CONCEPT: THE DOPPLER EFFECT

● **Doppler Effect** = ***shift*** in the frequency YOU *hear* ($f_{listener}$ or f_L) from the frequency of the *sound source* (f_{sound} or f_s).

- It occurs when a sound *source* (e.g. siren) or *listener* (e.g. you) are _____ relative to each other.

$f_{listener} = \frac{\quad}{\quad} f_{source}$, where v = speed of sound = +343m/s; v_L = velocity of listener; v_S = velocity of source

NO RELATIVE MOTION - NO DOPPLER EFFECT

$f_{listener}$ = ___ Hz

f_{source} = 5 Hz

● If nothing moves, $f_{listener}$ ___ f_{source}

RELATIVE MOTION - DOPPLER EFFECT

f_L ___ 5 Hz

f_S = 5 Hz

f_L ___ 5 Hz

f_S = 5 Hz

● If listener & source move toward each other , $f_{listener}$ ___ f_{source}

f_L ___ 5 Hz

f_S = 5 Hz

f_L ___ 5 Hz

f_S = 5 Hz

● If listener & source move away from each other , $f_{listener}$ ___ f_{source}

EXAMPLE: The alarm of a car at rest produces sound waves of frequency 550 Hz. You're riding on a motorcycle, traveling directly towards it, and you hear an observed frequency of 600 Hz. How fast must you be traveling?

● The direction of positive is *ALWAYS* from *listener* to *source*.