

# **N-Dimensional Cubes**

By Peter Kučera

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## 0-Cube

### Vertices; Edges; Faces; Cell count for 0-Cube:

- Vertices count:	1
- Edges count:	0
- Faces count:	0
- Cells count:	0

### Solid values for 0-Cube:

- None

## 1-Cube

### Vertices; Edges; Faces; Cell count for 1-Cube:

- Vertices count:	2
- Edges count:	1
- Faces count:	0
- Cells count:	0

### Solid values for 1-Cube:

- Lenght:	$a$
- Lenght for lenght $a = 1$ :	1
- Lenght for lenght $a = 2$ :	2

## 2-Cube (Square)

### Vertices; Edges; Faces; Cell count for 2-Cube:

- Vertices count:	4
- Edges count:	4
- Faces count:	1
- Cells count:	0

### Solid values for 2-Cube:

- <b>Area:</b>	$a^2$
- Area for side length $a = 1$ :	1
- Area for side length $a = 2$ :	4
- <b>Perimeter:</b>	$4a$
- Perimeter for side length $a = 1$ :	4
- Perimeter for side length $a = 2$ :	8
- <b>Diagonal:</b>	$a\sqrt{2}$
- Diagonal for side length $a = 1$ :	$1\sqrt{2}$ ; 1,414214...
- Diagonal for side length $a = 2$ :	$2\sqrt{2}$ ; 2,828427...

### 3-Cube (Cube)

#### Vertices; Edges; Faces; Cell count for 3-Cube:

- Vertices count:	8
- Edges count:	12
- Faces count:	6
- Cells count:	1

#### Solid values for 3-Cube:

- <b>Volume:</b>	$a^3$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	8
- <b>Surface:</b>	$6a^2$
- Surface for side length $a = 1$ :	6
- Surface for side length $a = 2$ :	24
- <b>Diagonal:</b>	$a\sqrt{3}$
- Diagonal for side length $a = 1$ :	$1\sqrt{3}$ ; 1,732051...
- Diagonal for side length $a = 2$ :	$2\sqrt{3}$ ; 3,464102...

## 4-Cube (Hypercube)

### Vertices; Edges; Faces; Cell count for 4-Cube:

- Vertices count:	16
- Edges count:	32
- Faces count:	24
- Cells count:	8

### Solid values for 4-Cube:

- <b>Volume:</b>	$a^4$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	16
- <b>Surface:</b>	$8a^3$
- Surface for side length $a = 1$ :	8
- Surface for side length $a = 2$ :	64
- <b>Diagonal:</b>	$a\sqrt{4} \quad ; \quad 2a$
- Diagonal for side length $a = 1$ :	$1\sqrt{4} \quad ; \quad 2$
- Diagonal for side length $a = 2$ :	$2\sqrt{4} \quad ; \quad 4$

## 5-Cube

### Vertices; Edges; Faces; Cell count for 5-Cube:

- Vertices count:	32
- Edges count:	80
- Faces count:	80
- Cells count:	40

### Solid values for 5-Cube:

- <b>Volume:</b>	$a^5$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	32
- <b>Surface:</b>	$10a^4$
- Surface for side length $a = 1$ :	10
- Surface for side length $a = 2$ :	160
- <b>Diagonal:</b>	$a\sqrt{5}$
- Diagonal for side length $a = 1$ :	$1\sqrt{5}$ ; 2,236068...
- Diagonal for side length $a = 2$ :	$2\sqrt{5}$ ; 4,472136...

## 6-Cube

### Vertices; Edges; Faces; Cell count for 6-Cube:

- Vertices count:	64
- Edges count:	192
- Faces count:	240
- Cells count:	160

### Solid values for 6-Cube:

- <b>Volume:</b>	$a^6$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	64
- <b>Surface:</b>	$12a^5$
- Surface for side length $a = 1$ :	12
- Surface for side length $a = 2$ :	384
- <b>Diagonal:</b>	$a\sqrt{6}$
- Diagonal for side length $a = 1$ :	$1\sqrt{6}$ ; 2,449490...
- Diagonal for side length $a = 2$ :	$2\sqrt{6}$ ; 4,898979...



## 7-Cube

### Vertices; Edges; Faces; Cell count for 7-Cube:

- Vertices count:	128
- Edges count:	448
- Faces count:	672
- Cells count:	560

### Solid values for 7-Cube:

- <b>Volume:</b>	$a^7$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	128
- <b>Surface:</b>	$14a^6$
- Surface for side length $a = 1$ :	14
- Surface for side length $a = 2$ :	896
- <b>Diagonal:</b>	$a\sqrt{7}$
- Diagonal for side length $a = 1$ :	$1\sqrt{7}$ ; 2,645751...
- Diagonal for side length $a = 2$ :	$2\sqrt{7}$ ; 5,291503...

