

The Harmonic Series

Music

Why some intervals sound consonant — the physics under all of harmony.

A vibrating string or column of air sounds a fundamental plus a series of quieter overtones at whole-number multiples of its frequency. The mix of those overtones is what makes a violin and a flute sound different on the same note.

OCTAVE
2:1

FIFTH
3:2

MAJOR 3RD
5:4

- Harmonic 1 is the fundamental — the pitch you name.
- Harmonic 2 is one octave above: exactly double the frequency.
- Harmonic 3 is an octave and a fifth: a 3:2 ratio.
- Harmonic 4 is two octaves; harmonic 5 adds the major third.
- Simple ratios sound consonant; complex ones sound dissonant.
- Brass instruments play the series directly — valves just change which fundamental.

LOOK FOR IT

Harmonics 4, 5 and 6 are a major triad. It is in the physics before it is in the theory.

The 7th harmonic is flatter than any note on a piano. Equal temperament is a compromise, not a truth.