

## **Solutions Hints Booklet**

The Puzzle with Another Dimension	2
Meet Your UFO	3
Maneuvering Your UFO	4
General Hints	9
Notation System	14
Sequences	18
Solution Hints	24
Additional Challenges	31

## Rubik's UFO - The Puzzle with Another Dimension

Rubik's UFO is another challenging puzzle from the inventor of the best-selling Rubik's Cube.

There are two revolving saucers, back to back. Both saucers are divided into 6 so that the UFO can also twist in 3 different ways.

Just a few twists and spins and, in the twinkling of an eye, the UFO will be jumbled up.

The Challenge is then to put the UFO back into working order with the colours matched up.

There are 39,916,000 different positions the UFO can be in. Only one is the solution.

Rubik's UFO is deceptive - more complex than it appears. It will be the ultimate challenge of your imagination.

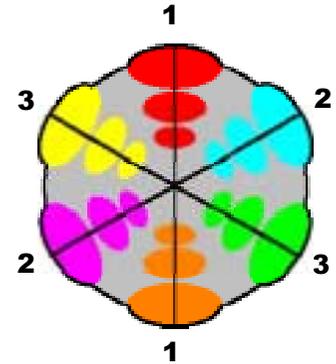
2

## Meet Your UFO

Rubik's UFO has two saucers placed back to back. One is light grey, the other dark grey. Each can be spun independently.

The saucers are divided into six segments by three axes (1-1; 2-2; and 3-3 as labelled in the diagram).

Half the UFO can be flipped upside down along any of these axes.



Each segment has three colored half-ovals along each edge. When the puzzle is in the solved position, the light and dark grey saucers are complete on each side with all colors matching, as in the diagram above.

3

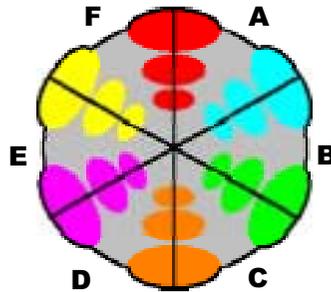
## Maneuvering Your UFO

There are two different maneuvers you can make with the UFO. You can: Spin one of the saucers clockwise or counterclockwise; or Flip half the UFO upside down about any of the three axes.

No matter how badly jumbled the UFO is, it can always be solved using combinations of these two maneuvers.

### Flips

When you Flip the UFO, you can Flip either half about any axis. In the diagram, the six segments have been lettered A to F. In the following sections, the letter indicates the central segment of the half to be Flipped.

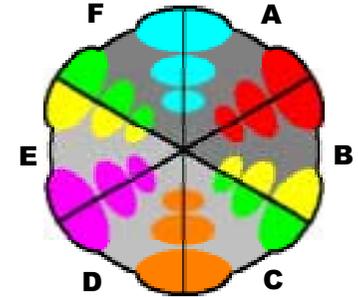


4

## Maneuvering Your UFO

To begin with, just Flip half **A**. Your UFO would then be as shown here.

Now try a few random Flips. Don't worry about mixing your UFO up. The idea is to master the Flip. Be careful not to do any Spins yet.



Now, using Flips only, try to get:

- Alternating light and dark grey segments.
- Five segments on one saucer light grey.
- All the segments on one saucer light grey.
- The solution position.

Try these exercises a few times before moving on to Spins.

5

## Maneuvering Your UFO

### Spins

A Spin rotates one of the saucers in the UFO clockwise or counterclockwise. The saucer can be moved to one of 5 new positions.

A Spin on its own doesn't do much but, when combined with Flips, will jumble the saucer up completely. So be careful.

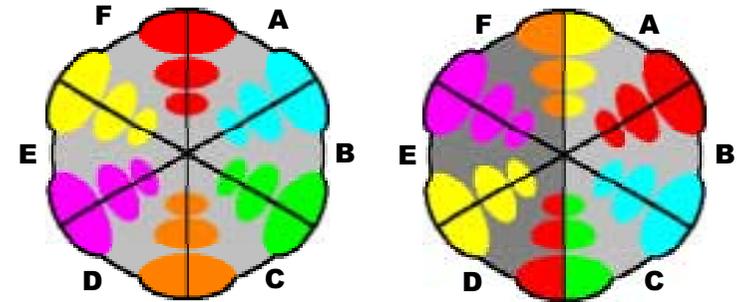
Flip the UFO back to the solution or until you have all the light grey segments in one saucer.

Don't worry if you can't Flip back to the solution, or your UFO is jumbled up, just make a note of the position of the segments before trying the following exercises.