## 8-Cube

### Vertices; Edges; Faces; Cell count for 8-Cube:

- Vertices count:	256
- Edges count:	1024
- Faces count:	1792
- Cells count:	1792

### Solid values for 8-Cube:

- <b>Volume:</b>	$a^8$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	256
- <b>Surface:</b>	$16a^7$
- Surface for side length $a = 1$ :	16
- Surface for side length $a = 2$ :	2048
- <b>Diagonal:</b>	$a\sqrt{8}$
- Diagonal for side length $a = 1$ :	$1\sqrt{8}$ ; 2,828427...
- Diagonal for side length $a = 2$ :	$2\sqrt{8}$ ; 5,656854...

## 9-Cube

### Vertices; Edges; Faces; Cell count for 9-Cube:

- Vertices count:	512
- Edges count:	2304
- Faces count:	4608
- Cells count:	5376

### Solid values for 9-Cube:

- <b>Volume:</b>	$a^9$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	512
- <b>Surface:</b>	$18a^8$
- Surface for side length $a = 1$ :	18
- Surface for side length $a = 2$ :	4608
- <b>Diagonal:</b>	$a\sqrt{9} \quad ; \quad 3a$
- Diagonal for side length $a = 1$ :	$1\sqrt{9} \quad ; \quad 3$
- Diagonal for side length $a = 2$ :	$2\sqrt{9} \quad ; \quad 6$

## 10-Cube

### Vertices; Edges; Faces; Cell count for 10-Cube:

- Vertices count:	1024
- Edges count:	5120
- Faces count:	11520
- Cells count:	15360

### Solid values for 10-Cube:

- <b>Volume:</b>	$a^{10}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	1024
- <b>Surface:</b>	$20a^9$
- Surface for side length $a = 1$ :	20
- Surface for side length $a = 2$ :	10240
- <b>Diagonal:</b>	$a\sqrt{10}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{10}$ ; 3,162278...
- Diagonalfor side length $a = 2$ :	$2\sqrt{10}$ ; 6,324555...

## 11-Cube

### Vertices; Edges; Faces; Cell count for 11-Cube:

- Vertices count:	2048
- Edges count:	11264
- Faces count:	28160
- Cells count:	42240

### Solid values for 11-Cube:

- <b>Volume:</b>	$a^{11}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	2048
- <b>Surface:</b>	$22a^{10}$
- Surface for side length $a = 1$ :	22
- Surface for side length $a = 2$ :	22528
- <b>Diagonal:</b>	$a\sqrt{11}$
- Diagonal for side length $a = 1$ :	$1\sqrt{11}$ ; 3,316625...
- Diagonal for side length $a = 2$ :	$2\sqrt{11}$ ; 6,633250...

## 12-Cube

### Vertices; Edges; Faces; Cell count for 12-Cube:

- Vertices count:	4096
- Edges count:	24576
- Faces count:	67584
- Cells count:	112640

### Solid values for 12-Cube:

- <b>Volume:</b>	$a^{12}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	4096
- <b>Surface:</b>	$24a^{11}$
- Surface for side length $a = 1$ :	24
- Surface for side length $a = 2$ :	49152
- <b>Diagonal:</b>	$a\sqrt{12}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{12}$ ; 3,464102...
- Diagonalfor side length $a = 2$ :	$2\sqrt{12}$ ; 6,928203...

## 13-Cube

### Vertices; Edges; Faces; Cell count for 13-Cube:

- Vertices count:	8192
- Edges count:	53248
- Faces count:	159744
- Cells count:	292864

### Solid values for 13-Cube:

- <b>Volume:</b>	$a^{13}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	8192
- <b>Surface:</b>	$26a^{12}$
- Surface for side length $a = 1$ :	26
- Surface for side length $a = 2$ :	106496
- <b>Diagonal:</b>	$a\sqrt{13}$
- Diagonal for side length $a = 1$ :	$1\sqrt{13}$ ; 3,605551...
- Diagonal for side length $a = 2$ :	$2\sqrt{13}$ ; 7,211103...

