

## Science 265

### Exam 1 Learning Goals

Students will be able to:

- describe and identify the source of a sound – vibrations.
- identify the difference between the direction a wave travels and the direction the medium moves.
- explain that sound carries energy and identify how sound energy transfers
- define natural frequency.
- define resonance and provide examples
- define sympathetic vibration and provide examples
- identify in a new situation if resonance or sympathetic vibration is occurring
- relate the terms pitch, frequency and high/low sounds.
- demonstrate the path that sound vibrations follow through the ear.
- describe how ears can be permanently damaged by loud sounds
- describe how tones can be varied by changing the length of the resonant cavity of a wind instrument.
- describe how string instruments change pitch by changing natural frequency
- describe how instruments use sympathetic vibration or resonance to amplify sound.
- generalize how an instrument makes music. All require a source of sound (vibrations), a way to change pitch (changing natural frequencies) and a way to amplify sound (resonance or sympathetic vibration).
  
- draw and label a basic transverse wave.
- identify a wavelength on a transverse wave.
- describe the difference between a transverse and a longitudinal wave.
- identify the source, receiver and medium for any type of wave.
- define frequency and amplitude in terms of a sound wave and what we hear.
- list several different types of waves and identify which need a medium and which do not.
  
- describe that there is a delay between when they see a sound happen and when they hear it.
- name several animals that use echolocation to find food or objects.
- describe if these animals can also use their eyes and if they do use both their eyes and ears, which one do they depend on?
- describe the limits of the size and distance that dolphins and bats can echolocate.
- describe how SONAR works
- explain the difference between *active* and *passive* SONAR/Echolocation
- describe how animals “localize” sounds
- describe how scientists find out what elephants can hear
- describe the difference in what you hear if a sound travels in the air compared to traveling in a solid
- describe how the speed of sound varies in a gas, liquid and a solid.

- explain how light enters the eye and we sense light
  - describe the cells in the eye that sense light and color
  - compare and contrast human color vision to other animals
  - identify what could be wrong in a person's eye if they have a certain type of color blindness.
  - list different types of electromagnetic waves
  - explain how ultraviolet, visible light and infrared electromagnetic waves were named.
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- describe and draw the three main states of matter including how atoms/molecules move in each state compared to the other states.
  - draw and explain why water is unique and the only material to take up more space as a solid than as a liquid.
  - how to make molecules/atoms stop moving completely.
  - explain what is in the bubbles of boiling water
  - calculate the density of air given the mass and the volume of a measured amount.
  - describe an experimental procedure for measuring the volume of a room.
  - Estimate the weight of air in a room.
  - Explain where the majority of mass comes from in trees.
  - Explain how the largest fraction of mass leaves a person's body when they lose 15 lbs.