Sound:

Sine Wave:

Speaker

Increased
Pressure

Decreased
Pressure

Compression

Atmospheric
Equilibrium

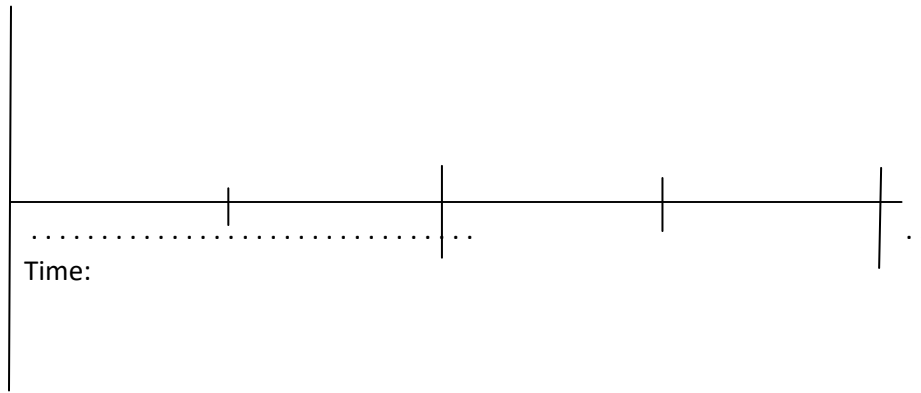To and Fro Motion of Air Molecules

Direction of Propagation

Time:
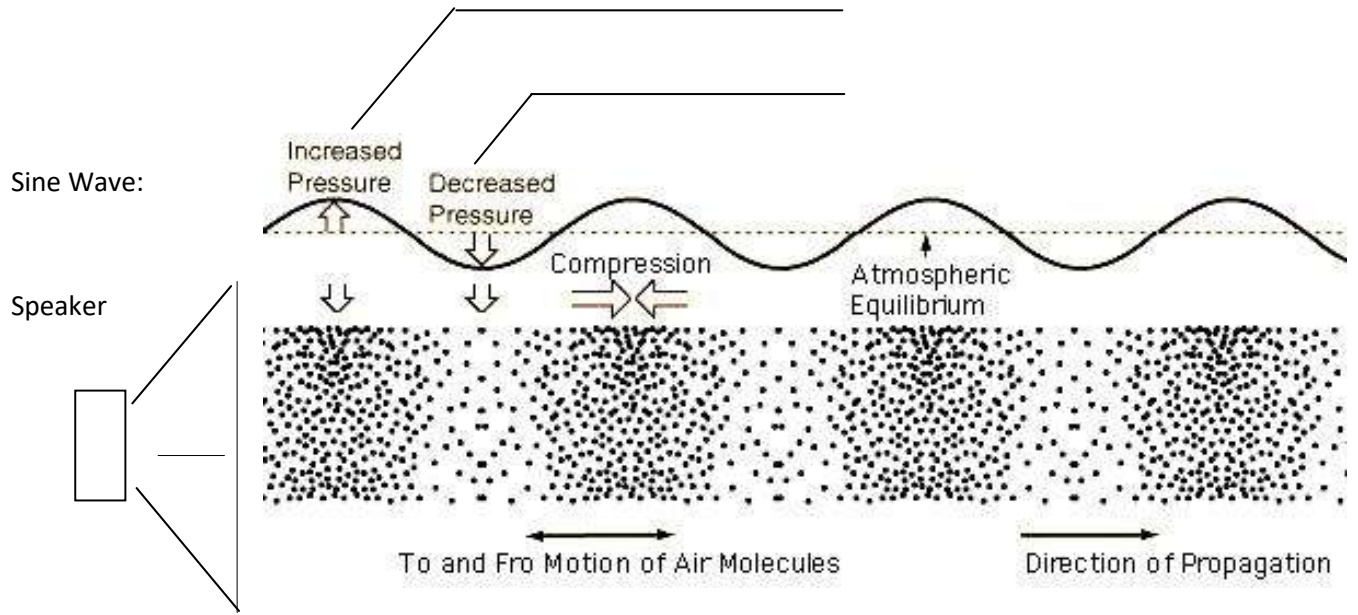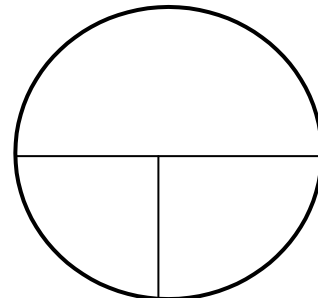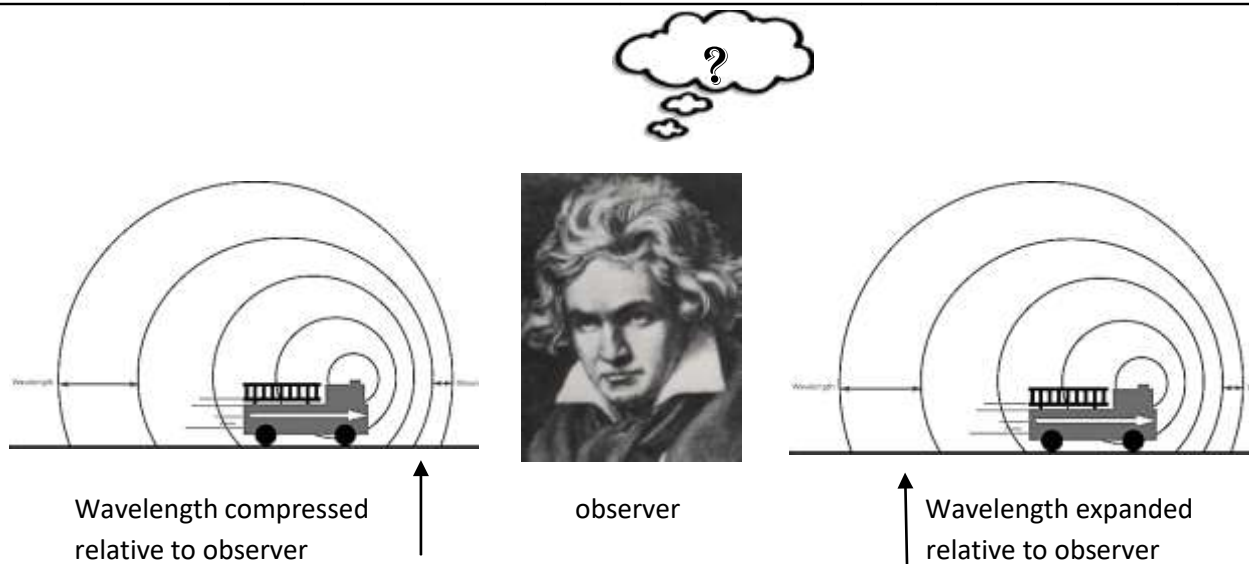
Frequency, wavelength, velocity:

The role of the medium in a mechanical wave

The medium determines_____of a wave

The Doppler Effect:

_____

_____

_____

Wavelength compressed   observer   Wavelength expanded
relative to observer   relative to observer

Longer_____= lower _____
Shorter_____= higher _____

Doppler equation: $\left(\underline{\qquad} \right)$

Where:
v_s = Velocity of the Source
v = Velocity of wave
f = Real frequency
f' = Apparent frequency

Equation to determine velocity of source:

$$= \dfrac{\qquad}{\qquad}$$

Doppler Effect Real World Example:

A sonar analyst detects an underwater sound at a frequency of 319.63 HZ.
He knows from prior intelligence that sound is actually propagated at 318.00 hz.

1. Is the sound source approaching or receding?
2. What is the speed of the source in Knots (nautical miles

per hour)? Data:

1. Speed of sound in water 4900 ft/sec
2. 1 Nautical mile 6000 ft.

U.S. P-3 Orion and Soviet submarine