Since a Spin changes the position of one saucer with regard to the other, it is usual just to Spin the uppermost saucer (the one facing you).

## Maneuvering Your UFO

Now to practice Spins, try this. Spin the top saucer one position clockwise, then Flip half **E**. This has been done here to change the first figure into the second.



Now for a surprise, repeat this process another 8 times, Spinning the top saucer one place clockwise and Flipping half **E** each time to make 9 times in all. Notice anything? Your UFO should be back in the position it was when you started.

## Maneuvering Your UFO

In fact, any sequence of Spins and Flips repeated over and over will eventually bring you back to where you started. It doesn't necessarily take nine repeats. Some sequences take more, some less.

Try some yourself.

Note the start position and the moves you want to repeat, then do them until you reach the start position again.

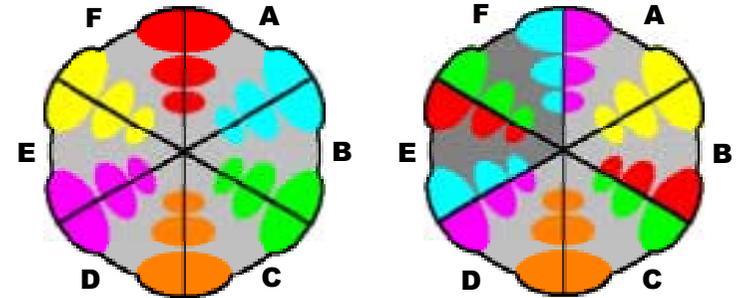
Once you are familiar with Spins and Flips, mess your UFO up with random moves and try and solve it. Repeating a sequence over and over won't necessarily do it, but you have had enough clues to come close.

There are General Hints in the next section, but only refer to them if you are having real problems. Try to solve the UFO for yourself first.

## General Hints

The fact that a repeated sequence returns the UFO to its start position is a big clue towards solving the puzzle. It is important to note what happens in between.

For example, Flipping half **F** then half **A** changes the UFO as shown in the two figures here.



The segments from B and F have swapped, and those from A and E have swapped. Those at F and E have also been turned upside down.

## General Hints

Repeating the sequence another three times returns to the start position. Thus it has a cycle of four. However, we know that doing it just once can turn two pairs of segments upside down.

To solve the puzzle, you must try to find sequences that do something useful at some point in their cycle.

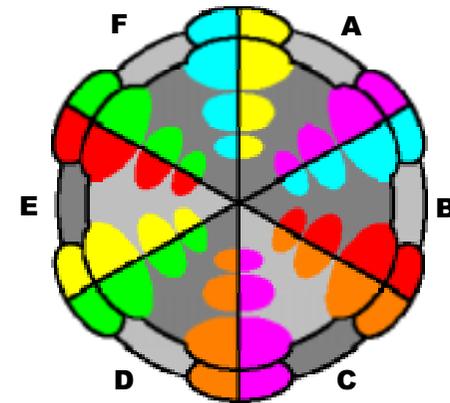
Look especially for any that:

- I Turn just one pair of segments upside down. (These can be used to put all pairs of segments the same way up.)
- II Swap two pairs of segments. (These can be used to arrange the paired segments.)
- III Move three or four individual segments, but leave the rest in pairs. (These can be used to arrange individual segments.)

## General Hints

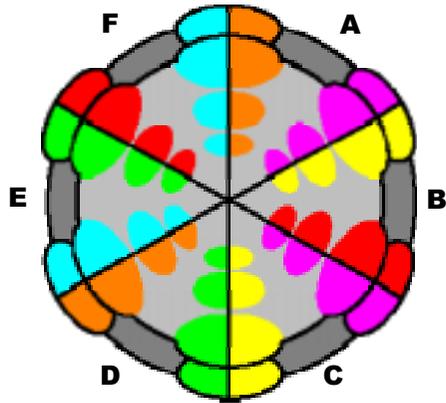
If you can find such sequences, a solution process can be seen:

- Step1 Use sequence type III you have found to arrange individual segments into back-to-back matching pairs, as shown below. (In the diagram, the segments on the underside are represented by the outer ring.)



### General Hints

Step 2: Use a sequence you have found that turns one pair of segments upside down to get all pairs of segments the same way up, as shown here.



Step 3: Use your sequences that rearrange pairs of segments to put them in the right order to solve the puzzle.

### General Hints

So, now try and find some sequences.

Remember that if you repeat a sequence enough you will always return to the position you started in. And remember to note down any interesting effects that occur during the cycle and after how many repeats they occurred.

