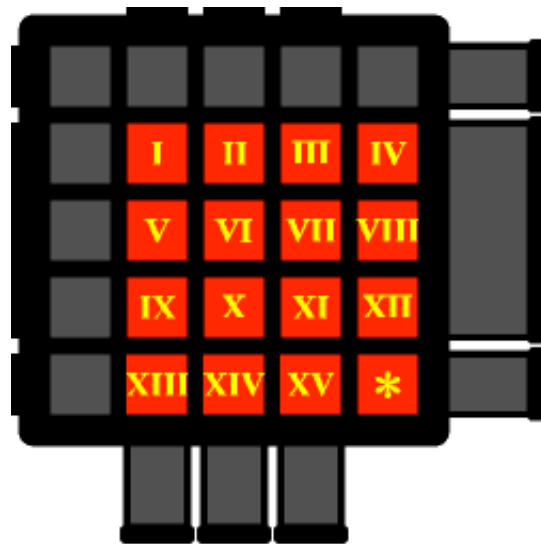# Rubik's XV

An expanded version of Jaap Scherpuis' Solution

Introduction

The above picture pretty much explains it all; try to get all the red tiles so that they are in ascending order (I thru XVI, with the **asterisk** as tile #16). After solving, the **4x4 red grid** is at the *lower-right quadrant* of the 5x5 grid, with the **vertical levers** pointing *downward* while the **horizontal levers** are *to the right*.
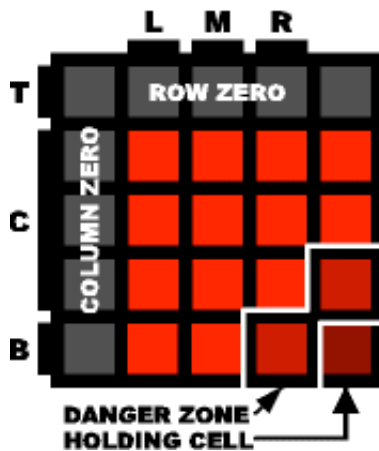
If you are already a cube expert, then I strongly urge you to go directly to Jaaps' Puzzle Page for the XV solution instead. That site will explain the solution clearly in a few simple paragraphs. However if you are a cube novice, then go ahead and read this site, which will help you solve the XV puzzle tile by tile.

The Levers:

The 3 vertical levers can move independently, along with the single large central horizontal lever. The other 2 horizontal levers have certain restrictions:

- You cannot move the **top** horizontal lever unless *all of the vertical levers* are pushed **upwards**.
- You cannot move the **bottom** horizontal lever unless *all of the vertical levers* are pushed **downwards**.

Terminology:

The three verticle levers are labeled as **L, M and R** (*for Left, Middle, and Right*). The three horizontal levers are labeled as **T, C, and B** (*for Top, Center and Right*).

The square in the extreme lower-right is known as the **holding cell**; while the two *adjacent squares* (directly above and to the left) and the *holding cell* itself are all refered to as the **danger zone**. There is a reason why they are labeled so; just read on.

The extreme upper row is called **Row Zero**, while the the extreme left column is called **Column Zero**. Because of this, the **first column** and the **first row** are actually a tad *inward* of the 5x5 grid.

Notation:

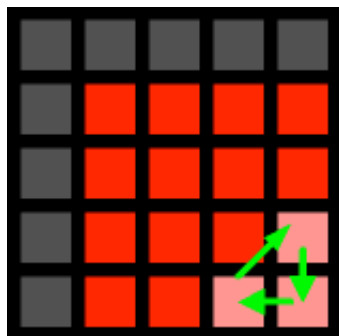|	
L	Push the LEFT vericle lever *(upwards or downwards)*
M	Push the MIDDLE vericle lever *(upwards or downwards)*
R	Push the RIGHT vericle lever *(upwards or downwards)*
T	Push the TOP horizontal lever *(left or right)*
C	Push the big ol' CENTER horizontal lever *(left or right)*
B	Push the BOTTOM horizontal lever *(left or right)*

Upward or downward; left or right; Exactly which way does that lever go? The answer is, just move it to the *other* direction.

