
- d. Do the move sequence $L L R' R' D D L' L' R R$.
- e. Turn the U layer back so its pieces are in the correct locations.
- f. Repeat a-d until there are no more flipped edges.

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