

Catalog of “Cube of Cubes” scale divisions of the Euler Genus (3 5 7 9 11 13)

Warren Burt 2004

This catalog shows the dividing of the Euler Genus (3 5 7 9 11 13) into 8 x 8 matrices. Each 8 note scale is a result of taking three factors of the scale, making an 8 note scale out of them, and then transposing those on the 8 levels of the scale made with the remaining 3 factors. There are 10 ways of doing this, and the 10 charts in this catalog show how.

The second page of this document is a listing of the whole scale – all 64 notes of it.

The remaining pages are matrices of 8 note scales transposed 8 ways. All of these charts show different ways of dividing up the whole 64 note scale. These charts can be used to make 8 note subsets of the larger scale using a software sequencer and either the Scala scl or tun files which accompany this document.

In the charts, each pitch is represented in three ways.

First as a ratio, on top.

Second, in cents from 1/1 = 0c.

Third, as Scale degrees in the *Scala* files. Scale degrees in parentheses indicate pitches in a top octave.

Listing of all 64 pitches in Euler Genus (3 5 7 9 11 13) made with *Scala*

0:	1/1	0.000	unison, perfect prime
1:	2079/2048	26.009	
2:	65/64	26.841	13th-partial chroma
3:	135135/131072	52.850	
4:	33/32	53.273	undecimal comma, al-Farabi's 1/4-tone
5:	2145/2048	80.114	
6:	135/128	92.179	major chroma, major limma
7:	273/256	111.309	Ibn Sina's minor second
8:	35/32	155.140	septimal neutral second
9:	9009/8192	164.582	
10:	143/128	191.846	
11:	9/8	203.910	major whole tone
12:	1155/1024	208.413	
13:	585/512	230.751	
14:	297/256	257.183	
15:	19305/16384	284.024	
16:	2457/2048	315.219	
17:	77/64	320.144	
18:	39/32	342.483	39th harmonic, Zalzal wosta of Ibn Sina
19:	5005/4096	346.985	
20:	315/256	359.050	
21:	5/4	386.314	major third
22:	1287/1024	395.756	
23:	10395/8192	412.323	
24:	165/128	439.587	
25:	21/16	470.781	narrow fourth
26:	1365/1024	497.622	
27:	693/512	524.054	
28:	351/256	546.393	
29:	45045/32768	550.895	
30:	11/8	551.318	undecimal semi-augmented fourth
31:	715/512	578.159	
32:	45/32	590.224	diatonic tritone
33:	91/64	609.354	
34:	1485/1024	643.497	
35:	3003/2048	662.627	
36:	189/128	674.691	
37:	12285/8192	701.532	
38:	3/2	701.955	perfect fifth
39:	385/256	706.458	
40:	195/128	728.796	
41:	99/64	755.228	
42:	6435/4096	782.069	
43:	819/512	813.264	
44:	13/8	840.528	tridecimal neutral sixth
45:	105/64	857.095	septimal neutral sixth
46:	27027/16384	866.537	
47:	429/256	893.801	
48:	27/16	905.865	Pythagorean major sixth
49:	3465/2048	910.368	
50:	1755/1024	932.706	
51:	55/32	937.632	
52:	7/4	968.826	harmonic seventh
53:	455/256	995.667	
54:	231/128	1022.099	
55:	117/64	1044.438	
56:	15015/8192	1048.940	
57:	945/512	1061.005	
58:	15/8	1088.269	classic major seventh
59:	3861/2048	1097.711	
60:	495/256	1141.542	
61:	1001/512	1160.672	
62:	63/32	1172.736	octave - septimal comma
63:	4095/2048	1199.577	
64:	2/1	1200.000	octave

