Sound is a mechanical longitudinal wave!
This means it needs a medium, and has compressions and rarefactions.

The pitch (how high and low the sound seems) is determined by the frequency of the wave.

The amplitude of the sound wave determines the sound's volume.

The speed of the sound is determined by the medium it is traveling in.

Sound travels fastest in a solid and slowest in a gas. In air at room temperature, we say that sound travels at 343 m/s.

To find sound's speed in air at any temperature, we use the formula $v = 331 + .6T$ where T = temperature in ^{o}C.

Acoustics is the study of sound: its amplification and how to cancel out sounds... how to design buildings to minimize noise, et cetera.

Doppler was a scientist who studied acoustics. While riding on a train, he noted that a sound's pitch is affected by the speed of the sound compared to the speed of the listener.

When moving towards each other, the sound is heard at a higher pitch than the frequency actually being produced. When moving away from each other, the frequency drops.

We call the increase in frequency a blue shift, since light appears to behave this way also. A red shift is a drop in frequency heard when an object is moving away from you.
Police radar uses the Doppler shift to determine your vehicle's speed. Weather radar uses this to determine wind speed.

The Doppler formula is:

$$F_L = F_S (V \pm V_L)/ (V \pm V_S)$$

F_L = frequency heard by the listener,

F_S = frequency emitted by the source,

V = speed of sound (in air = 343 m/s)

V_L = velocity of the listener

(+ if moving towards sound, - if moving away)

V_S = velocity of the sound source

(- if moving towards listener, + if moving away)

A car's horn emits a 1490 Hz tone when stationary. What tone is heard when the car is coming towards you at 27 m/s?

= 1490 (343+0)/(343-27)
= 1490 x 343 ÷ 316 = 1617.31
= 1620 Hz - it's higher!

When your parents yell, "Turn down that noise!" and you retort tearfully, "It's MUSIC!" Who is correct?

Music is made of frequencies that are planned, and sound good together, while noise is random and does NOT sound pleasant.

Beats are fluctuations in volume due to interference between two similar frequencies. This is used to tune instruments, among other things.

Frequencies that go together are called consonances, which form small, whole number ratios between their frequencies, like 3:5 or 5:7. Dissonances are sounds that sound nasty together: their frequencies do NOT form small ratios (more like 11:17)

Octaves are a doubling of the frequency going up an octave, and a halving going down. Middle "C" is 256 Hz - what is "C" one octave lower? (128 Hz) Two higher? (1024 Hz)

Sound is a <u>mechanical</u> <u>longitudinal</u> wave!
This means it needs a _____, and has _____ and _____.

The _____ (how high and low the sound seems) is determined by the _____ of the wave.

The _____ of the sound wave determines the sound's _____.

The _____ of the sound is determined by the _____ is traveling in.

Sound travels fastest in a solid and slowest in a gas. In air at room temperature, we say that sound travels at _____.

To find sound's speed in air at any temperature, we use the formula _____ where T = temperature in ^{o}C.

_____ is the study of _____: its amplification and how to cancel out sounds... how to design buildings to minimize noise, et cetera.

_____ was a scientist who studied acoustics. While riding on a train, he noted that a sound's pitch is affected by the speed of the sound compared to the speed of the listener.
When moving towards each other, the sound is heard at a higher pitch than the frequency actually being produced. When moving away from each other, the frequency drops.

We call the _____ in frequency a <u>blue shift</u>, since light appears to behave this way also. A <u>red shift</u> is a _____ in frequency heard when an object is moving _____ from you. Police radar uses the Doppler shift to determine your vehicle's speed. Weather radar uses this to determine wind speed.

The Doppler formula is:

$$F_L = F_S (V \pm V_L)/ (V \pm V_S)$$

F_L = frequency heard by the listener,

F_S = frequency emitted by the source,

V = speed of sound (in air = 343 m/s)

V_L = velocity of the listener

(+ if moving towards sound, - if moving away)

V_S = velocity of the sound source

(- if moving towards listener, + if moving away)

A car's horn emits a 1490 Hz tone when stationary. What tone is heard when the car is coming towards you at 27 m/s?

=

When your parents yell, "Turn down that noise!" and you retort tearfully, "It's MUSIC!" Who is correct?
_____ is made of frequencies that are planned, and sound good together, while _____is random and does NOT sound pleasant.

_____ are fluctuations in volume due to _____ between two similar frequencies. This is used to tune instruments, among other things.

Frequencies that go together are called _____, which form small, whole number ratios between their frequencies, like 3:5 or 5:7. _____ are sounds that sound nasty together: their frequencies do NOT form small ratios (more like 11:17)

_____ are a doubling of the frequency going up an octave, and a halving going down. If Middle "C" is 256 Hz - what is "C" one octave lower? ___ Two higher? ____