

## Reflection and Transmission of Waves

At boundaries between different media, there is generally both **reflection** and **transmission**. A “boundary” is a place where there is a change in “how hard it is” for the wave to pass through the two media. This includes the **end** of a medium.

- The **incident** wave is the one that approaches the boundary, but hasn’t reached it yet.
- The **reflected** wave is the one that moves away from the boundary, but in the same medium as the incident wave.
- The **transmitted** wave is the one that moves away from the boundary, on the other side of the boundary from the incident wave.

The reflected and transmitted waves are described as **inverted** or **upright**.

- **Inverted** means turned upside down relative to the incident wave.
- **Upright** means not turned upside down relative to the incident wave
- **NEITHER** of these means “pointing up” or “pointing down”. It depends on what the incident wave looks like.

The following table shows what happens in a variety of cases.

	(→ unmovable)	(→ heavier)	(same medium)	(→ lighter)	(→ movable)
<b>The Situation:</b>	fixed end	speed 1 > speed 2	speed 1 = speed 2	speed 1 < speed 2	free end
<b>Reflected Wave:</b>	all reflected	some reflected reflection is inverted	none reflected XXXX	some reflected reflection is upright	all reflected
<b>Transmitted Wave:</b>	none transmitted XXXX	some transmitted	all transmitted	some transmitted	none transmitted XXXX
	transmission is <b>always</b> upright (wave-point-wave)				

The extremes of this table can be summarized by:

If an end is **fixed** (can’t be displaced) → the wave is inverted  
 If an end is **free** (no restoring force) → the wave remains upright