SUMMARY OF CHAPTER 4

THE HUMAN ORGANISM AND THE PERCEPTION OF LIGHT AND SOUND

1. WHAT IS A WAVE ?

- A wave is a disturbance that travels through a medium. A disturbance is a localized and temporary change in the properties of a particular medium. A wave transports energy; it does not transport matter (p. 92).
- Waves are distinguished by the two ways they can propagate through media: transverse or longitudinal.
  - A transverse wave is a wave that propagates perpendicular to the motion of its medium (p. 93).
  - A longitudinal wave is a wave that propagates parallel to the motion of its medium (p. 93).
- The amplitude of a wave corresponds to the maximum distance travelled by a particle in the medium compared to its position at equilibrium (p. 94).
- A wavelength is the length of a wave's complete cycle (p. 95).
- A wave's frequency corresponds to the number of cycles per unit of time (p. 95).
- There are two types of waves: mechanical and electromagnetic (p. 96).
- A mechanical wave requires a medium in order to propagate. It generally arises from a localized disturbance (p. 96).
- An electromagnetic wave can travel in both a vacuum and a medium. The form of energy associated with electromagnetic waves is radiant energy (p. 96).
- The electromagnetic spectrum organizes all electromagnetic waves according to their wavelength and frequency (p. 97).

2. SOUND WAVES

- Sound is a longitudinal mechanical wave produced by the vibration of an object and transmitted to the object's environment (p. 100).
- There are great variations in the speed of sound from one medium to another. The speed of sound is greater in liquids or solids than in air (p. 101).
- The decibel scale is a relative scale that represents the perception of the intensity of sound by the human ear (p. 102).
- Depending on their frequency, sounds can have a high or a low pitch (p. 103).

3. LIGHT WAVES

- Light is an electromagnetic wave that is visible to the human eye (p. 106).
- Reflection is the rebounding of light that occurs when a light ray hits a different medium and "bounces back" to the medium from which it came (p. 106).
- The incident ray is the ray that contacts the surface of an object (p. 106).
- The normal is a line perpendicular to the surface at the point of reflection (p. 106).
- The angle of incidence is the angle formed by the incident ray and the normal (p. 106).
- The angle of reflection is the angle formed by the reflected ray and the normal (p. 106).
- Diffuse reflection happens when parallel light rays hit a rough surface and are reflected in all directions (p. 108).
- Specular reflection happens when parallel light rays contact a surface that is perfectly smooth. This reflection produces a true mirror image of the reflected object (p. 108).
- A virtual image is produced by the prolongation of reflected light rays. It can't be captured on a reflecting surface or a screen (p. 109).
- A real image is produced at the real crossing of light rays. It can be captured on a screen (p. 109).
- Refraction is the deviation of a light ray as it passes from one transparent medium to another (p. 110).

- There are two types of lenses: converging and diverging (p. 111).
- Converging lenses bring together light rays that pass through them (p. 111).
- Diverging lenses disperse light rays that pass through them (p. 111).
- The focal point of a converging lens is the real point where the refracted light rays actually meet when the incident rays run parallel (p. 112).
- The principal focal point is the meeting point of light rays travelling through a lens parallel to the principal axis (p. 112).
- The focal point of a diverging lens is the virtual point from which the refracted light rays appear to emanate when the incident rays run parallel (p. 113).