

Signal generator: stationary waves on a string

Typed version of the handwritten class note of 7 February 2021 (one page of four labelled sketches).
The original page is on the same page of [megalecture.com](#).

The set-up

A signal generator drives an oscillator (a vibrator) attached to one end of a string. The string runs over a fixed pulley and a load hangs from the far end, keeping the string taut. The oscillator end and the pulley end are both nodes (N). Raising the frequency of the signal generator changes the pattern of the stationary wave on the string.

The four patterns sketched

Frequency	Pattern	Nodes and antinodes
Lowest frequency (fundamental frequency)	one loop	N at each end, one antinode (A) in the middle
Higher: first overtone	two loops	N – A – N – A – N
Increased even further: second overtone	three loops	N – A – N – A – N – A – N
Increased even further: third overtone	four loops	N – A – N – A – N – A – N – A – N

- Each sketch shows the string at two extremes of its vibration (solid and dashed), so the antinodes appear as the widest points and the nodes as the points where the two lines cross.
- Each step up in frequency adds one more loop, i.e. one more node and one more antinode.

Checked by Mega Lecture

This page of the original is drawings with short labels; the typed version puts the labels into a table and describes what the sketches show. No values were changed. Spotted a mistake? Tell us on WhatsApp: +92 336 780 1123.