To do this, you will need a method of recording Flips and Spins and the Start and End positions.

In the next section, you will find a method of doing this. Since this is the system that will be used in the rest of this booklet, it would be best if you used it to record your own moves and sequences.

If you have trouble finding any sequences of your own, there are some useful ones given in the section that follows the system for recording moves.

## Notation System

There are only two types of moves to record: Flips and Spins.

### Flips

Segments are lettered starting from the 1 o'clock position, as shown in the diagram opposite. To record a Flip, note the letter that corresponds to the central segment of the half that is Flipped. Thus, **D** in a sequence means that the half with **D** as its centre is Flipped.

### Spins

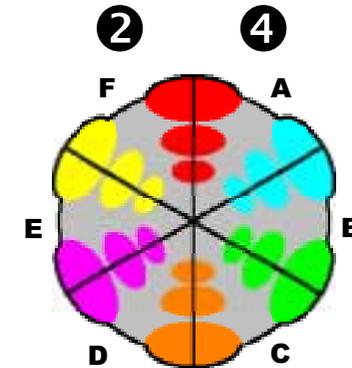
Spins are either clockwise or counterclockwise. Only Spin the upper saucer of the UFO.

A Spin is recorded by an arrow pointing right or left and a number to show the number of clicks the top saucer is Spun. The arrow relates to the 12 o'clock position. So **⌚3** would mean the top saucer is rotated three positions clockwise.

## Notation System

Counterclockwise

Clockwise



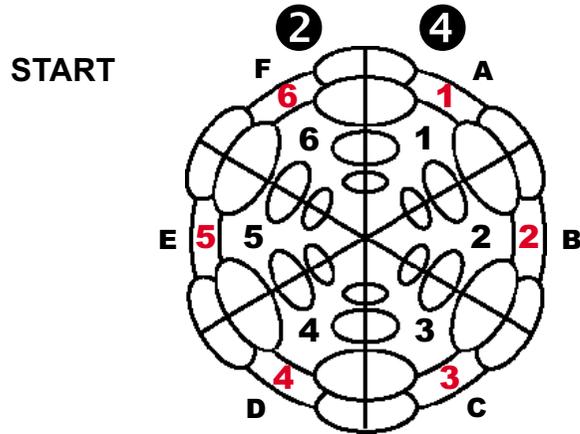
Thus a sequence might read:

**⌚1; A; F; ⌚2; A; F.**

This would mean: Spin top saucer 1 clockwise; Flip half **A**; Flip half **F**; Spin top saucer two positions counterclockwise; Flip half **A**; Flip half **F**. This sequence returns to its start with a cycle of 4.

## Notation System

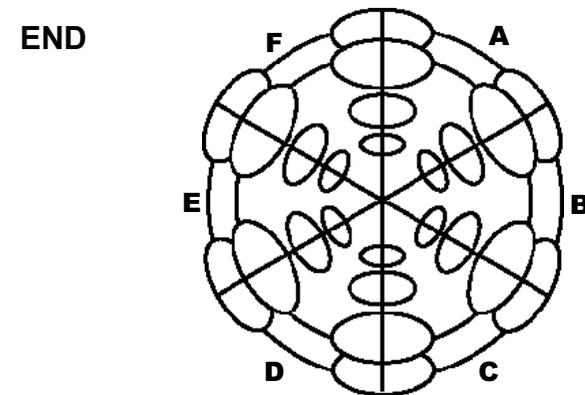
The Start and End position also need to be noted. Colors are not important. What is important is which segments have moved where. Colors may be noted on the Start position, but each segment should be numbered, as below.



SEQUENCE:

## Notation System

The End position should show where the numbered segments have moved to. The outer circle represents the bottom saucer. Segments that started there are numbered in red. The letters and arrows are for reference. (Photocopy these pages to use for recording your sequences.)



If you have trouble finding any sequences, there are some useful ones in the next section.

## Sequences

The sequences here should help you to solve your UFO.

If you are still having trouble, there are solution hints in the next section. However, you are advised to try solving the puzzle on your own first.

In the following sequences, the diagrams have been simplified for clarity.

In each sequence, unnumbered segments remain unmoved. Only the numbered segments move.

The outer ring represents the segments in the lower saucer.

For each sequence, the reverse sequence is given. This will take the segments from the End position back to the Start position. The main effect of the sequence is also described.

## Sequences

### The Nifty Shifty

This half-swaps two pairs of segments (1 and 4). All other pairs stay together, though 2 and 3 move.

This sorts out two pairs of mixed up segments opposite each other. The Reverse sorts out two next to each other.