The Normal (or Basic) Moves:

L C L C	**M C M C**	**R C R C**
Swaps around 7 (out of 8) tiles on the left half **clockwise**.	Swaps around 7 (out of 8) tiles on the middle section **clockwise**.	Swaps around 7 (out of 8) tiles on the right half **clockwise**.
C L C L	**C M C M**	**C R C R**
Swaps around 7 (out of 8) tiles on the left half **counter-clockwise**.	Swaps around 7 (out of 8) tiles on the middle section **counter-clockwise**.	Swaps around 7 (out of 8) tiles on the right half **counter-clockwise**.

Notice how you can control any square in the 4x4 grid *except* for the single square at the lower-right. For this reason alone, I aptly named it the **holding cell**.

Free a Tile from the Holding Cell:

B R C R
B R C R

Swaps around the 3 tiles
in the **danger zone**
.

You may have to bail a tile out of the holding cell here or there throughout the solution. I will not remind you at each and every time you might need to free a tile, so remember this move! Notice how one tile is released from the holding cell, while another takes its place. All three squares are at risk of landing in the cell, thus the name **danger zone.**
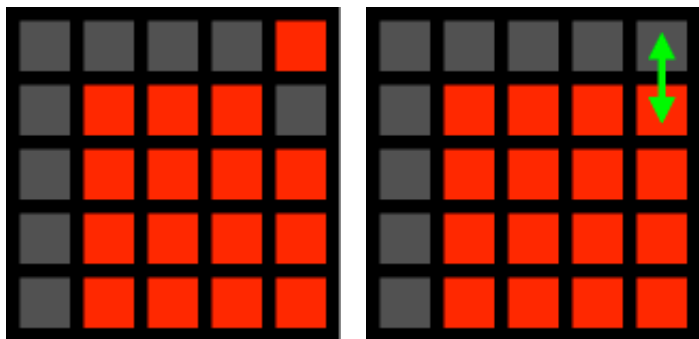

Initialize the Puzzle:

Reset the Levers

Before you start, you must reset the levers:

- Push the **central horizontal** lever to the *right*
- Push **all verticle** levers *upward*
- Push the **top horizontal** lever to the *right*
- Push **all verticle** levers *downward*
- Push the **bottom horizontal** lever to the *right*

You only have to do this *once*; because after each and every move used in this solution, the levers automatically become reset again at the end.

Send the Blank Tile to Row Zero

Use any of the **NORMAL MOVES** to navigate the **blank tile**
directly underneath the single red cell at *Row Zero*.

Do the move to swap the **blank cell** to *Row Zero*...

LMR T LMR C
LMR T LMR C

If the blank tile is in the **holding cell**, then do the move to release it...

B R C R
B R C R

- And continue afterwards to send the **blank tile** to *Row Zero*.

Send the Asterisk Tile into the Holding Cell *(Optional)*

Use any of the **NORMAL MOVES** to navigate the **asterisk**
almost to the bottom of the fourth column.

Do the move to transfer the **asterisk** to the *holding cell*...

B R C R
B R C R

The only reason for this step is to fill the holding cell with a tile that won't be used for awhile. The asterisk won't remain in jail forever, but at least the tiles for the first three columns will be free to solve (without any annoying interruptions).

Next

@ Introduction/Notation @ Solve Columns 1 and 2
@ Solve Columns 3 and 4 @ Solve the Back Side

Return to Mathematica

-

Rubik's XV

An expanded version of Jaap Scherpuis' Solution

Solve Columns 1 and 2 of the Front Side

Solve the 1st Column

Use any of the **NORMAL MOVES** to navigate
tile I to the bottom of the first column.

