Czech Calendar Cube Design

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WebSites	http://www.mementoslangues.fr/	http://www.randelshofer.ch/

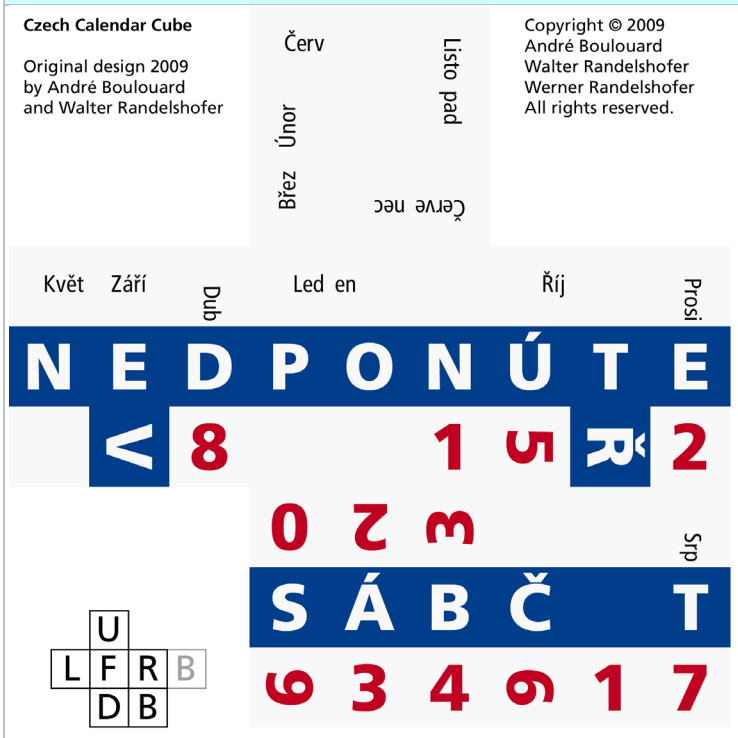
Introduction

The Magic Cube was invented in 1974 by Hungarian-born **Ernő Rubik** and was later called the **Rubik's Cube**. An English calendar cube was subsequently invented and calendar cubes have been designed in many other languages since then. A **Czech Calendar Cube** is a 3x3x3 **Rubik's Cube** used as a **Czech Calendar**. There are **virtual cubes** that can be *virtually* rotated and twisted on a computer screen and **real cubes** that can only be *physically* rotated and twisted by hand. A **texture** is laid down on a virtual cube whereas real **stickers** are laid down on a real cube. A Czech Calendar Cube is designed by placing letters, numerals and words on a texture which is then laid down on a virtual cube (see http://www.randelshofer.ch/).

Czech Language – Useful Links	
http://en.wikipedia.org/wiki/Czech_language	http://en.wikipedia.org/wiki/Czech_alphabet
http://en.wikipedia.org/wiki/Czech_months	http://www.unilang.org/wiki/index.php/Czech_days

The date of the day can be displayed on a *selected* cube face by rotating and twisting some parts of the cube. When this has been achieved, we say that the cube has been *solved*. The following example shows the *initial* state of the cube (Monday, January 01).

Virtual Czech Calendar Cube



Czech Calendar Cube Texture | Virtual Czech Calendar Cube

Design Particularities

Months are displayed on the top layer, weekdays on the middle layer and days on the bottom layer. The layout of the Czech Calendar Cube is similar to those of the Italian Calendar Cube designed by Gaetano Zumbo.

