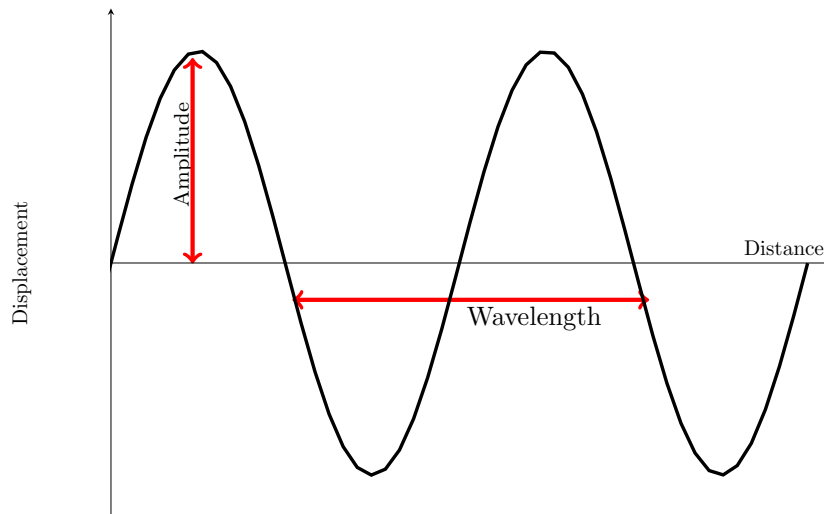


# Progressive and stationary waves

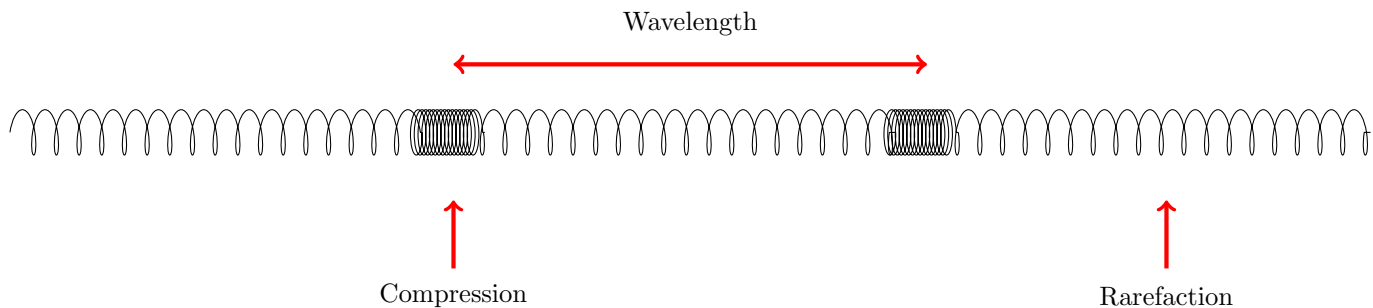
## 1 Progressive waves

### 1.1 Transverse wave



Wave direction and energy are perpendicular

### 1.2 Longitudinal wave



Wave direction and energy are parallel

### 1.3 Definitions

**Displacement** - Distance from equilibrium to the position of the particle

**Amplitude** - The maximum displacement of a particle

**Wavelength** - The distance from a point on a wave to the same point on the next wave

**Complete cycle** - The cycle from one point of maximum displacement to the next section of maximum displacement

**Period** - The time for 1 complete cycle

**Frequency** - The number of complete cycles per second

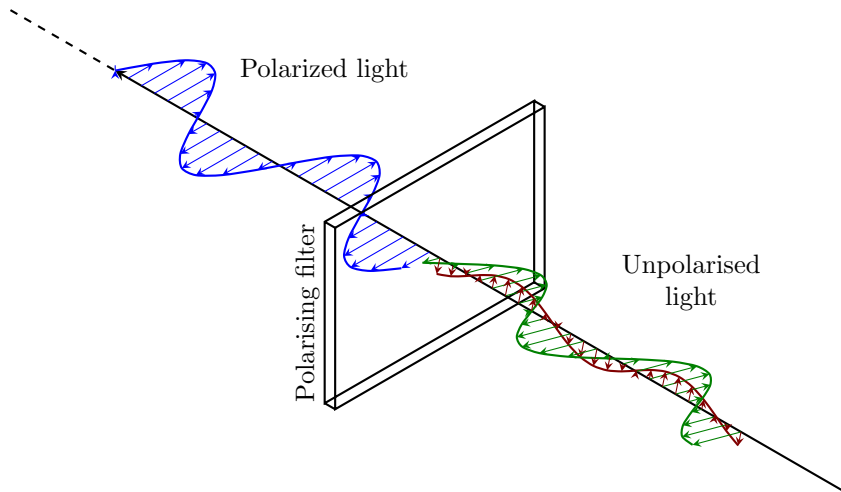
## 1.4 Polarisation

Polarised light all travels in the same direction

Unpolarised light travels in all directions

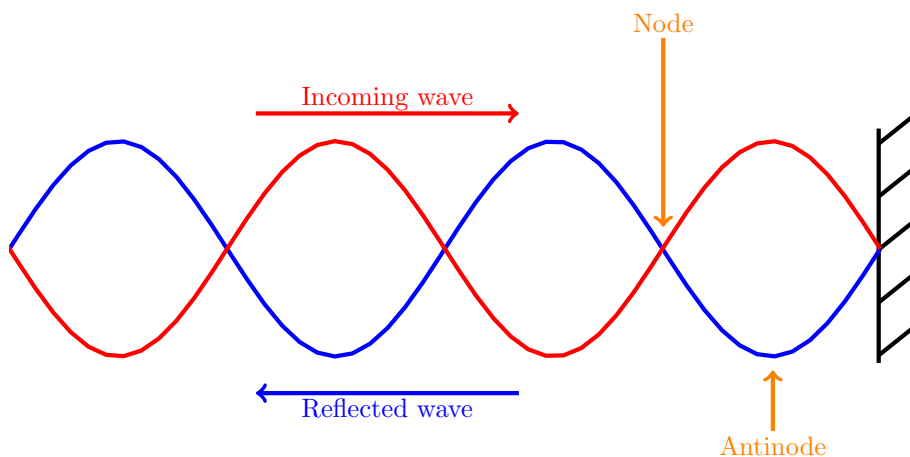
Unpolarised light can be polarised using a polarising filter which contains stripes, only allowing one direction of light through