Next, use any of the the **NORMAL MOVES** to navigate
tile V *almost* to the bottom of the second column,
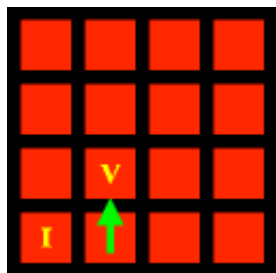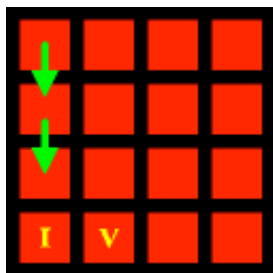*without disturbing the first column*.

If tile V happens to be on the first
column,
then **repeat** the move until **tile V**
is in the *second column*, and then STOP
to keep **tile I** in the *first column*...

L C L C

Once tile V is on the second column,
then **repeat** the move until **tile V**
is at the bottom of the second column...

C M C M

Now **repeat** the move until **tile I** is at the bottom of the first column...
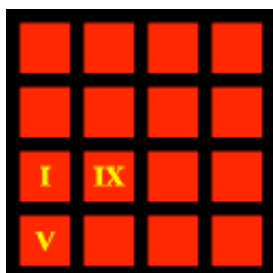
C L C L

Finally, do the move to get **tile V** *almost* to the bottom of the second column...

M C M C

Once tiles I and V are at the set-up position, then do the move to get both tiles together in the first column, with **tile V** directly below **tile I**...
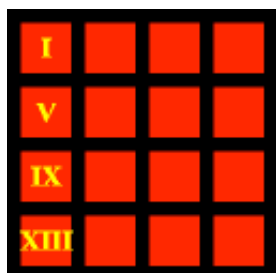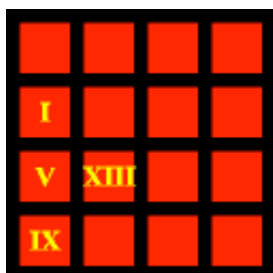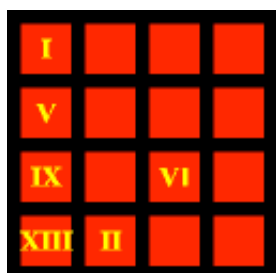
L C L C

Use any of the the **NORMAL MOVES** to navigate **tile IX** *almost* to the bottom of the second column, *without disturbing the first column*.

(If tile IX is in the first column, use the same method as before to get it to the second column at the set-up position.)

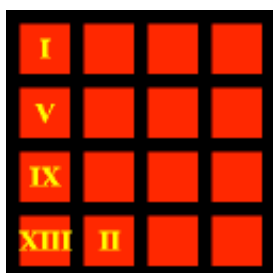Do the move to get all three tiles together in the first column...

L C L C

Use any of the the **NORMAL MOVES** to navigate **tile XIII** *almost* to the bottom of the second column, *without disturbing the first column*.

(If tile XIII is in the first column, use the same method as before to get it to the second column at the set-up position.)

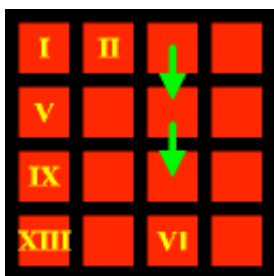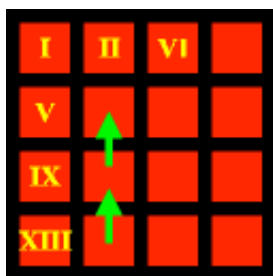Do the move to get all four tiles together in the first column...

L C L C

Solve the 2nd Column

Use any of the **NORMAL MOVES** to navigate **tile II** to the bottom of the second column.

Next, use any of the the **NORMAL MOVES** to navigate **tile VI** *almost* to the bottom of the third column, *without disturbing the second column*.

If tile VI happens to be on the second column,
then **repeat** the move until **tile VI**
is in the *third column*, and then STOP
to keep **tile II** in the *second column*...