Czech Calendar Cube Design

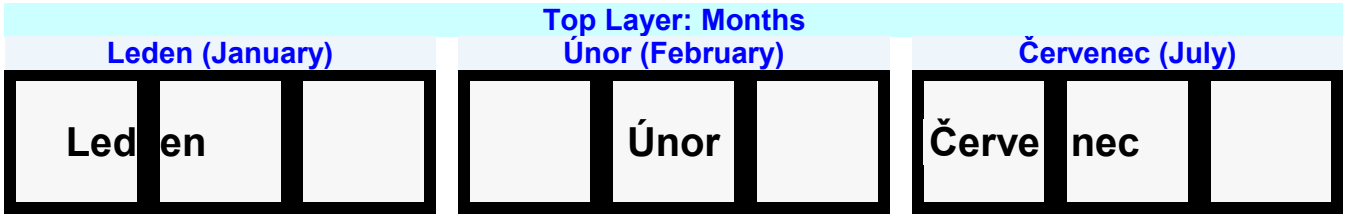
Czech Calendar

Czech Calendar						
Months				**Weekdays**		
English	**Czech**			**English**	**Czech**	
January	I	LEDen	Leden	Monday	PONdělí	Pondělí
February	II	ÚNOr	Únor	Tuesday	ÚTErý	Úterý
March	III	BŘEzen	Březen	Wednesday	STŘeda	Středa
April	IV	DUBen	Duben	Thursday	ČTVrtek	Čtvrtek
May	V	KVĚten	Květen	Friday	PÁTek	Pátek
June	VI	ČerVeN	Červen	Saturday	SOBota	Sobota
July	VII	ČerVeneC	Červenec	Sunday	NEDěle	Neděle
August	VIII	SRPen	Srpen			
September	IX	ZÁŘí	Září			
October	X	ŘÍJen	Říjen			
November	XI	LISTopad	Listopad			
December	XII	PROsinec	Prosinec			
Months	10 letters on left-hand corner cubes			L Ú B D K Č S **Z** Ř P		
	9 letters on edge cubes			E N Ř U V R Á Í I		
	11 letters on right-hand corner cubes			D O E B Ě **N** C P Ř J S		
Note 1: There are too many letters for displaying abbreviated month names on a 3x3x3 cube						
Weekdays	5 letters on left-hand edge cubes			P Ú S Č N		
	4 letters on center cubes			O T Á E		
	7 letters on right-hand edge cubes			N E Ř V T B D		
Note 2: Abbreviated weekday names can be displayed on a 3x3x3 cube						

Cube Layout

Months are displayed on **T**op **L**ayer, weekdays on **M**iddle **L**ayer and days on **B**ottom **L**ayer.

Top Layer Layout



Months on the **T**op **L**ayer are sorted out as follows:

1- 10 **T**op **L**eft month parts and 2 blanks on corner cubes: Led, Břez, Dub, Květ, Červ, Červe, Srp, Říj, Listo, Prosi, blank*, blank*
2- 2 **T**op **C**enter months, 3 month parts and 1 blank on edge cubes: Únor, Září, en, nec, pad, blank

Months and month parts are now combined on corner and edge cubes:

1- 4 **T**op **L**eft corner cubes: (Led,Břez,Dub), (Květ,Červ,Srp), (Červe,Říj,blank*), (Listo,Prosi,blank*)
2- 3 **T**op **C**enter edge cubes: (Únor,Září), (en,nec), (pad,blank)

* This ensures that there is at least 1 blank available at any time on a **T**op **R**ight corner cube for 10 months and that there are 2 blanks available **T**op **R**ight and **T**op **L**eft for months 'Únor' and 'Září'.

So, now there are 4 corner and 9 edge cubes left that can be used for the 2 remaining layers.

Middle Layer Layout

Weekdays on the **M**iddle **L**ayer are sorted out as follows:

1- 5 **M**iddle **L**eft letters on edge cubes: P, Ú, S, Č, N
2- 4 **M**iddle **C**enter letters on center cubes: O, T, Á, E
3- 7 **M**iddle **R**ight letters on edge cubes: N, E, Ř, V, T, B, D

Letters are now combined on edge cubes in order to display 3 abbreviated weekdays (PON, ÚTE and NED), respectively on faces F, R and L, in the initial state:

1- 6 edge cubes:
(P_**ML**, D_**MR**), (Ú_**ML**, N_**MR**), (S_**ML**, V_**MR**), (Č_**ML**, E_**MR**), (N_**ML**, T_**MR**), (B_**MR**, Ř_**MR**)

So, now there are 4 corner and 3 edge cubes left that can be used for the Bottom Layer.

Bottom Layer Layout

Days on the **B**ottom **L**ayer are sorted out as follows:

1- 2 **B**ottom **L**eft blanks on corner cubes: blank, blank
2- 3 **B**ottom **C**enter numbers and 1 bank on edge cubes: 1, 2, 3, blank
3- 10 **B**ottom **R**ight numbers on corner cubes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0

Numbers are now combined on corner and edge cubes:

1- 2 **B**ottom **C**enter edge cubes: (1,3), (2,blank)
2- 4 **B**ottom **R**ight corner cubes: (1,3,5), (2,4,6), (7,9,blank**), (8,0,blank**)

** This ensures that there is at least 1 blank available at any time on a **B**ottom **L**eft corner for any number displayed on a **B**ottom **R**ight corner.