## 14-Cube

### Vertices; Edges; Faces; Cell count for 14-Cube:

- Vertices count:	16384
- Edges count:	114688
- Faces count:	372736
- Cells count:	745472

### Solid values for 14-Cube:

- <b>Volume:</b>	$a^{14}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	16384
- <b>Surface:</b>	$28a^{13}$
- Surface for side length $a = 1$ :	28
- Surface for side length $a = 2$ :	229376
- <b>Diagonal:</b>	$a\sqrt{14}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{14}$ ; 3,741657...
- Diagonalfor side length $a = 2$ :	$2\sqrt{14}$ ; 7,483315...



## 15-Cube

### Vertices; Edges; Faces; Cell count for 15-Cube:

- Vertices count:	32768
- Edges count:	245760
- Faces count:	860160
- Cells count:	1863680

### Solid values for 15-Cube:

- <b>Volume:</b>	$a^{15}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	32768
- <b>Surface:</b>	$30a^{14}$
- Surface for side length $a = 1$ :	30
- Surface for side length $a = 2$ :	491520
- <b>Diagonal:</b>	$a\sqrt{15}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{15}$ ; 3,872983...
- Diagonalfor side length $a = 2$ :	$2\sqrt{15}$ ; 7,745967...

## 16-Cube

### Vertices; Edges; Faces; Cell count for 16-Cube:

- Vertices count:	65536
- Edges count:	524288
- Faces count:	1966080
- Cells count:	4587520

### Solid values for 16-Cube:

- <b>Volume:</b>	$a^{16}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	65536
- <b>Surface:</b>	$32a^{15}$
- Surface for side length $a = 1$ :	32
- Surface for side length $a = 2$ :	1048576
- <b>Diagonal:</b>	$a\sqrt{16} \quad ; \quad 4a$
- Diagonal for side length $a = 1$ :	$1\sqrt{16} \quad ; \quad 4$
- Diagonal for side length $a = 2$ :	$2\sqrt{16} \quad ; \quad 8$

## 17-Cube

### Vertices; Edges; Faces; Cell count for 17-Cube:

- Vertices count:	131072
- Edges count:	1114112
- Faces count:	4456448
- Cells count:	11141120

### Solid values for 17-Cube:

- <b>Volume:</b>	$a^{17}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	131072
- <b>Surface:</b>	$34a^{16}$
- Surface for side length $a = 1$ :	34
- Surface for side length $a = 2$ :	2228224
- <b>Diagonal:</b>	$a\sqrt{17}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{17}$ ; 4,123106...
- Diagonalfor side length $a = 2$ :	$2\sqrt{17}$ ; 8,246211...

## 18-Cube

### Vertices; Edges; Faces; Cell count for 18-Cube:

- Vertices count:	262144
- Edges count:	2359296
- Faces count:	10027008
- Cells count:	26738688

### Solid values for 18-Cube:

- <b>Volume:</b>	$a^{18}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	262144
- <b>Surface:</b>	$36a^{17}$
- Surface for side length $a = 1$ :	36
- Surface for side length $a = 2$ :	4718592
- <b>Diagonal:</b>	$a\sqrt{18}$
- Diagonal for side length $a = 1$ :	$1\sqrt{18}$ ; 4,242641...
- Diagonal for side length $a = 2$ :	$2\sqrt{18}$ ; 8,485281...

## 19-Cube

### Vertices; Edges; Faces; Cell count for 19-Cube:

- Vertices count:	524288
- Edges count:	4980736
- Faces count:	22413312
- Cells count:	63504384

### Solid values for 19-Cube:

- <b>Volume:</b>	$a^{19}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	524288
- <b>Surface:</b>	$38a^{18}$
- Surface for side length $a = 1$ :	38
- Surface for side length $a = 2$ :	9961472
- <b>Diagonal:</b>	$a\sqrt{19}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{19}$ ; 4,358899...
- Diagonalfor side length $a = 2$ :	$2\sqrt{19}$ ; 8,717798...

## 20-Cube

### Vertices; Edges; Faces; Cell count for 20-Cube:

- Vertices count:	1048576
- Edges count:	10485760
- Faces count:	49807360
- Cells count:	149422080

### Solid values for 20-Cube:

- <b>Volume:</b>	$a^{20}$
- Volume for side length $a = 1$ :	1
- Volume for side length $a = 2$ :	1048576
- <b>Surface:</b>	$40a^{19}$
- Surface for side length $a = 1$ :	40
- Surface for side length $a = 2$ :	20971520
- <b>Diagonal:</b>	$a\sqrt{20}$
- Diagonalfor side length $a = 1$ :	$1\sqrt{20}$ ; 4,472136...
- Diagonalfor side length $a = 2$ :	$2\sqrt{20}$ ; 8,944272...