025:250 COMPOSITION: ELECTRONIC MEDIA I

Calculating period from frequency, frequency from period, frequency from pitch name, and sample rate from interval of transposition.

Period from frequency

Example: If a sound has a frequency f of 625 Hz, what is its period T in milliseconds?

a) f = 625 Hz

b) T = (1/625 Hz) x 1000

c) T = 0.0016 x 1000

d) T = 1.6 ms

Frequency from period

Example: If a sound has a period T of 8 ms, what is its frequency f in Hertz?

a) T = 8 ms

b) f = 1/(8/1000) Hz

c) f = 1/(0.008) Hz

d) f = 125 Hz

Frequency from pitch name

Let C4 denote middle C and B3 denote B below middle C.
Let A4 have a frequency of 440 Hz.
Let A5 have a frequency of 440 x 2 Hz.
Let Bb4 have a frequency of 440 x 1.0595 Hz.

Example: What is the frequency f of Eb2?

a) f of A4 = 440 Hz

b) f of A1 = 440 Hz/8 Hz

c) f of A1 = 55 Hz

d) f of Eb2 = 55 Hz x 1.0595^{n} where n = number of semitones Eb2 is above A1

e) f of Eb2 = 55 Hz x 1.0595^{6}
(Hint: since multiplying a frequency by 1.0595 raises the pitch a semitone, keep multiplying the transpositions by 1.0595 until the desired number of semitones has been reached. Fun fact: to lower a pitch by n semitones, divide f by 1.0595^{n}.)

f) f of Eb2 = 55 Hz x 1.0595 x 1.0595 x 1.0595 x 1.0595 x 1.0595 x 1.0595

g) f of Eb2 = 77.77 Hz

Sample rate from interval of transposition

Let sampling rate S kHz = Hz/1000

Example: If a sound has a sampling rate of 44.1 kHz, what sampling rate will lower its pitch by 3 semitones?

a) $S = 44.1 \text{ kHz}/1.0595^{n}$ where n = number of semitones you wish to lower the pitch

b) $S = 44.1 \text{ kHz}/1.0595^{3}$

c) S = 44.1 kHz/(1.0595 x 1.0595 x 1.0595)

d) S = 44.1 kHz/1.189

e) S = 37.089 kHz