And finally, there is 1 unused edge cube left…

Czech Calendar Cube – Layout Table		
Reading from Left to Right		
Top **L**eft – Corner cubes	**T**op **C**enter – Edge cubes	**T**op **R**ight – Corner cube
Led, Březˌ Dub, Květ, Červ, Červe, Srp, Říj, Listo, Prosi, blank	Únor, Září, en, nec, pad, blank	blank
Middle **L**eft – Edge cubes	**M**iddle **C**enter – Center cubes	**M**iddle **R**ight – Edge cubes
P, Úˌ S, Č, N	O, T, Á, E, blank	N, E, Řˌ V, T, B, D
Bottom **L**eft – Corner cube	**B**ottom **C**enter – Edge cubes	**B**ottom **R**ight – Corner cubes
blank	1, 2, 3, blank	1, 2, 3, 4, 5, 6, 7, 8, 9, 0

Numbered Cube Texture – 3x3x3 Cubes

Numbered Cube Texture

Virtual Numbered Cube

Czech Calendar Cube – Months							
Letters						Months	
Left	Numbering	Middle	Numbering	Right	Numbering	Month	Numbering
Led	0	en	1	b2	2	January	0
b45	45	Únor	21	b2	2	February	1
Březen	24	en	1	b2	2	March	2
Dub	29	en	1	b2	2	April	3
Květ	27	en	1	b2	2	May	4
Červ	18	en	1	b2	2	June	5
Červe	26	nec	25	b45	45	July	6
Srp	47	en	1	b2	2	August	7
b45	45	Září	28	b2	2	September	8
Říj	9	en	1	b45	45	October	9
Listo	20	pad	23	b2	2	November	10
Prosi	11	nec	25	b2	2	December	11

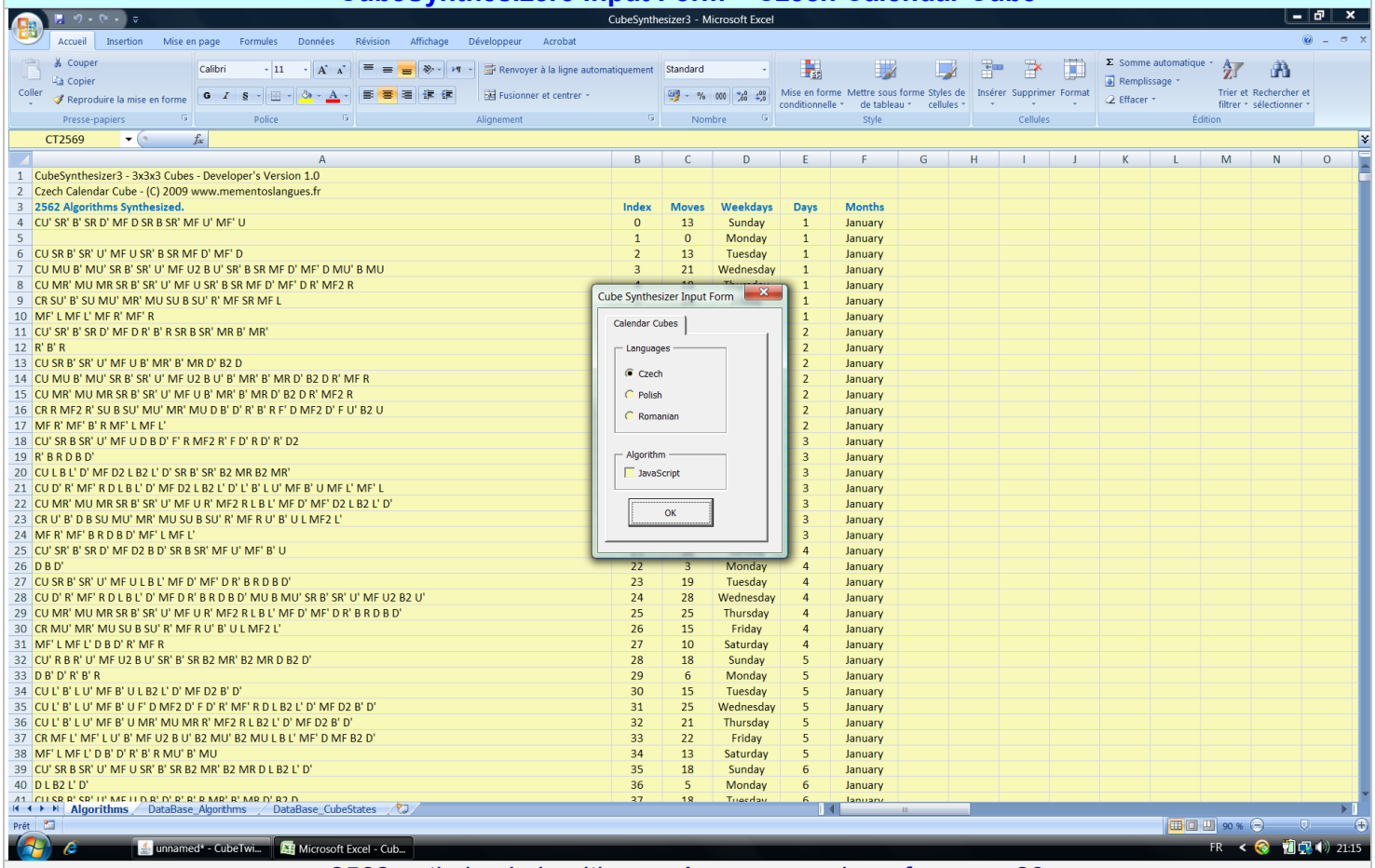
Czech Calendar Cube – Weekdays							
Letters						Weekdays	
Left	Numbering	Middle	Numbering	Right	Numbering	Weekday	Numbering
N	30	E	31	D	32	Sunday	0
P	3	O	4	N	5	Monday	1
Ú	12	T	13	E	14	Tuesday	2
S	39	T	13	Ř	16	Wednesday	3
Č	48	T	13	V	34	Thursday	4
P	3	Á	40	T	50	Friday	5
S	39	O	4	B	41	Saturday	6