Euler Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.
 2: 3-5-9 vs 7-11-13

1/1	135/138	9/8	5/4	45/32	3/2	27/16	15/8
0	92.2	203.9	386.3	590.2	702.0	905.9	1088.3
0	6	11	21	32	38	48	58
143/128	19305/16384	1287/1024	715/512	6435/4096	429/256	3861/2048	2145/2048
191.8	284.0	395.8	578.2	782.1	893.8	1097.7	80.1
10	15	22	31	42	47	59	5 (69)
77/64	10395/8192	693/512	385/256	3465/2048	231/128	2079/2048	1155/1024
320.1	412.3	524.0	706.4	910.4	1022.1	26.0	208.4
17	23	27	39	49	54	1 (65)	12 (76)
11/8	1485/1024	99/64	55/32	495/256	33/32	297/256	165/128
551.3	643.5	755.2	937.6	1141.5	53.3	257.2	439.6
30	34	41	51	60	4 (68)	13 (78)	24 (88)
91/64	12285/8192	819/512	455/256	4095/2048	273/256	2457/2048	1365/1024
609.4	701.5	813.3	995.7	1199.6	111.3	315.2	497.6
33	37	43	53	63	7 (71)	16 (80)	26 (90)
13/8	1755/1024	117/64	65/64	585/512	39/32	351/256	195/128
840.5	932.7	1044.4	26.8	230.7	342.5	546.4	728.8
44	50	55	2 (66)	13 (77)	18 (82)	28 (92)	40 (104)
7/4	945/512	63/32	35/32	315/256	21/16	189/128	105/64
968.8	1061.0	1172.7	155.1	359.1	470.8	674.7	857.1
52	57	62	8 (72)	20 (84)	25 (89)	36 (100)	45 (109)
1001/512	135135/131072	9009/8192	5005/4096	45045/32768	3003/2048	27027/16384	15015/8192
1160.7	52.9	164.6	347.0	550.9	662.6	866.5	1048.9
61	3 (67)	9 (73)	19 (83)	29 (91)	35 (99)	46 (110)	56 (120)

Euler Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.
 3. 3-5-11 x 7-9-13

1/1	33/32	5/4	165/128	11/8	3/2	55/32	15/8
0	53.3	386.3	439.6	551.3	702.0	937.6	1088.3
0	8	21	24	30	38	51	58
9/8	297/256	45/32	1485/1024	99/64	27/16	495/256	135/128
203.9	257.2	590.2	643.5	755.2	905.8	1141.5	92.2
11	14	32	34	41	48	60	6 (70)
91/64	3003/2048	455/256	15015/8192	1001/512	273/256	5005/4096	1365/1024
609.4	662.6	995.7	1048.9	1160.7	111.3	347.0	497.6
33	35	53	56	61	7 (71)	19 (83)	26 (90)
819/512	27027/16384	4095/2048	135135/131072	9009/8192	2457/2048	45045/32768	12285/8192
813.3	866.5	1199.6	52.8	164.6	315.2	550.9	701.5
43	46	63	3 (67)	9 (73)	16 (80)	29 (93)	37 (101)
13/8	429/256	65/64	2145/2048	143/128	39/32	715/512	195/128
840.6	893.8	26.8	80.1	191.9	342.5	578.2	728.8
44	47	2 (66)	5 (69)	10 (74)	18 (82)	31 (95)	40 (104)
7/4	231/128	35/32	1155/1024	77/64	21/16	385/256	105/64
968.8	1022.1	155.1	208.4	320.1	470.8	706.5	857.1
52	54	8 (72)	12 (76)	17 (81)	25 (89)	39 (103)	45 (109)
117/64	3861/2048	585/512	19305/16384	1287/1024	351/256	6435/4096	1755/1024
1044.4	1097.7	230.8	284.0	395.8	546.4	782.1	932.7
55	59	13 (77)	15 (79)	22 (86)	28 (92)	42 (106)	50 (114)
63/32	2079/2048	315/256	10395/8192	693/512	189/128	3465/2048	945/512
1172.7	26.0	359.1	412.3	524.1	674.7	910.4	1061.0
62	1 (65)	20 (84)	23 (87)	27 (91)	36 (100)	49 (113)	57 (121)

