

Face	R (x)	L (-x)	U (y)	D (-y)	F (z)	B (-z)
	0	1	2	3	4	5
R (Cx)	0	1	4	5	3	2
U (Cy)	5	4	2	3	0	1
F (Cz)	2	3	1	0	4	5

One may represent the elements of the cubic group as S6 permutations. Number the faces 0 thru 5. Then rotations of the cube may be represented as permutations listing how the rotations swap the faces around. The composition of two rotations is found by permutation multiplication. The group elements may also be represented with 3x3 transform matrixes of the coordinate axes.: Composition is via matrix multiplication,

List 0h Symmetries

Symtag: 0

E

key: @" x, y, z"

Matrix Representation T1u

I 1, 0, 0l
I 0, 1, 0l
I 0, 0, 1l

Symtag: 1

C_{2x}

key: @" x,-y,-z"

Matrix Representation T1u

I 1, 0, 0l
I 0,-1, 0l
I 0, 0,-1l

Symtag: 2

C_{2y}

key: @"-x, y,-z"

Matrix Representation T1u

I-1, 0, 0l
I 0, 1, 0l
I 0, 0,-1l

Symtag: 3

C_{2z}

key: @"-x,-y, z"

Matrix Representation T1u

I-1, 0, 0l
I 0,-1, 0l
I 0, 0, 1l

Symtag: 4

C_{3xyz}

key: @" y, z, x"

Matrix Representation T1u

I 0, 1, 0l
I 0, 0, 1l
I 1, 0, 0l

Symtag: 5

C_{3xyz}²

key: @" z, x, y"

Matrix Representation T1u

I 0, 0, 1l
I 1, 0, 0l
I 0, 1, 0l

Symtag: 6

C_{3x'y'z'}

key: @" y,-z,-x"

Matrix Representation T1u

I 0, 1, 0l
I 0, 0,-1l
I-1, 0, 0l

Symtag: 7

C_{3x'y'z'}²

key: @"-z, x,-y"

Matrix Representation T1u

I 0, 0,-1l
I 1, 0, 0l
I 0,-1, 0l

Symtag: 8

C_{3x'y'z'}

key: @"-y,-z, x"

Matrix Representation T1u

I 0,-1, 0l
I 0, 0,-1l
I 1, 0, 0l

Symtag: 9

C_{3x'y'z'}²

key: @" z,-x,-y"

Matrix Representation T1u

I 0, 0, 1l
I-1, 0, 0l
I 0,-1, 0l

Symtag: 10
 $C_{3xy'z'}$
key: @"-y, z,-x"
Matrix Representation T1u
| 0,-1, 0|
| 0, 0, 1|
|-1, 0, 0|

Symtag: 11
 $C_{3xy'z'}^2$
key: @"-z,-x, y"
Matrix Representation T1u
| 0, 0,-1|
|-1, 0, 0|
| 0, 1, 0|

Symtag: 12
 C_{4x}
key: @"-x, z,-y"
Matrix Representation T1u
| 1, 0, 0|
| 0, 0, 1|
| 0,-1, 0|

Symtag: 13
 C_{4x}^3
key: @"-x,-z, y"
Matrix Representation T1u
| 1, 0, 0|
| 0, 0,-1|
| 0, 1, 0|

Symtag: 14
 C_{4y}
key: @"-z, y, x"
Matrix Representation T1u
| 0, 0,-1|
| 0, 1, 0|
| 1, 0, 0|

Symtag: 15
 C_{4y}^3
key: @"-z, y,-x"
Matrix Representation T1u
| 0, 0, 1|
| 0, 1, 0|
|-1, 0, 0|

Symtag: 16
 C_{4z}
key: @"-y,-x, z"
Matrix Representation T1u
| 0, 1, 0|
|-1, 0, 0|
| 0, 0, 1|

Symtag: 17
 C_{4z}^3
key: @"-y, x, z"
Matrix Representation T1u
| 0,-1, 0|
| 1, 0, 0|
| 0, 0, 1|

Symtag: 18
 C_{2xy}
key: @"-y, x,-z"
Matrix Representation T1u
| 0, 1, 0|
| 1, 0, 0|
| 0, 0,-1|