Note 1: Weekday numbering begins with Sunday (for compatibility with JavaScript)

Czech Calendar Cube – Days							
Left	Numbering	Middle	Numbering	Right	Numbering	Day	Numbering
b6	6	b7	7	1	8	1	1
b6	6	b7	7	2	17	2	2
b6	6	b7	7	3	38	3	3
b6	6	b7	7	4	44	4	4
b6	6	b7	7	5	15	5	5
b6	6	b7	7	6	51	6	6
b6	6	b7	7	7	53	7	7
b33	33	b7	7	8	35	8	8
b6	6	b7	7	9	42	9	9
b33	33	1	52	0	36	10	10
b6	6	1	52	1	8	11	11
b6	6	1	52	2	17	12	12
b6	6	1	52	3	38	13	13
b6	6	1	52	4	44	14	14
b6	6	1	52	5	15	15	15
b6	6	1	52	6	51	16	16
b6	6	1	52	7	53	17	17
b33	33	1	52	8	35	18	18
b6	6	1	52	9	42	19	19
b33	33	2	37	0	36	20	20
b6	6	2	37	1	8	21	21
b6	6	2	37	2	17	22	22
b6	6	2	37	3	38	23	23
b6	6	2	37	4	44	24	24
b6	6	2	37	5	15	25	25
b6	6	2	37	6	51	26	26
b6	6	2	37	7	53	27	27
b33	33	2	37	8	35	28	28
b6	6	2	37	9	42	29	29
b33	33	3	43	0	36	30	30
b6	6	3	43	1	8	31	31

Note 2: Blank b6 is used with numbers (1,2,3,4,5,6,7,9), whereas blank b33 is used with numbers (0,8)

CubeSynthesizer3 Input Form – Czech Calendar Cube



2562 optimized algorithms – Average number of moves: 20

Synthesized Algorithms – Czech Calendar Cube

Tuesday, July 14

Saturday, August 15

Synthesized Algorithms

Tuesday, July 14	CU L B L' MF' D MF D' R' B R D B D' L' B L U B U2 MF2 B U R B R'
Saturday, August 15	MF R' MF' R MR' B2 MR D B' D' R' B' R MF' L MF L' U B2 U'

