**Chapter 12**

**Sound** compression:

j0333130[1]hm00483_[1]an03325_[1] rarefaction:

20 Hz 20,000 Hz

j0352697[1]Fundamental frequency determines pitch.

j0364230[1] high f = low f =

Number and intensity of an instrument’s

harmonics give it its unique sound

quality, or \_\_\_\_\_\_\_\_

* ***The Doppler Effect*** Relative motion between wave source and observer causes

a change in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ frequency.



Other examples of Doppler effect:

j0398547[1]

pe05685_[1] Sun

R O Y G B V

bd07389_[1] most stars

* ***Traveling Very Fast***

supersonic: “faster than sound” (vs. subsonic)

shock wave:



sonic boom:

* ***Sound Intensity***

j0307389[1]

EX. If a piano’s power output is 0.302 W,

find the sound intensity at a distance of…

A. …1.0 m

B. …2.0 m

Intensity is related to volume (or relative intensity):

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-- measured in decibels (dB)

A difference of 10 dB changes

the sound intensity by a factor 50 dB 🡪 40 dB 60 dB 🡪 90 dB

of 10 and the volume by a factor of 2.

* ***Beats*** 🡪 alternating loud-and-soft sounds resulting from interference between two slightly-different frequencies

Equation:

**Forced Vibrations and Resonance**



natural frequency:

forced vibration:

resonance:

-- result of resonance =

Examples: