

## Science 265

### Exam 3 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).
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- 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.
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- 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.

## **Energy**

Students will be able to:

- Explain why energy does not contain mass
- Identify the form of energy that an object has depending on its motion or position
- Compare the amount of potential energy objects have depending on their height and mass.
- Compare the amount of kinetic energy objects have depending on their speed and mass
- Identify the energy form before and after a particular event
- Apply conservation of energy to different events
- Explain what "The lion eats the sun" means in terms of conservation of energy
- Predict the final location of an object (pendulum or skater) based on its initial height
- Explain the behavior of electrically charged objects
- Explain some differences between magnets and electrical charges. For example, electric charges are attracted to all metals but magnets are not attracted to all metals, only those that can be magnetized.
- Describe how induction occurs and which variables increase the induction
- Describe how a generator produces electricity from a water wheel
- Describe how a wind turbine produces electricity and trace the energy conversions a step at a time from wind to the motion of electrons
- Describe the difference between a direct current (DC) and an alternating current (AC)
- Describe how an AC or DC current is able to light a light bulb or heat a toaster
- Calculate the horsepower produced by a person based on data from running up a set of stairs.