Czech Calendar Cube: Excel/VBA Code as used in CubeSynthesizer3

```
Sub mapCzechCalendarCube()

    'This Sub will map the Czech Calendar Cube

    'Initializing arrays

    'Top Layer: Months

    months(0, 0) = 0
    months(0, 1) = 1
    months(0, 2) = 2

    months(1, 0) = 45
    months(1, 1) = 21
    months(1, 2) = 2

    months(2, 0) = 24
    months(2, 1) = 1
    months(2, 2) = 2

    months(3, 0) = 29
    months(3, 1) = 1
    months(3, 2) = 2

    months(4, 0) = 27
    months(4, 1) = 1
    months(4, 2) = 2

    months(5, 0) = 18
    months(5, 1) = 1
    months(5, 2) = 2

    months(6, 0) = 26
    months(6, 1) = 25
    months(6, 2) = 45

    months(7, 0) = 47
    months(7, 1) = 1
    months(7, 2) = 2

    months(8, 0) = 45
    months(8, 1) = 28
    months(8, 2) = 2

    months(9, 0) = 9
    months(9, 1) = 1
    months(9, 2) = 45

    months(10, 0) = 20
    months(10, 1) = 23
    months(10, 2) = 2

    months(11, 0) = 11
    months(11, 1) = 25
    months(11, 2) = 2

    'Middle Layer: Weekdays

    weekdays(0, 0) = 30
    weekdays(0, 1) = 31
    weekdays(0, 2) = 32
```

weekdays(1, 0) = 3
weekdays(1, 1) = 4
weekdays(1, 2) = 5

weekdays(2, 0) = 12
weekdays(2, 1) = 13
weekdays(2, 2) = 14

weekdays(3, 0) = 39
weekdays(3, 1) = 13
weekdays(3, 2) = 16

weekdays(4, 0) = 48
weekdays(4, 1) = 13
weekdays(4, 2) = 34

weekdays(5, 0) = 3
weekdays(5, 1) = 40
weekdays(5, 2) = 50

weekdays(6, 0) = 39
weekdays(6, 1) = 4
weekdays(6, 2) = 41

'Bottom Layer: Days

days(1, 0) = 6
days(1, 1) = 7
days(1, 2) = 8

days(2, 0) = 6
days(2, 1) = 7
days(2, 2) = 17

days(3, 0) = 6
days(3, 1) = 7
days(3, 2) = 38

days(4, 0) = 6
days(4, 1) = 7
days(4, 2) = 44

days(5, 0) = 6
days(5, 1) = 7
days(5, 2) = 15

days(6, 0) = 6
days(6, 1) = 7
days(6, 2) = 51

days(7, 0) = 6
days(7, 1) = 7
days(7, 2) = 53

days(8, 0) = 33
days(8, 1) = 7
days(8, 2) = 35

days(9, 0) = 6
days(9, 1) = 7
days(9, 2) = 42

days(10, 0) = 33
days(10, 1) = 52
days(10, 2) = 36

days(11, 0) = 6
days(11, 1) = 52
days(11, 2) = 8

days(12, 0) = 6
days(12, 1) = 52
days(12, 2) = 17

days(13, 0) = 6
days(13, 1) = 52
days(13, 2) = 38

days(14, 0) = 6
days(14, 1) = 52
days(14, 2) = 44

days(15, 0) = 6
days(15, 1) = 52
days(15, 2) = 15

days(16, 0) = 6
days(16, 1) = 52
days(16, 2) = 51

days(17, 0) = 6
days(17, 1) = 52
days(17, 2) = 53

days(18, 0) = 33
days(18, 1) = 52
days(18, 2) = 35

days(19, 0) = 6
days(19, 1) = 52
days(19, 2) = 42

days(20, 0) = 33
days(20, 1) = 37
days(20, 2) = 36

days(21, 0) = 6
days(21, 1) = 37
days(21, 2) = 8

days(22, 0) = 6
days(22, 1) = 37
days(22, 2) = 17

days(23, 0) = 6
days(23, 1) = 37
days(23, 2) = 38

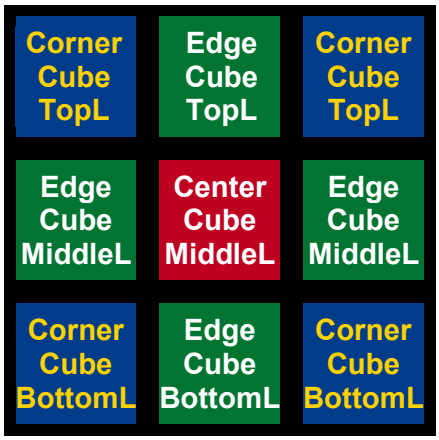
days(24, 0) = 6
days(24, 1) = 37
days(24, 2) = 44

