RECORDING SOUND
The Sound Wave

Wavelength (frequency measured in cycles per sec = Hz)

Amplitude determines volume (high amplitude = loud)
Frequency determines pitch (high frequency = high pitch)
DIGITAL RECORDING

Sound Resolution

1. **SAMPLE RATE** - how often sound is sampled and converted to numbers (quantized). Sample rate must be at least twice as frequent as the highest frequency you want to record (So if human voice is around 20 kHz, minimum acceptable sample rate is 40 kHz). CD quality is 44.1 kHz. Professional quality is 48 kHz.
2. **BIT DEPTH** - measure of precision, how fine are the increments used to measure each sample; 8-bit sound has 256 levels; 16-bit has 65,536 (or \(256^2\)) levels.
OPTIMIZING SOUND RECORDING
1. CHOOSE THE RIGHT KIND OF MIC FOR THE LOCATION; BEWARE OF DIRECTIONALITY
Omnidirectional
Hypercardioid
Shotgun
Recording made with shotgun mic pointing towards source
Recording made with shotgun mic pointing away from source
1. **SHOTGUN** - long mic, narrow angle of acceptance, very focused (kind of like a telephoto lens)

**PRO:** great for noisy situations and documentary since it eliminates so much off-axis noise.

**CON:** long shape can intimidate subject; wind noise can be worse than other mics; can be hard to record multiple subjects; has back pickup, so on a quiet set it can catch crew talking or other undesirable sound from behind.
2. **HYPERCARDIOID** - more natural, open / less focused sound than shotgun; easier to pick up multiple subjects.

3. **CARDIOID** - good for larger group of speakers (picks up more from sides)
4. **LAVALIER** - omnidirectional clip-on mic often used for interviews.

**PRO:** always very close to subject for clean interview sound; doesn’t require boom operator.

**CON:** Can get rustling sounds from clothing fabric (especially silks and synthetics); can get chest vibrations / make less natural-sounding recording; Can be hard to hide – some people prefer a good boom mic offscreen / from above even for interviews.
5. WIRELESS RADIO MIC - has receiver and transmitter packs; transmitters can be clipped to individual subjects.

PRO: great for unpredictable documentary situations where a subject (or multiple subjects) are being followed. Provides clean, close recording and great flexibility.

CON: can pick up interference and static from radio waves. Batteries die frequently. Some dislike the unnatural sound perspective. Can be hard to hide.
2. PLACE MIC AS CLOSE TO SOUND SOURCE AS POSSIBLE
SIGNAL TO NOISE RATIO (SNR)
Recording made with a shotgun mic, 15 feet away
Same recording (shotgun mic @ 15 feet), volume turned up
Recording made with shotgun mic, 4 feet away
Recording made with shotgun mic, 6 inches away with no level adjustment (OVERMODULATED audio with clipping and distortion)
Recording made with shotgun mic, 6 inches away with proper level adjustment
Recording made with wireless lav mic
3. ELIMINATE DISTRACTING BACKGROUND NOISES

1. Be aware of noises / hums that exist in the shooting environment that may create loud ambient tone (traffic, refrigerators, air conditioners, fluorescent light fixtures, computers).

2. Eliminate as many of these noises as possible: turn off the TV / radio / any background music, turn off computers and fluorescent lights, unplug the fridge (remember to plug it in when finished shooting!), move away from traffic, etc.
3. Tape down any cables that might move around during shooting.

4. Use a softie cover, blimp, or other windscreen if shooting outdoors in windy situation.
4. KEEP MIC AWAY FROM CAMERA TO ELIMINATE CAMERA / HANDLING NOISE

1. shockmount

2. pistol grip

3. boom

4. wireless radio mic
5. ALWAYS RECORD ROOM TONE / WILD SOUND