Euler Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

4. 3-5-13 x 7-9-11

1/1	65/64	39/32	5/4	3/2	195/128	13/8	15/8
0	26.8	342.5	386.3	702.0	728.8	840.5	1088.3
0	2	18	21	38	40	44	58
9/8	585/512	351/256	45/32	27/16	1755/1024	117/64	135/128
203.9	230.8	546.4	590.2	905.9	932.7	1044.4	92.2
11	13	28	32	48	50	55	6 (70)
77/64	5005/4096	3003/2048	385/256	231/128	15015/8192	1001/512	1155/1024
320.1	347.0	662.6	706.5	1022.1	1048.9	1160.7	208.4
17	19	35	39	54	56	61	12 (76)
693/512	45045/32768	27027/16384	3465/2048	2079/2048	^{135135/131072}	9009/8192	10395/8192
524.1	550.9	866.5	910.4	26.0	52.9	164.6	412.3
27	29	46	49	1 (65)	3 (67)	9 (73)	23 (87)
11/8	715/512	429/256	55/32	33/32	2145/2048	143/128	165/128
551.3	578.2	893.8	937.6	53.3	80.1	191.8	439.6
30	31	47	51	4 (68)	5 (69)	10 (74)	24 (88)
99/64	6435/4096	3861/2048	495/256	297/256	19305/16384	1287/1024	1485/1024
755.2	782.1	1097.7	1141.5	257.2	284.0	395.8	643.5
41	42	59	60	14 (78)	15 (79)	22 (86)	34 (98)
7/4	455/256	273/256	35/32	21/16	1365/1024	91/64	105/64
968.8	995.7	111.3	155.1	470.8	497.6	609.4	857.1
52	53	7 (71)	8 (72)	25 (89)	26 (90)	33 (97)	45 (109)
63/32	4095/2048	2457/2048	315/256	189/128	12285/8192	819/512	945/512
1172.7	1199.6	315.2	359.1	674.7	701.5	813.3	1061.0
62	63	16 (80)	20 (84)	36 (100)	37 (101)	43 (107)	57 (121)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

5. 3-7-9 x 5-11-13

1/1	9/8	21/16	189/128	3/2	27/16	7/4	63/32
0	203.9	470.8	674.7	702.0	905.9	968.8	1172.7
0	11	25	36	37	48	52	62
65/64	585/512	1365/1024	12285/8192	195/128	1755/1024	455/256	4095/2048
26.8	230.8	497.6	701.5	728.8	932.7	995.7	1199.6
2	13	26	37	40	50	53	63
143/128	1287/1024	3003/2048	27027/16384	429/256	3861/2048	1001/512	9009/8192
191.8	395.8	662.6	866.5	893.8	1097.7	1160.7	164.6
10	22	35	46	47	59	61	9 (73)
5/4	45/32	105/64	945/512	15/8	135/128	35/32	315/256
386.3	590.2	857.1	1061.0	1088.3	92.2	155.1	359.1
21	32	45	57	58	6 (70)	8 (72)	20 (84)
11/8	99/64	231/128	2079/2048	33/32	297/256	77/64	693/512
551.3	755.2	1022.1	26.0	53.3	257.2	320.1	524.1
30	41	54	1 (65)	4 (68)	14 (78)	17 (81)	27 (91)
715/512	6435/4096	15015/8192	135135/131072	2145/2048	19305/16384	5005/4096	45045/32768
578.2	782.1	1048.9	52.8	80.1	284.0	347.0	550.9
31	42	56	3 (67)	5 (69)	15 (79)	19 (83)	29 (93)
13/8	117/64	273/256	2457/2048	39/32	351/256	91/64	819/512
840.5	1044.4	111.3	315.2	342.5	546.4	609.4	813.3
44	55	7 (71)	16 (80)	18 (82)	28 (92)	33 (97)	43 (107)
55/32	495/256	1155/1024	10395/8192	165/128	1485/1024	385/256	3465/2048
937.6	1141.6	208.4	412.3	439.6	643.5	706.5	910.4
51	60	12 (76)	23 (87)	24 (88)	34 (98)	39 (103)	49 (113)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

6. 3-7-11 x 5-9-13

1/1	33/32	77/64	21/16	11/8	3/2	7/4	231/128
0	53.3	320.1	470.8	551.3	702.0	968.8	1022.1
0	4	17	25	30	38	52	54
65/64	2145/2048	5005/4096	1365/1024	715/512	195/128	455/256	15015/8192
26.8	80.1	347.0	497.6	578.2	728.8	995.7	1048.9
2	5	19`	26	31	40	53	56
9/8	297/256	693/512	189/128	99/64	27/16	63/32	2079/2048
203.9	257.2	524.1	674.7	755.2	905.9	1172.7	26.0
11	14	27	36	41	48	62	1 (65)
585/512	19305/16384	45045/32768	12285/8192	6435/4096	1755/1024	4095/2048	135135/131072
230.8	284.0	550.9	701.5	782.1	932.7	1199.6	52.9
13	15	29	37	42	50	63	3 (67)
5/4	165/128	385/256	105/64	55/32	15/8	35/32	1155/1024
386.3	439.6	706.5	857.1	937.6	1088.3	155.1	208.4
21	24	39	45	51	58	8 (72)	12 (76)
45/32	1485/1024	3465/2048	945/512	495/256	135/128	315/256	10395/8192
590.2	643.5	910.4	1061.0	1141.5	92.2	359.1	412.3
32	34	49	57	60	6 (70)	20 (84)	23 (87)
13/8	429/256	1001/512	273/256	143/128	39/32	91/64	3003/2048
840.5	893.8	1160.7	111.3	191.8	342.5	609.4	662.6
44	47	61	7 (71)	10 (74)	18 (82)	33 (97)	35 (99)
117/64	3861/2048	9009/8192	2457/2048	1287/1024	351/256	819/512	27027/16384
1044.4	1097.7	164.6	315.2	395.8	546.4	813.3	866.5
55	59	9 (73)	16 (80)	22 (86)	28 (92)	43 (107)	46 (110)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