②1; B; ④1; B.



### Reverse Nifty Shifty:

④1; B; ②1; B.

## Sequences

### The Triple Shifter

This shifts three segments one place around a triangle. It can always sort out two pairs of mixed up segments that are one segment apart. Doing the Triple Shifter twice is the same as doing the Reverse once

C; ②2; C; ④2; C; ②2; C; ④2; C; ②2; C; ④2;  
C; ②2; C; ④2; C; ②2; C; ④2.



### Reverse Triple Shifter

②2; C; ④2; C; ②2; C; ④2; C; ②2; C; ④2; C;  
②2; C; ④2; C; ②2; C; ④2; C.

## Sequences

### The Oppo-Swoppo

This swaps and turns a pair of opposite segments.

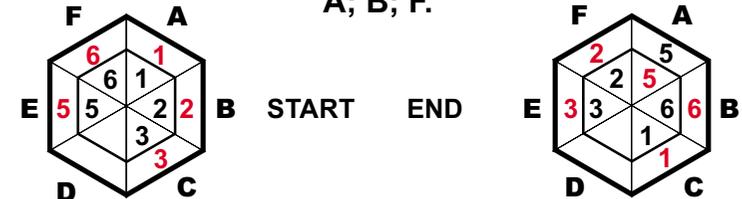
②1; F; ④2; A; ②1.



### The Lone Arranger

This turns one pair of segments upside down. Most of the other pairs will move.

A; B; F.



## Sequences

### Propellor (Clockwise)

This rotates a group of three alternate pairs of segments one position clockwise. All remain the same way up. .

A; B; C; A; B; C.



### Anti-Propellor

This rotates the same three pairs of segments counterclockwise.

C; B; A; C; B; A.

## Sequences

### The Butterfly Swap

This swaps a pair of segments one position apart. The reverse has the same effect.

D; C; 22; C; 42; C; 22; C; 42; C;  
 22; C; 42; C; 22; C; 42; C; 22; C; 42;  
 D; 22; C; 42; C; 22; C; 42; C;  
 22; C; 42; C; 22; C; 42; C; 22; C; 42; C.



These sequences are all you need to solve the puzzle. If you are still having trouble, there are Solution Hints in the next section.

## Solution Hints

As stated in the General Hints, there are three steps in solving the puzzle:

### Step1

Arrange all segments into matching pairs (i.e. red-yellow light grey backing red-yellow dark grey). Don't worry about the order or which way up they are.

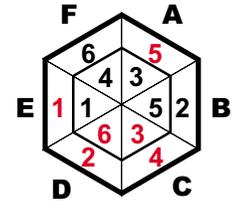
Matching up one pair is fairly straightforward.

Next, match a pair of segments next to the first. Simply place a segment in the top saucer so that it can be Flipped into the position you want in the bottom saucer, or vice versa. You may have to split a pair you have formed with a Spin, but make sure you Spin back to match the pairs up again.

Don't worry if any pairs are turned upside down. For now, it doesn't matter which way up they are.

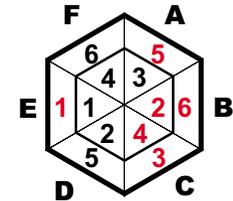
## Solution Hints

For example, suppose you've matched up the 1s, as in the diagram here. You could now try to match up the 2 or 6 segments below 1; or the 6 or 4 segments above 1. The 4 segments are probably easiest.



The red 4 needs to be placed where the black 6 is on the bottom saucer. The 1 segments must also end up as a matched pair. So the process would be as follows.

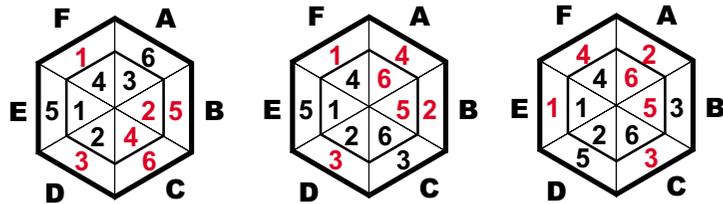
Flipping **C** produces the diagram here.



The red 4 is now in the top saucer ready to be placed into the bottom saucer by Flipping **B**.

### Solution Hints

At the moment, this would swap the red 4 with the red 5, so the bottom saucer must be Spun one place clockwise, or the top saucer one place counterclockwise, as in the first diagram.



Flipping **B** now swaps the red 4 with the black 6 on the bottom saucer (center diagram).

