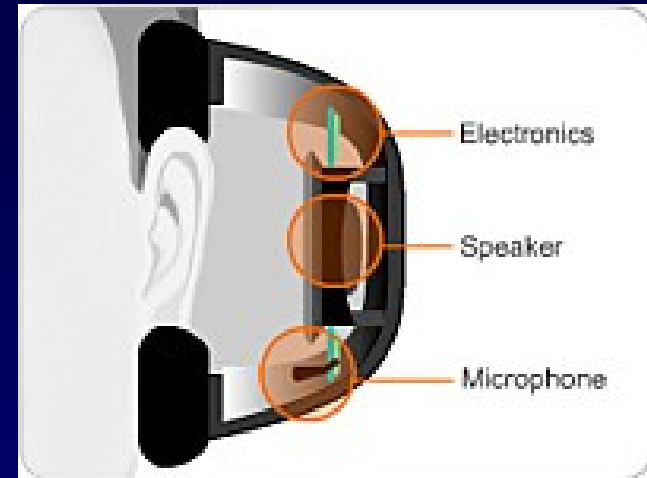


# ACT 1:

## Noise-cancelling Headphones

Noise-canceling headphones work using interference. A microphone on the earpiece monitors the instantaneous amplitude of the external sound wave, and a speaker on the inside of the earpiece produces a sound wave to cancel it.



1. What must be the phase of the signal from the speaker relative to the external noise?
  - a. 0
  - b.  $90^\circ$
  - c.  $\pi$
  - d.  $-180^\circ$
  - e.  $2\pi$
2. What must be the intensity  $I_s$  of the signal from the speaker relative to the external noise  $I_n$ ?
  - a.  $I_s = I_n$
  - b.  $I_s < I_n$
  - c.  $I_s > I_n$