

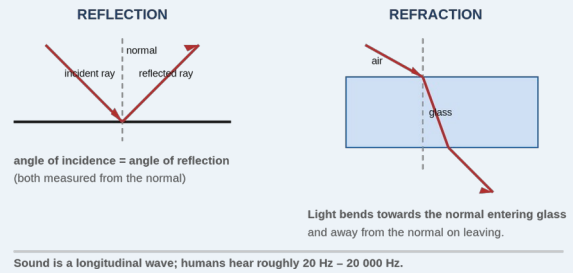
3.3 Light and Sound

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1. KEY VOCABULARY

TERM	MEANING
Reflection	A wave bouncing off a surface.
Refraction	A wave changing direction as it changes speed.
Normal	A line drawn at 90° to a surface, used to measure angles.
Total internal reflection	Light fully reflecting inside a denser medium.
Pitch	How high or low a sound is — set by its frequency.

2. REFLECTION & REFRACTION



3. REFLECTION

Angle of incidence = angle of reflection.

Both angles are measured between the ray and the normal — not the surface.

4. REFRACTION

Light bends when it changes speed moving between materials of different density.

Entering glass it slows down and bends **TOWARDS** the normal; leaving glass it speeds up and bends **AWAY** from the normal.

5. SOUND WAVES

Sound is a longitudinal wave and needs a medium — it cannot travel through a vacuum.

Higher frequency → **higher pitch**. Larger amplitude → louder sound.

Humans can hear roughly 20 Hz to 20 000 Hz.

6. THE WHY

Why light refracts: it travels slower in a denser medium — the change in speed at the boundary makes the ray change direction.

Why sound cannot travel through a vacuum: it needs particles to pass the vibration along — a vacuum has none.

7. COMMON EXAM MISTAKES

- ✗ Measuring angles from the surface.
- ✓ Always measure angles from the **NORMAL**.
- ✗ "Light bends because it changes colour."
- ✓ Light refracts because it changes **SPEED**.
- ✗ "Sound can travel through space."
- ✓ Sound needs a medium — there is no sound in a vacuum.

8. SELF-CHECK · cover & quiz

Can you...

1. State the law of reflection?
2. Describe how light bends entering and leaving glass?
3. Explain why light refracts?
4. State what frequency and amplitude control in sound?
5. Give the human range of hearing?
6. Explain why sound cannot travel through a vacuum?