Symtag: 19
 C_{2xz}
key: @"-z,-y, x"
Matrix Representation T1u
| 0, 0, 1|
| 0,-1, 0|
| 1, 0, 0|

Symtag: 20
 C_{2yz}
key: @"-x, z, y"
Matrix Representation T1u
|-1, 0, 0|
| 0, 0, 1|
| 0, 1, 0|

Symtag: 21
 $C_{2yz'}$
key: @"-x,-z,-y"
Matrix Representation T1u
|-1, 0, 0|

$\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & -1 & 0 & 0 \end{pmatrix}$

Symtag: 22
 C_{2xy}
 key: @"-y,-x,-z"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$

Symtag: 23
 C_{2xz}
 key: @"-z,-y,-x"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 24
 $\sigma_{d_{yz}}$
 key: @" x, z, y"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 25
 $\sigma_{d_{yz}}$
 key: @" x,-z,-y"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & -1 & 0 & 0 \end{pmatrix}$

Symtag: 26
 $\sigma_{d_{xy}}$
 key: @" y, x, z"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 27
 $\sigma_{d_{xz}}$
 key: @" z, y, x"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$

Symtag: 28
 $\sigma_{d_{xy}}$
 key: @"-y,-x, z"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 29
 $\sigma_{d_{xz}}$
 key: @"-z, y,-x"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$

Symtag: 30
 S_{4x}
 key: @"-x, z,-y"
 Matrix Representation T1u
 $\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$

Symtag: 31
 S_{4x}^3
 key: @"-x,-z, y"
 Matrix Representation T1u
 $\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$

Symtag: 32
 S_{4y}
 key: @"-z,-y, x"
 Matrix Representation T1u
 $\begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$

Symtag: 33
 S_{4y}^3
 key: @" z,-y,-x"

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$

Symtag: 34

S_{4z}

key: @ⁿ y, x, zⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 1 & 0 \\ -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$

Symtag: 35

S^3_{4z}

key: @ⁿ y, x, zⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & -1 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$

Symtag: 36

i

key: @ⁿ x, y, zⁿ

Matrix Representation T1u

$\begin{pmatrix} -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$

Symtag: 37

σ_{h_x}

key: @ⁿ x, y, zⁿ

Matrix Representation T1u

$\begin{pmatrix} -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 38

σ_{h_y}

key: @ⁿ x, y, zⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Symtag: 39

σ_{h_z}

key: @ⁿ x, y, zⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$

Symtag: 40

S_{6xyz}

key: @ⁿ z, x, yⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 0 & -1 \\ -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \end{pmatrix}$

Symtag: 41

S^5_{6xyz}

key: @ⁿ y, z, xⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & -1 & 0 \\ 0 & 0 & -1 & 1 \\ -1 & 1 & 0 & 0 \end{pmatrix}$

Symtag: 42

$S_{6xy'z'}$

key: @ⁿ z, x, yⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & -1 & 0 & 1 \end{pmatrix}$

Symtag: 43

$S^5_{6xy'z'}$

key: @ⁿ y, z, xⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 0 & -1 & 1 \\ 1 & 1 & 0 & 0 \end{pmatrix}$

Symtag: 44

$S_{6x'yz}$

key: @ⁿ z, x, yⁿ

Matrix Representation T1u

$\begin{pmatrix} 1 & 0 & 0 & -1 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \end{pmatrix}$

Symtag: 45

S⁵_{6x'yz}
key: @ⁿ y, z, -xⁿ
Matrix Representation T1u
| 0, 1, 0|
| 0, 0, 1|
|-1, 0, 0|

Symtag: 46
S⁶_{6x'yz}
key: @ⁿ z, -x, yⁿ
Matrix Representation T1u
| 0, 0, 1|
|-1, 0, 0|
| 0, 1, 0|

Symtag: 47
S⁵_{6x'yz}
key: @ⁿ -y, z, xⁿ
Matrix Representation T1u
| 0, -1, 0|
| 0, 0, 1|
| 1, 0, 0|