**Only transverse waves can be polarised**



## 2 The superposition of waves and stationary waves

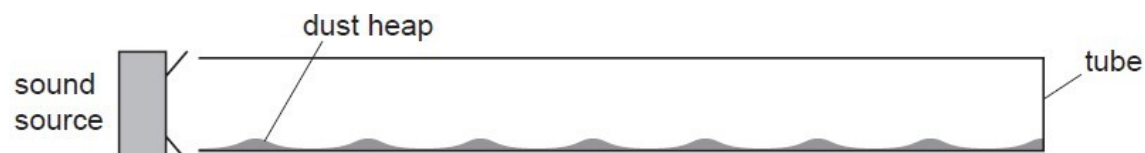
Stationary waves are formed when a wave collides with itself after reflection



When both waves are at equilibrium there is a **node**

When one wave is at a maximum and one at a minimum there is an **antinode**

### 2.1 Sound



Dust heaps are made at nodes and dips are made at antinodes







$\lambda = \text{Distance between the nodes} \times 2$

## 2.2 Microwaves



The receiver can be moved to find areas of nodes or antinodes

## 2.3 Harmonics

| Harmonic | Pattern   | # of Loops | Length-Wavelength Relationship |
|----------|---|------------|--------------------------------|
| 1st      |    | 1          | $L = 1 / 2 \cdot \lambda$      |
| 2nd      |    | 2          | $L = 2 / 2 \cdot \lambda$      |
| 3rd      |    | 3          | $L = 3 / 2 \cdot \lambda$      |
| 4th      |  | 4          | $L = 4 / 2 \cdot \lambda$      |
| 5th      |  | 5          | $L = 5 / 2 \cdot \lambda$      |
| 6th      |  | 6          | $L = 6 / 2 \cdot \lambda$      |