The bottom saucer is then Spun back one position counterclockwise. The 1 and 4 segments are now in matched pairs (righthand diagram).

(Note: From the first diagram, the 5 segments could also be paired by **C**; ④1.)

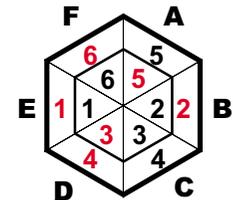
### Solution Hints

Pair up as many segments as you can.

Then use the Nifty-Shifty, or the Triple Shifter, to pair up the remaining segments. Don't worry about the order. This can be sorted out later.

Also, don't worry if you can't match up more than one or two pairs. Use the Nifty-Shifty and the Triple Shifter to match up further pairs.

Sometimes you may find a position where it seems impossible to pair up the remaining segments. In such cases, use some of the other sequences to change the position of those segments. In the diagram, the Oppo-Swoppo would put one of the unmatched pairs of 3 and 4 into a position where the Triple Shifter could then pair them up properly.



### Solution Hints

The sequences in the Sequence Section can be used to sort out any situation that may arise.

Once you have all the segments in matching pairs, go to Step 2.

#### Step 2

Now turn all the matching pairs the same way up, ie, all light grey, or dark grey, on the top saucer. This makes it easier to see the order that the pairs must be arranged in the next step.

Use only Flips to do this. If you have trouble, do them one at a time using the Lone Arranger.

#### Step 3

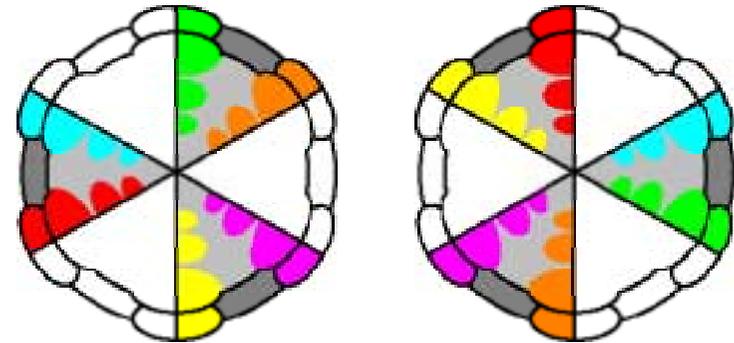
All that remains now is to put the pairs in order.

The Propellor Sequences (clockwise and counter-clockwise) rotate a group of three alternate pairs.

### Solution Hints

If those pairs are in the right order, we know we can then position them properly.

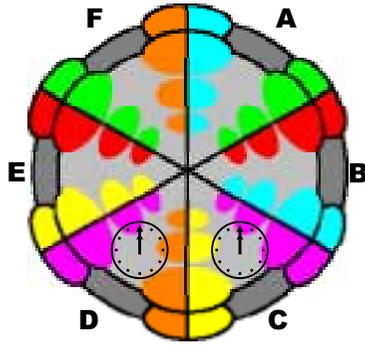
Check your UFO. The two different sets of three are shown below in the order they need to be in. If they are already in their sets in the right order, the Propellor will rotate one set to solve the puzzle.



If they're not in their sets, you will need to swap one pair from one set with one from the other.

### Solution Hints

Use Flips to get the two you wish to swap opposite each other. For example, to swap the starred pairs, first Flip half **B** to put them opposite each other. The Oppo-Swoppo can then swap them. The Lone Arranger is used to put any upside down pairs the right way up.



A set may be in its alternate positions but in reverse order. In this case, the Butterfly Swap will put them in the right order. Any two pairs in the set can be swapped.

Once the matched pairs of segments are in their right order, use the Propellor to rotate one group into its correct position to solve the puzzle.

### Additional Challenges

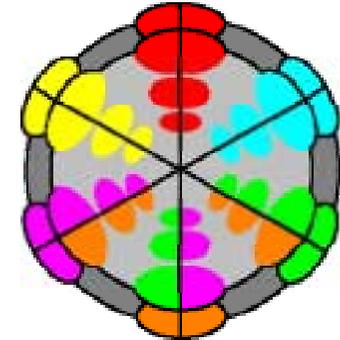
Here are some other Challenges you can try.

#### Dimension Shift

Try solving the puzzle in a different order. For example, solve the puzzle by building up matching pairs in the right order; or completing one saucer, then the other.

#### Close Encounter

See if you can solve the puzzle, but have just two adjacent segments in one saucer swapped, as shown here. If you can, it proves that the segments of the UFO can be arranged in every possible configuration.



Everything is possible with Rubik's UFO.