Chapter 10.2: Loudness and Pitch of Sound

1. Differentiation of Sounds

- **Strength and Pitch**: Our ears can differentiate sounds based on their strength (loudness) and pitch.
- **Amplitude**: The loudness of a sound depends on the amplitude of the sound wave.
- **Frequency**: The pitch of a sound depends on the frequency of the sound wave, measured in Hertz (Hz).

Example Sentence: The mooing of a cow is a low-frequency sound, while the squeaking of a rat is a high-frequency sound.

2. Relationship Between Amplitude and Loudness

- **Increase in Amplitude**: Results in a louder sound.
- **Wave Representation**: Higher wave amplitude on a graph indicates a louder sound.

Example Sentence: When you press the piano keys harder, the amplitude of the sound wave increases, producing a louder sound.

3. Relationship Between Frequency and Pitch

- **Increase in Frequency**: Results in a higher pitch.
- **Wave Representation**: Higher wave frequency on a graph indicates a higher pitch.

Example Sentence: The frequency of the sound wave produced by a rat's squeak is higher than that of a cow's moo, giving it a higher pitch.

4. Doppler Effect

- **Definition**: The apparent change in frequency caused by the relative movement of the sound source, the observer, or both.
- **Example**:
  - Frequency increases as an ambulance approaches a stationary observer.
  - Frequency decreases as the ambulance moves away from the stationary observer.

Example Sentence: The Doppler effect explains why the siren of an approaching ambulance sounds higher in pitch than when it is moving away.