M C M C

Once tile VI is on the third column,
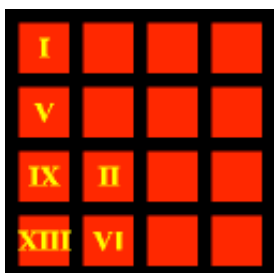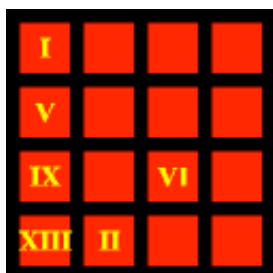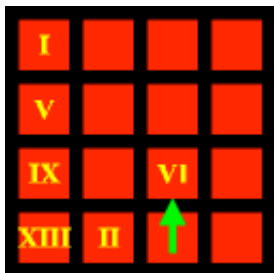then **repeat** the move until **tile V**
is at the bottom of the third column...

C R C R

Now **repeat** the move until **tile II**
is at the bottom of the second column...

C M C M

Finally, do the move to get **tile VI**
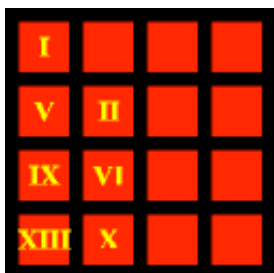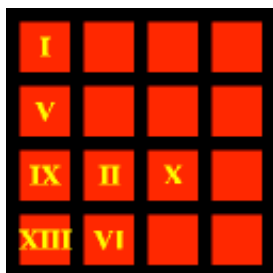*almost* to the bottom of the third
column...

R C R C

Once tiles II and VI are at the
set-up position, then do the move to get
both tiles together in the second column,
with **tile VI** directly below **tile II**...

M C M C

Use any of the the **NORMAL MOVES** to navigate
tile X *almost* to the bottom of the third column,
without disturbing the second column.

(If tile X is in the second column, use the same method as
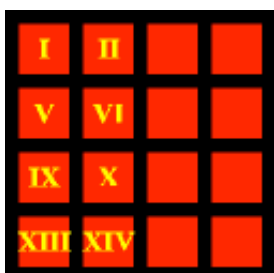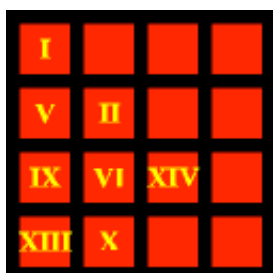before to get it to the third column at the set-up position.)

Do the move to get all three tiles
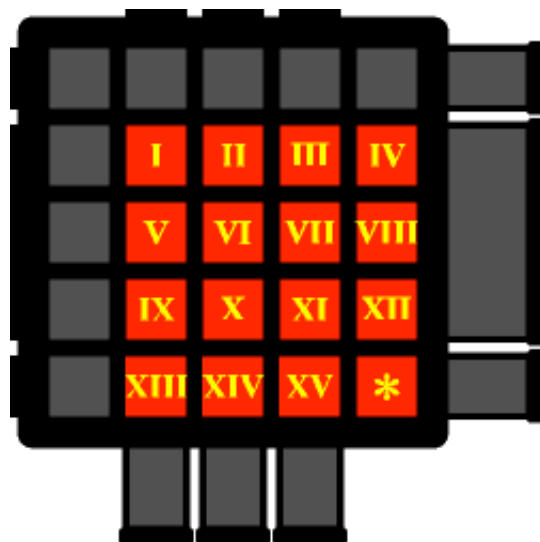together in the second column...

M C M C

Use any of the the **NORMAL MOVES** to navigate
tile XIV *almost* to the bottom of the third column,
without disturbing the second column.

(If tile XIV is in the second column, use the same method as
before to get it to the third column at the set-up position.)

Do the move to get all four tiles
together in the second column...

