**Chromatic scale:** 12 equal frequency ratios of $2^{1/12}$ ["equal temperament"] = 12 "semitones" (12s) or "half-steps" = 6 "tones" (6t) or "whole steps".

**Interval** = pitch ratio = number of semitones:

- **second** (2) = 2 semitones = 1 whole step [examples: C→D, E→F♯]
- **minor third** (b3, m3) = 3 semitones [examples: C→Eb, E→G]
- (major) **third** (3) = 4 semitones = 2 whole steps [examples: C→E, A→C♯]
- **fourth** (4) = 5 semitones [example: C→F, E→A, F→B♭]
- **fifth** (5) = 7 semitones [examples: C→G, D→A, B→F♯]
- **sixth** (6) = 9 semitones [example: C→A]
- (minor) **seventh** (7) = 10 semitones [examples: C→B♭, D→C]
- **major seventh** (maj7, Δ7) = 11 semitones [examples: C→B♭, D→C♯]
- **diminished** interval $N$ (−$N$, °$N$, Ndim): **subtract one semitone**
- **augmented** interval $N$ (+$N$): **add one semitone**

**Chord** = 2+ intervals starting at "root" of chord

- **major** = 3 and b3 [e.g. 1–3–5–7, C = C–E–G, D = D–F♯–A]
- **minor** = b3 and 3 [e.g. 1–b3–5–7, Cm = C–E♭–G, Am = A–C–E]
- (dominant) **seventh** = 3 and b3 and b3 [e.g. 1–3–5–7–1(=9), C7 = C–E–G–B♭, G7 = G–B–D–F]  
  - **minor seventh** = b3 and 3 and b3 [e.g. 1–b3–5–7, Cm7 = C–E♭–G–B♭, Dm7 = D–F–A–C]
  - **major seventh** = 3 and b3 and 3 [e.g. 1–3–5–maj7, Cmaj7 = C–E–G–B, Dmaj7 = G–B–D–F♯]
  - **ninth** = 3 and b3 and b3 and 3 [e.g. 1–3–5–7–1(=9), G9 = G–B–D–F–A]
  - **augmented** = 3 and 3 [e.g. 1–3–♯5, C+ = C–E–G♯, E+ = E–G♯–C, G♯+ = G♯–C–E]
  - **diminished** = b3 and b3 [e.g. 1–b3–♯5, Cdim = C–E♭–G♭]
  - **diminished seventh** = b3 and b3 and b3 [e.g. 1–b3–b3–b7(=6), Cdim7 = C–E♭–G♭–A, Adim7 = A–C–E♭–G♭]

Changing the root of a chord X: X/R means play X with R on the bottom. e.g. C/E = E–G–C–... (= inversion of C)

**Transposition** = shift all pitches by same interval [ e.g. transposing down by 4th gives F→C, B♭→F, ...]
Standard guitar tuning:

Em chord diagram:

- o = strum the "open" string
- x = do not strum! (or mute by touching)
- fingering ("voicing") is not unique! another Em chord: starts on 7th fret!

E (major) chord:

- a few more simple chords:

G chord

C chord

D chord

D7 chord