Physics of Music - Notes

Tuning

Frequencies for equal-tempered scale, $A_4 = 440 \text{ Hz}$

Other tuning choices, $A_4 =$

432 434 436 438 440 442 444 446

Speed of Sound = 345 m/s = 1130 ft/s = 770 miles/hrMore about Speed of Sound

("Middle C" is C₄)

Note	Frequency (Hz)	Wavelength (cm)
C_0	16.35	2109.89
$\boxed{\mathbf{C^{\#}_{0}/D^{b}_{0}}}$	17.32	1991.47
D_0	18.35	1879.69
$D^{\#}_{0}/E^{b}_{0}$	19.45	1774.20
E ₀	20.60	1674.62
F ₀	21.83	1580.63
F [#] ₀ /G ^b ₀	23.12	1491.91
G_0	24.50	1408.18
$\boxed{G^{\#}_{0}/A^{b}_{0}}$	25.96	1329.14
A ₀	27.50	1254.55
$A^{\#}_{0}/B^{b}_{0}$	29.14	1184.13
B_0	30.87	1117.67
C ₁	32.70	1054.94
C [#] 1/D ^b 1	34.65	995.73
D ₁	36.71	939.85
D#1/Eb1	38.89	887.10

E ₁	41.20	837.31
F ₁	43.65	790.31
F [#] ₁ /G ^b ₁	46.25	745.96
G ₁	49.00	704.09
$G^{\#}_{1}/A^{b}_{1}$	51.91	664.57
A ₁	55.00	627.27
$A^{\#}_{1}/B^{b}_{1}$	58.27	592.07
B ₁	61.74	558.84
C ₂	65.41	527.47
$C^{\#}_{2}/D^{b}_{2}$	69.30	497.87
D_2	73.42	469.92
$D^{\#}_{2}/E^{b}_{2}$	77.78	443.55
E ₂	82.41	418.65
F ₂	87.31	395.16
F [#] 2/G ^b 2	92.50	372.98
G ₂	98.00	352.04
$G^{\#}_{2}/A^{b}_{2}$	103.83	332.29
A ₂	110.00	313.64
$A^{\#}_{2}/B^{b}_{2}$	116.54	296.03
B ₂	123.47	279.42
C ₃	130.81	263.74
$C^{\#}_{3}/D^{b}_{3}$	138.59	248.93
D_3	146.83	234.96
$D^{\#}_{3}/E^{b}_{3}$	155.56	221.77
E ₃	164.81	209.33
F ₃	174.61	197.58
F#3/Gb3	185.00	186.49
G ₃	196.00	176.02
$G^{\#}_{3}/A^{b}_{3}$	207.65	166.14
A ₃	220.00	156.82

B ₃ 246.94 139.71 C ₄ 261.63 131.87 C [#] ₄ /D ^b ₄ 277.18 124.47 D ₄ 293.66 117.48 D [#] ₄ /E ^b ₄ 311.13 110.89 E ₄ 329.63 104.66 F ₄ 349.23 98.79 F [#] ₄ /G ^b ₄ 369.99 93.24 G ₄ 392.00 88.01 G [#] ₄ /A ^b ₄ 415.30 83.07 A ₄ 440.00 78.41 A [#] ₄ /B ^b ₄ 466.16 74.01 B ₄ 493.88 69.85 C ₅ 523.25 65.93 C [#] ₅ /D ^b ₅ 554.37 62.23 D ₅ 587.33 58.74 D [#] ₅ /E ^b ₅ 622.25 55.44 E ₅ 659.25 52.33 F ₅ 698.46 49.39 F [#] ₅ /G ^b ₅ 739.99 46.62 G ₅ 783.99 44.01 G [#] ₅ /A ^b ₅ 830.61 41.54	$A^{\#}_{3}/B^{b}_{3}$	233.08	148.02
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	B ₃	246.94	139.71
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	C ₄	261.63	131.87
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	C#4/Db4	277.18	124.47
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	D ₄	293.66	117.48
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	D#4/Eb4	311.13	110.89
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	E ₄	329.63	104.66
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	F ₄	349.23	98.79
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	F#4/Gb4	369.99	93.24
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		392.00	88.01
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	G#4/Ab4	415.30	83.07
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A ₄	440.00	78.41
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A#4/Bb4	466.16	74.01
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	B ₄	493.88	69.85
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	C ₅	523.25	65.93
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	C#5/Db5	554.37	62.23
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	D ₅	587.33	58.74
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	D#5/Eb5	622.25	55.44
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	E ₅	659.25	52.33
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	F ₅	698.46	49.39
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	F [#] ₅ /G ^b ₅	739.99	46.62
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	G ₅	783.99	44.01
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	G#5/Ab5	830.61	41.54
B_5 987.77 34.93 C_6 1046.50 32.97 $C^{\#}_6/D^b_6$ 1108.73 31.12 D_6 1174.66 29.37	A ₅	880.00	39.20
C_6 1046.50 32.97 $C_6^{\#}/D_6^{b}$ 1108.73 31.12 D_6 1174.66 29.37	A#5/Bb5	932.33	37.00
$ \begin{array}{c cccc} C^{\#}_{6}/D^{b}_{6} & 1108.73 & 31.12 \\ \hline D_{6} & 1174.66 & 29.37 \end{array} $		987.77	34.93
D ₆ 1174.66 29.37	C ₆	1046.50	32.97
, , , , , , , , , , , , , , , , , , ,	C#6/Db6	1108.73	31.12
D [#] ₆ /E ^b ₆ 1244.51 27.72	D ₆	1174.66	29.37
	D#6/Eb6	1244.51	27.72

E ₆	1318.51	26.17
F ₆	1396.91	24.70
F [#] ₆ /G ^b ₆	1479.98	23.31
G ₆	1567.98	22.00
G [#] 6/A ^b 6	1661.22	20.77
A ₆	1760.00	19.60
$A^{\#}_{6}/B^{b}_{6}$	1864.66	18.50
В ₆	1975.53	17.46
C ₇	2093.00	16.48
C#7/Db7	2217.46	15.56
D ₇	2349.32	14.69
D#7/Eb7	2489.02	13.86
E ₇	2637.02	13.08
F ₇	2793.83	12.35
F#7/Gb7	2959.96	11.66
G ₇	3135.96	11.00
G#7/Ab7	3322.44	10.38
A ₇	3520.00	9.80
A#7/Bb7	3729.31	9.25
B ₇	3951.07	8.73
C ₈	4186.01	8.24
C#8/Db8	4434.92	7.78
D ₈	4698.63	7.34
D#8/Eb8	4978.03	6.93
E ₈	5274.04	6.54
F ₈	5587.65	6.17
F#8/Gb8	5919.91	5.83
G ₈	6271.93	5.50
G#8/Ab8	6644.88	5.19
A ₈	7040.00	4.90

$\left[\begin{array}{c} A^{\#}_{8}/B^{b}_{8} \end{array}\right]$	7458.62	4.63
B ₈	7902.13	4.37

(To convert lengths in cm to inches, divide by 2.54)

More information on the equal tempered scale Equations used for this table

Questions/Comments to: suits@mtu.edu

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