M C M C

[Next](#)

**@ Introduction/Notation @ Solve Columns 1 and 2
@ Solve Columns 3 and 4 @ Solve the Back Side**
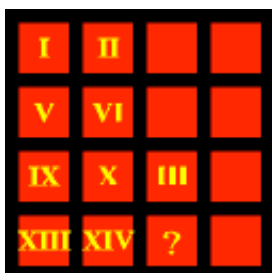
Return to Mathematica

Rubik's XV

An expanded version of Jaap Scherpuis' Solution

Solve Columns 3 and 4 of the Front Side

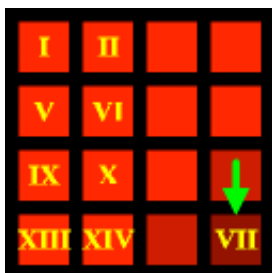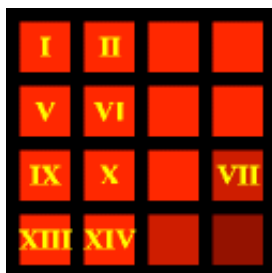## Solve the 3rd Column

**Link tile III
to tile VII:**

Repeat the move until **tile III** is anywhere in the third column (except the for bottom row)...

R C R C

If **tile VII** is directly below it, then tiles III and VII are *already linked*.

If tiles III and VII are *not linked*, then **repeat** the move until **tile VII** is *almost* on the bottom of the fourth column...
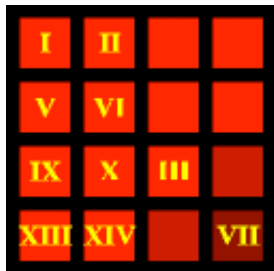
R C R C

Do the move to transfer tile VII into the **holding cell**...

B R C R
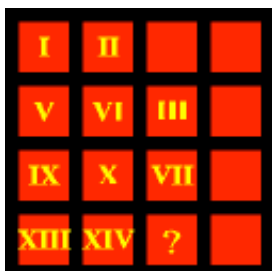**B R C R**

Repeat the move until tile III

Repeat the move until **tile III** is *almost* on the bottom of the thrid column...

C R C R

Now do the move to **link** tiles III and VII together...

B R C R
B R C R

Link tile VII to tile XI:

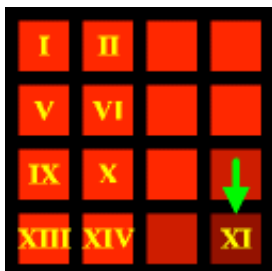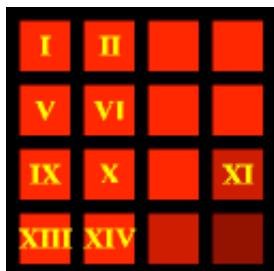**Repeat** the move until **tile VII** is anywhere in the third column (except for the bottom row)...

If **tile XI** is directly below it, then tiles VII and XI are *already linked*.
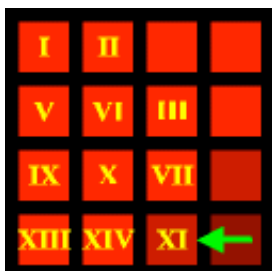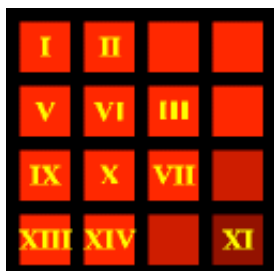
R C R C

If tiles VII and XI are *not linked*, then **repeat** the move until **tile XI** is *almost* on the bottom of the fourth column...

R C R C

Do the move to transfer tile XI into the **holding cell**...
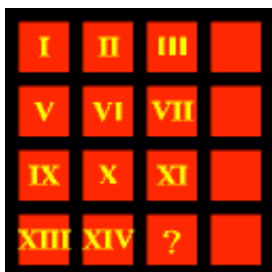
B R C R
B R C R

Repeat the move until **tile VII** is *almost* on the bottom of the thrid column...

C R C R

Now do the move to **link** tiles VII and XI together...
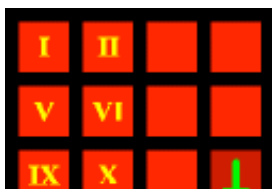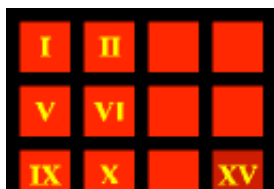
B R C R
B R C R

Link tile XI to tile XV:

Repeat the move until **tile XI** is anywhere in the third column (except for the bottom row)...

