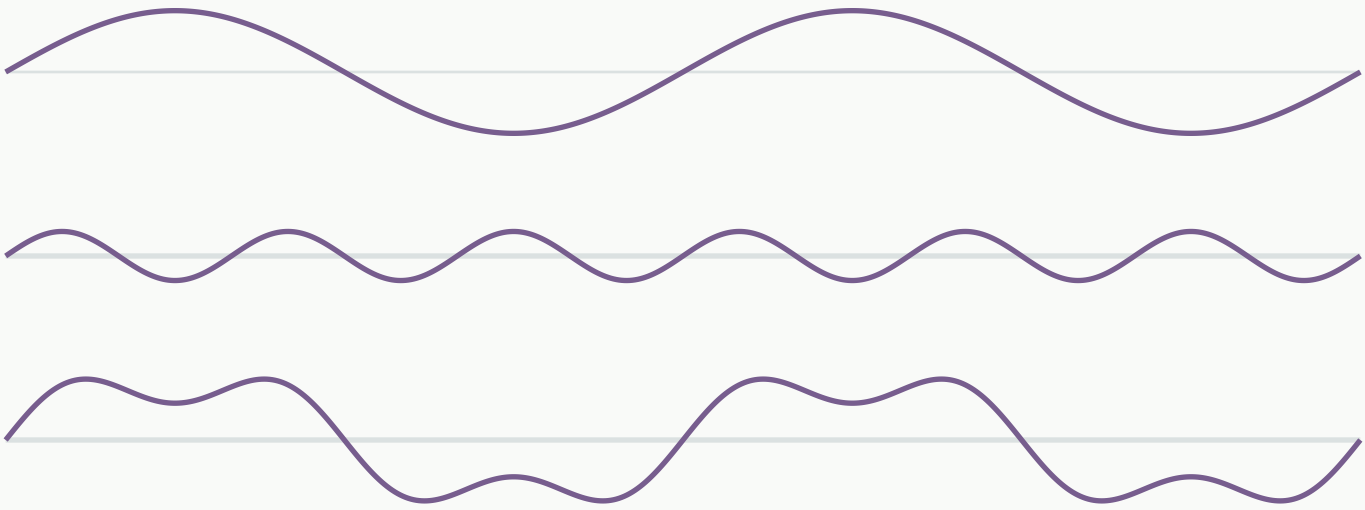
Fourier perspectives

A signal, seen through the frequencies that compose it.

01 ONE CURVE. SEVERAL RHYTHMS.

A periodic signal can be described by sinusoidal components. Their amplitudes, frequencies, and phases determine the shape of the combined wave.



Fundamental + third harmonic = combined signal

02 CHOOSE A USEFUL VIEWPOINT

The time domain shows how a signal changes. The frequency domain reveals its repeating components. Both describe the same signal from different angles.

03 / SIGNALS

Sample with care.

A finite recording is a window into a longer signal.

Sampling

For a band-limited signal, the sampling rate must exceed twice the highest frequency to avoid aliasing under ideal conditions.

Windowing

A finite observation can spread energy across frequency bins. Window functions trade a wider main lobe for reduced sidelobes.

Resolution

Longer observation time gives more closely spaced frequency bins. A higher sampling rate alone does not improve that spacing for a fixed duration.

Three reading questions

Use a second view to test your interpretation.

01 What repeats?

Locate the strongest periodic components, then compare them with the time-domain waveform.

02 What changed?

Check amplitude and phase, not only the frequency of a peak.

03 What did you measure?

Record the sampling rate, duration, and window alongside your spectrum.