days(25, 0) = 6
days(25, 1) = 37
days(25, 2) = 15

```
    days(26, 0) = 6
    days(26, 1) = 37
    days(26, 2) = 51

    days(27, 0) = 6
    days(27, 1) = 37
    days(27, 2) = 53

    days(28, 0) = 33
    days(28, 1) = 37
    days(28, 2) = 35

    days(29, 0) = 6
    days(29, 1) = 37
    days(29, 2) = 42

    days(30, 0) = 33
    days(30, 1) = 43
    days(30, 2) = 36

    days(31, 0) = 6
    days(31, 1) = 43
    days(31, 2) = 8

    'Initializing facelets
    'Months on Top Layer

    frontFaceStickers(0) = months(month, 0)
    frontFaceStickers(1) = months(month, 1)
    frontFaceStickers(2) = months(month, 2)

    'Weekdays on Middle Layer

    frontFaceStickers(3) = weekdays(weekday, 0)
    frontFaceStickers(4) = weekdays(weekday, 1)
    frontFaceStickers(5) = weekdays(weekday, 2)

    'Days on Bottom Layer

    frontFaceStickers(6) = days(day, 0)
    frontFaceStickers(7) = days(day, 1)
    frontFaceStickers(8) = days(day, 2)

    'Center facelet orientation: 0 (0°), 1 (270°), 2 (180°), 3 (90°)

    centerOrientation = 0

End Sub
```

Terminology

In a 3x3x3 **Rubik's Cube**, there are 8 *Corner Cubes*, 12 *Edge Cubes*, 6 *Center Cubes* and 6 *Cube Faces*. There are also 4 Corner Cube faces, 4 Edge Cube faces and 1 Center Cube face *per Cube Face*, as shown below.