7: 3-7-13 x 5-9-11

1/1	273/256	39/32	21/16	91/64	3/2	13/8	7/4
0	111.3	342.5	470.8	609.4	702.0	840.5	968.8
0	7	18	25	33	38	44	52
9/8	2457/2048	351/256	189/128	819/512	27/16	117/64	63/32
203.9	315.2	546.4	674.7	813.3	905.9	1044.4	1172.7
11	16	28	36	43	48	55	62
5/4	1365/1024	195/128	105/64	455/256	15/8	65/64	35/32
386.3	497.6	728.8	857.1	995.7	1088.3	26.8	155.1
21	26	40	45	53	58	2 (66)	8 (72)
11/8	3003/2048	429/256	231/128	1001/512	33/32	143/128	77/64
551.3	662.6	893.8	1022.1	1160.7	53.3	191.8	320.1
30	35	47	54	61	4 (68)	10 (74)	17 (81)
45/32	12285/8192	1755/1024	945/512	4095/2048	135/128	585/512	315/256
590.2	701.5	932.7	1061.0	1199.6	92.2	230.8	359.1
32	37	50	57	63	6 (70)	13 (77)	20 (84)
99/64	27027/16384	3861/2048	2079/2048	9009/8192	297/256	1287/1024	693/512
755.2	866.5	1097.7	26.0	164.6	257.2	395.8	524.1
41	46	59	1 (65)	9 (73)	14 (78)	22 (86)	27 (91)
55/32	15015/8192	2145/2048	1155/1024	5005/4096	165/128	715/512	385/256
937.6	1048.9	80.1	208.4	347.0	439.6	578.2	706.5
51	56	5 (69)	12 (76)	19 (83)	24 (88)	31 (95)	39 (103)
495/256	135135/131072	19305/16384	10395/8192	45045/32768	1485/1024	6435/4096	3465/2048
1141.5	52.9	284.0	412.3	550.9	643.5	782.1	910.4
60	3 (67)	15 (79)	23 (87)	29 (93)	34 (98)	42 (106)	49 (113)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

8: 3-9-11 x 5-7-13

1/1	33/32	9/8	297/256	11/8	3/2	99/64	27/64
0	53.3	203.9	257.2	551.3	702.0	755.2	905.9
0	4	11	14	30	38	41	48
65/64	2145/2048	585/512	19305/16384	715/512	195/128	6435/4096	1755/1024
26.8	80.1	230.8	284.0	578.2	728.8	782.1	932.7
2	5	13	15	31	40	42	50
35/32	1155/1024	315/256	10395/8192	385/256	105/64	3465/2048	945/512
155.1	208.4	359.1	412.3	706.5	857.1	910.4	1061.0
8	12	20	23	39	45	49	57
5/4	165/128	45/32	1485/1024	55/32	15/8	495/256	135/128
386.3	439.6	590.2	643.5	937.6	1088.3	1141.5	92.2
21	24	32	34	51	58	60	6 (70)
91/64	3003/2048	819/512	27027/16384	1001/512	273/256	9009/8192	2457/2048
609.3	662.6	813.3	866.5	1160.7	111.3	164.6	315.2
33	35	43	46	57	7 (71)	9 (73)	16 (80)
13/8	429/256	117/64	3861/2048	143/128	39/32	1287/1024	351/256
840.5	893.8	1044.4	1097.7	191.8	342.5	395.8	546.4
44	47	55	59	10 (74)	18 (82)	22 (86)	28 (92)
7/4	231/128	63/32	2079/2048	77/64	21/16	693/512	189/128
968.9	1022.1	1172.7	26.0	320.1	470.8	524.1	674.7
52	54	62	1 (65)	17 (81)	25 (89)	27 (91)	36 (100)
455/256	15015/8192	4095/2048	135135/131072	5005/4096	1365/1024	45045/32768	12285/8192
995.7	1048.9	1199.6	52.9	347.0	497.6	550.9	701.5
53	56	63	3 (67)	19 (83)	26 (90)	29 (93)	37 (101)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.

