PRE-U REVISION NOTES. WAVES AF/2/19

TYPES OF WAVES. MATHEMATICAL ANATOMY OF WAVES. STANDING WAVES

REFLECTION, REFRACTION, DIFFRACTION. INTERFERENCE. DOPPLER EFFECT.

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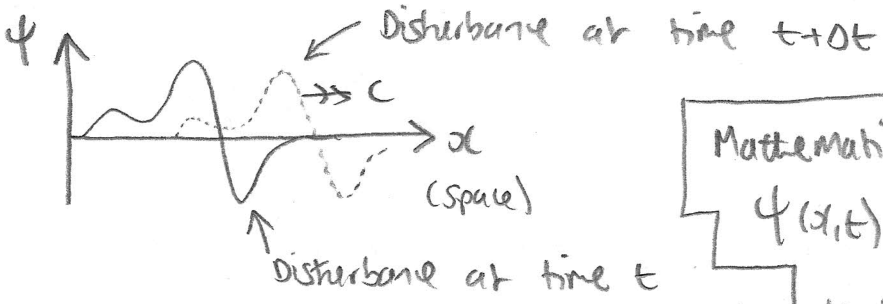
A wave is essentially a <u>disturbance</u> that propagates at speed $c$ through space. The disturbance, which has numeric value $\psi$ could be:
gas pressure above ambient, movement of a string from equilibrium under tension, fluctuations in electric and magnetic fields....




Mathematically could write:

$$\psi(x,t) = f(x-ct) \times \text{attenuation factor}$$

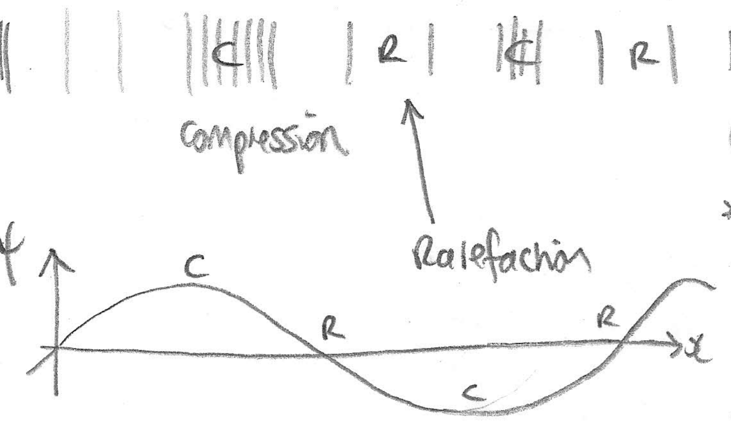
ie translation of $f(x)$

$t$

**Types of waves**

**Transverse**: Disturbance ⊥ to propagation direction
- * Electromagnetic waves (radio, microwave, IR, visible, UV, X-ray, gamma)
- * Earthquake S-waves
- * GRAVITY waves

**Longitudinal**: Disturbance // propagation direction
- * Sound waves in gases, liquids, solids
- * Earthquake P-waves




**Surface (or interfaces)**
- * Rayleigh & love waves (Earthquakes)
- * Water waves → Kelvin wedge; Surf; Ripples
- * Meteorological effects
  - ↳ lenticular clouds

  - ↳ Kelvin-Helmholtz instability

**Shock waves**
- * E.g. from explosions ["Detonation"]
- * Aircraft breaking the sound barrier

MOST INFORMATION ABOUT THE UNIVERSE IS TRANSMITTED IN WAVE FORM! BEYOND EARTH OUR ONLY SOURCE IS EM WAVES (+ GRAVITY WAVES)