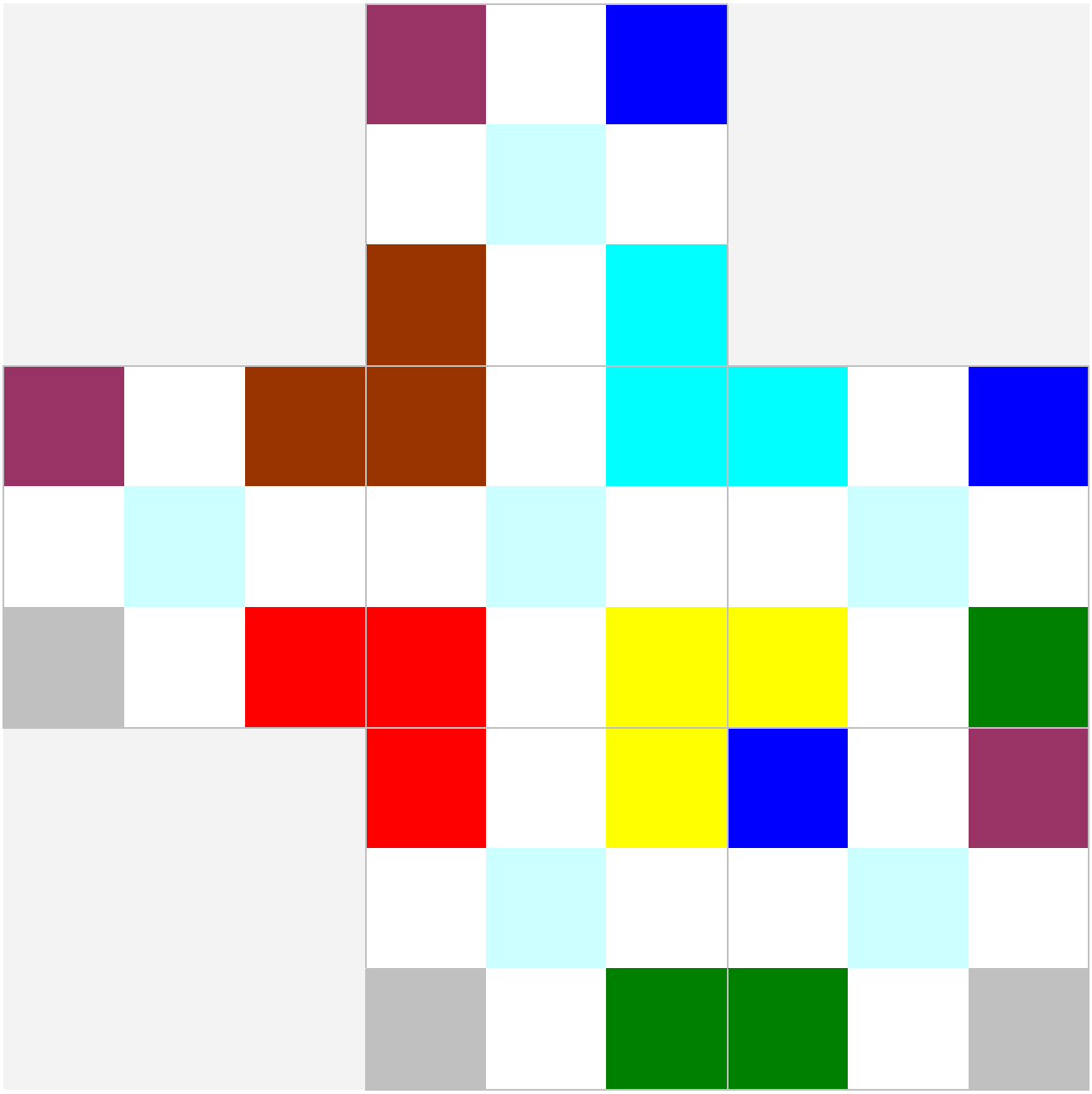
There are 1 face per Center Cube, 2 faces per Edge Cube and 3 faces per Corner Cube.

There are also 3 horizontal *Layers* called *Top*, *Middle* and *Bottom Layers*.

Cube Lexicon		
English	**Français**	**Deutsch**
Cube	Cube	Würfel
cubie, cube	cube, petit cube	Würfelteil, Teil des Würfels
face	face	Seite, Seitenfläche
front face	face avant	vordere Seite, vorne
back face	face arrière	hintere Seite, hinten
left face	face gauche	linke Seite, links
right face	face droite	rechte Seite, rechts
top face	face supérieure	obere Seite, oben
bottom face	face inférieure	untere Seite, unten
sticker	étiquette (autocollante), plaquette	Kleber, Farbkleber
tile	tuile, plaquette	Plättchen, Farbplättchen
center cube, center	cube central, centre	Mittelwürfel, Mittelstein, Mitte
edge cube, edge	cube-arête, arête	Kantenwürfel, Kantenstein, Kante
corner cube, corner	cube de coin, coin	Eckwürfel, Eckstein, Ecke
layer	couronne	Schicht, Scheibe
top layer	couronne supérieure	obere Schicht, obere Scheibe
middle layer	couronne intermédiaire	mittlere Schicht, mittlere Scheibe, Mittelschicht, Mittelscheibe
bottom layer	couronne inférieure	untere Schicht, untere Scheibe
orientation, direction	orientation	Orientierung
to solve	résoudre	lösen, zusammen drehen
to twist	pivoter	drehen
to rotate	tourner, effectuer une rotation	drehen
clockwise	dans le sens horaire	im Uhrzeigersinn
anticlockwise, counter-clockwise	dans le sens anti-horaire	im Gegenuhrzeigersinn