If **tile XV** is directly below it, then tiles XI and XV are *already linked*.

R C R C

If tiles XI and XV are *not linked*, then **repeat** the move until **tile XV** is *almost* on the bottom of the fourth column...

R C R C

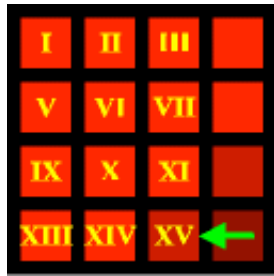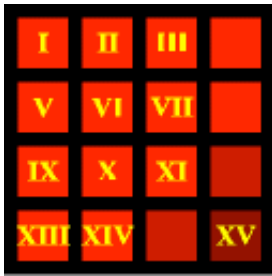**B R C R**

Do the move to transfer tile XV into the **holding cell**...

B R C R

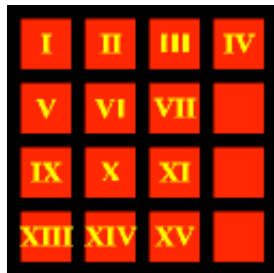**Repeat** the move until **tile XI** is *almost* on the bottom of the thrid column...

C R C R

Now do the move to **link** tiles XI and XV together...
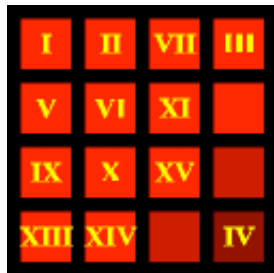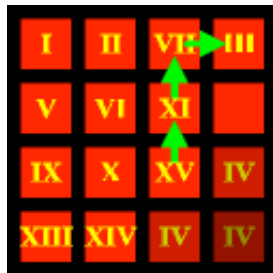
B R C R
B R C R

Solve the 4th Column

Link tile IV to tile III:

Repeat the move until **tile III** is on top of the third column...

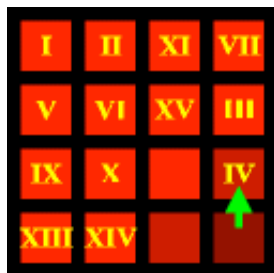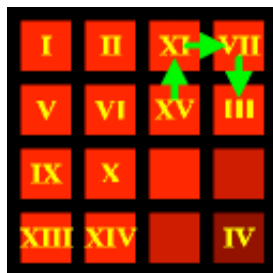If **tile IV** is on top of the fourth column, then tiles IV and III are *already linked*.

R C R C

If tiles IV and III are *not linked*, then do the move so that **tile XV** is *out* of the **danger zone**, while **tile IV** is *in* the **danger zone**...

R C R C

Repeat the move until **tile IV** is in the *holding cell*...
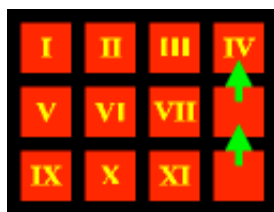
B R C R
B R C R

Do the move so that **tile III** is *almost* on top of the fourth column...

R C R C

Repeat the move until **tiles III and IV** are linked together...

B R C R
B R C R

Finish the last three tiles:

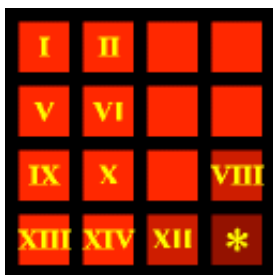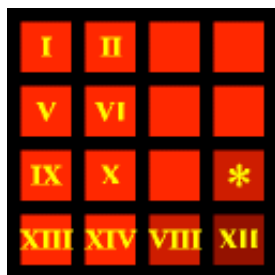**Repeat** the move until **tiles III and IV** are both on the top row...

