

a longitudinal wave that needs a medium, carries energy, and shifts pitch the instant something moves

Wave motion, and the two types

- mechanical waves need a material medium: water waves, string waves, sound
- EM waves need none at all, they cross vacuum
- a progressive wave carries energy and momentum outward
- the medium's own particles never travel along with it, they only oscillate
- waves split into two types by how particles move relative to the wave
- transverse: particles vibrate perpendicular to the wave's direction
- longitudinal: particles vibrate along the same line as the wave
- waves are doubly periodic: periodic in time (period T), periodic in space (wavelength λ)
- a wave travels outward until stopped by a boundary: a wall, a pond's edge, the medium's limit

Transverse vs longitudinal *

Transverse

- particles vibrate perpendicular to the wave's direction: crests, troughs
- needs elasticity of shape, travels through solids and liquid surfaces only
- can be polarised, vibration confined to one plane

Longitudinal

- particles vibrate along the same line as the wave: compressions, rarefactions
- needs elasticity of volume, travels through solids, liquids, gases
- cannot be polarised, vibration and propagation share one direction

sound is longitudinal in every fluid; that's why it cannot cross vacuum, though light (transverse) does