Corner Cubes Final Check

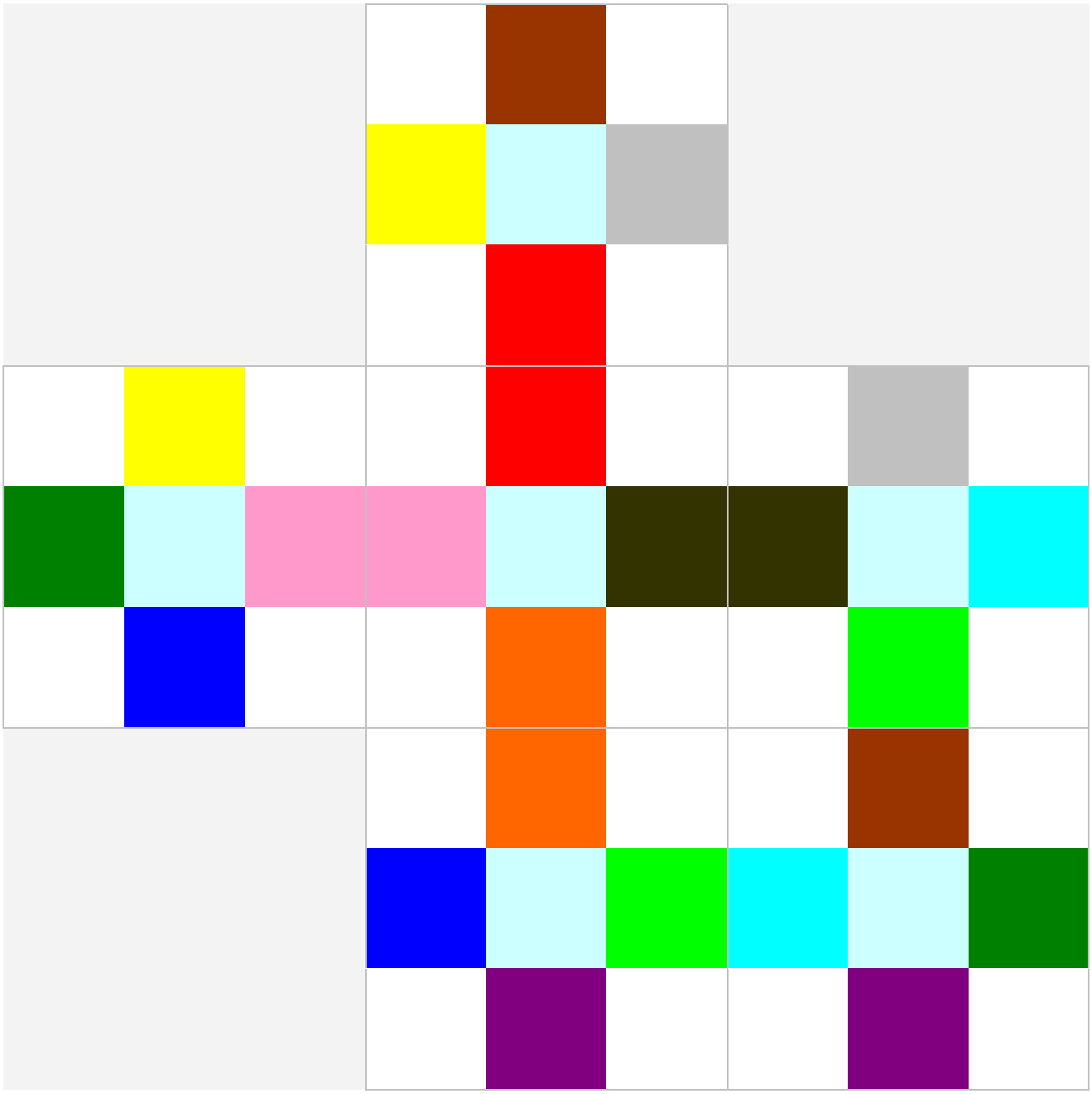
There are 8 Corner Cubes and 3 faces per Corner Cube. In the diagram below, each Corner Cube is displayed in 8 different colors and with the same color applied to each of its 3 faces. This diagram can be used as a convenient *visual aid* to check Design Rules (DRC).



	Up		
Left	**F**ront	**R**ight	Back
	Down	**B**ack	

Edge Cubes Final Check

There are 12 Edge Cubes and 2 faces per Edge Cube. In the diagram below, each Edge Cube is displayed in 12 different colors and with the same color applied to each of its 2 faces. This diagram can be used as a convenient *visual aid* to check Design Rules (DRC).



	Up		
Left	**F**ront	**R**ight	Back
	Down	**B**ack	

Texture Template

This is a texture template that can be printed out and used for writing down numbers and letters by hand *prior to* texture design. All is needed are pencil, rubber…and time.