Check to make sure that the third column is still *intact*, while **tile IV**

C R C R

is on top of the fourth column.
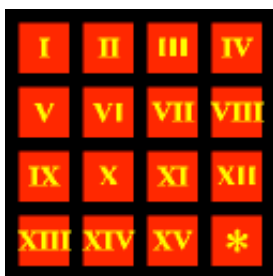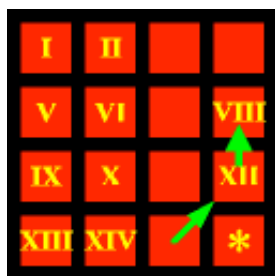
Do the move to get **tiles VIII, XII** and the **asterisk** into the *danger zone…*

R C R C

Repeat the move until the **asterisk** is in the *holding cell…*

B R C R
B R C R

Do the move to rotate **tiles VIII and XII** back to the fourth column...

C R C R

Now the fourth column is finished, along with the rest of the puzzle
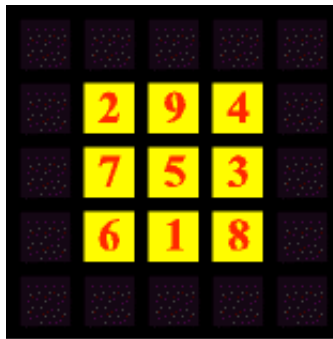
Next

Return to Mathematica
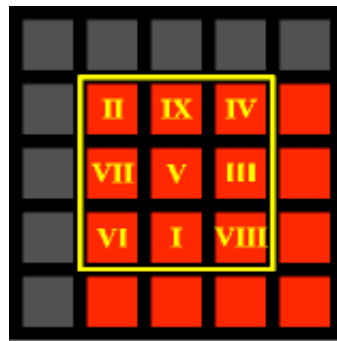
Rubik's XV

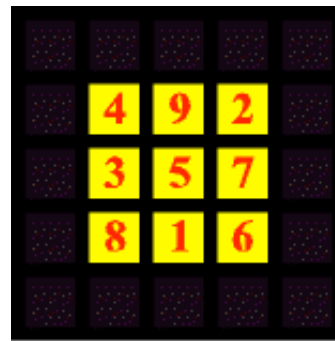### *An expanded version of Jaap Scherpuis' Solution*

Solve the Back Side

For the back side, you have to come up with a **magic sqaure**, where each row, column and diagonal add up to the same sum. In the example abouve, they each add up to 15, but you can use any other sum ranging from 12 to 36.

The 9 tiles that appear on the back are the same tiles that lie in the 9 **central squares** on the front. The yellow tiles (1 thru 15) have the same numbers as the red tiles (I thru XV) with the asterisk as zero.

**Magic Square,
front side solved**

**Magic Square,
back side solved**

*Note how the front and back sides are
mirror images of each other*

You must solve the puzzle from the front side, concentrating on those 9 central squares. But instead of solving the 1st column as **I, V, IX and XIII**, solve the 1st column as **II, VII, VI,** and any other tile. The same goes for the next two columns; solve the 2nd column as **IX-V-I-any** (instead of **II-VI-X-XIV**), and solve the 3rd column as **IV-III-VII-any** (instead of **III-VII-XI-XV**). Ignore the 4th column altogether.

Hint: Do not use place a tile on the bottom row that you may need for the magic square itself. If you do, then you'll have to dig it out later on.

So, use the exact same moves you used while solving the front side. In case you have to dig out a tile from the bottom row (without disturbing the Magic Square itself), use these *new* moves:

B MR C MR	**B R C R**
B MR C MR	**B R C R**
B LMR C LMR	**B MR C MR**
B LMR C LMR	**B MR C MR**

Visit **Jaap's XV page** to view all possible Magic Square combinations. While you're at it, go ahead and visit *all* of his pages for the entire Rubik's 90's collection:	• **Rubik's Fifteen** • **Rubik's Dice** • **Rubik's Triamid** • **Rubik's Tangle**

@ Introduction/Notation @ Solve Columns 1 and 2
@ Solve Columns 3 and 4 @ Solve the Back Side

Return to Mathematica

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