9: 3-9-13 x 5-7-11

1/1	9/8	39/32	351/256	3/2	13/8	27/16	117/64
0	203.9	342.5	546.4	702.0	840.5	905.9	1044.4
0	11	18	28	38	44	48	55
35/32	315/256	1365/1024	12285/8192	105/64	455/256	945/512	4095/2048
155.1	359.1	497.6	701.5	857.1	995.7	1061.0	1199.6
8	20	26	37	45	53	57	63
77/64	693/512	3003/2048	27027/16384	231/128	1001/512	2079/2048	9009/8192
320.1	524.0	662.6	866.5	1022.1	1160.7	26.0	164.6
17	27	35	46	54	61	1 (65)	9 (73)
5/4	45/32	195/128	1755/1024	15/8	65/64	135/128	585/512
386.3	590.2	728.8	932.7	1088.3	26.8	92.2	230.8
21	32	40	50	58	2 (66)	6 (70)	13 (77)
11/8	99/64	429/256	3861/2048	33/32	143/128	297/256	1287/1024
551.3	755.2	893.8	1097.7	53.3	191.8	257.2	395.8
30	41	47	59	4 (68)	10 (74)	14 (78)	22 (86)
385/256	3465/2048	15015/8192	135135/131072	1155/1024	5005/4096	10395/8192	45045/32768
706.5	910.4	1048.9	52.9	208.4	347.0	412.3	550.9
39	49	55	3 (67)	12 (76)	19 (83)	23 (87)	29 (93)
55/32	495/256	2145/2048	19305/16384	165/128	715/512	1485/1024	6435/4096
937.6	1141.5	80.1	284.0	439.6	578.2	643.5	782.1
51	60	5 (69)	15 (79)	24 (88)	31 (95)	34 (98)	42 (106)
7/4	63/32	273/256	2457/2048	21/16	91/64	189/128	819/512
968.8	1172.7	111.3	315.2	470.8	609.4	674.7	813.3
52	62	7 (71)	16 (80)	25 (89)	33 (97)	36 (100)	43 (107)

Genus 3 5 7 9 11 13 as 8 Parallel 8 Note Scales with Scale Degrees 0 - 63 for Vaz.
 10: 3-11-13 x 5-7-9

1/1	33/32	143/128	39/32	11/8	3/2	13/8	429/256
0	53.3	191.9	342.5	551.3	702.0	840.5	893.8
0	4	10	18	30	38	44	47
35/32	1155/1024	5005/4096	1365/1024	385/256	105/64	455/256	15015/8192
155.1	208.4	347.0	497.6	706.5	857.1	995.7	1048.9
8	12	19	26	39	45	53	56
9/8	297/256	1287/1024	351/256	99/64	27/16	117/64	3861/2048
203.9	257.2	395.8	546.4	755.2	905.8	1044.4	1097.7
11	14	22	28	41	48	55	59
315/256	10395/8192	45045/32768	12285/8192	3465/2048	945/512	4095/2048	135135/131072
359.1	412.3	550.9	701.5	910.4	1061.0	1199.6	52.9
22	23	29	37	49	57	63	3 (67)
5/4	165/128	715/512	195/128	55/32	15/8	65/64	2145/2048
386.3	439.6	578.2	728.8	937.6	1088.3	26.8	80.1
21	24	31	40	51	58	2 (66)	5 (69)
45/32	1485/1024	6435/4096	1755/1024	495/256	135/128	585/512	19305/16384
590.2	643.5	782.1	932.7	1141.5	92.2	230.8	284.0
32	34	42	50	60	6 (70)	13 (77)	15 (79)
7/4	231/128	1001/512	273/256	77/64	21/16	91/64	3003/2048
968.8	1022.1	1160.7	111.3	320.1	470.8	609.4	662.6
52	54	61	7 (71)	17 (81)	25 (89)	33 (97)	35 (99)
63/32	2079/2048	9009/8192	2457/2048	693/512	189/128	819/512	27027/16384
1172.7	26.0	164.6	315.2	524.1	674.7	813.3	866.5
62	1 (65)	9 (73)	16 (80)	27 (91)	36 (100)	43 (107)	46 (110)