

2 Characteristics of Life

2.0 CHAPTER PREVIEW

In this chapter we will:

- Investigate the meaning of “organism.”
- Define the properties that all living things share.
- Discuss the common things that almost all organisms on earth require to live.

2.1 OVERVIEW

- All living things share certain properties associated with being alive. This chapter will discuss them.

Topic question:

True or False? In order to study life, one must know what is alive and what is not. **True. Establishing common criteria to define life allows for accurate study and discussion of the experimentation process.**

2.2 PROPERTIES OF LIFE: CELLS

- The basic functional unit of all life forms is the cell. All living things are made up of one or more cells.

Topic question:

True or False? A multicellular organism is made up of two or more cells. **True.**

True or False? Unicellular organisms are not alive because they only contain one cell. **False. Unicellular organisms are every bit as alive as multicellular organisms.**

2.3 PROPERTIES OF LIFE: DEOXYRIBONUCLEIC ACID (DNA)

- All living things contain DNA.
- The basic unit of DNA is the gene.
- DNA (genes) are passed from parent to offspring.

Topic question:

Why is DNA called the “blueprint of life?” **DNA contains the genetic information that codes for, or controls, the development of every aspect of an organism’s appearance and function.**

2.4 PROPERTIES OF LIFE: REPRODUCTION

- All organisms reproduce.
- There are two forms of reproduction—sexual and asexual.
- Asexual reproduction involves cell division without mixing of chromosomes. Sexual reproduction involves reproduction through the combination of chromosomes from a male and female organism to form a new organism.

Topic question:

What is the difference between sexual and asexual reproduction? **Sexual reproduction occurs by the DNA of two organisms combining to form a new organism. Asexual reproduction occurs without combining genetic information. Sexual reproduction forms organisms that are genetically different than either parent, but asexual reproduction leads to organisms that are genetically identical to the parent cell.**

2.5 PROPERTIES OF LIFE: COMPLEX AND ORGANIZED

- All life forms are highly organized and complex structures.

Topic questions:

True or False? Even unicellular organisms are complex and organized. **True. All life forms are complex and organized no matter how big or small they are.**

Do multicellular organisms have a higher degree of complexity than single cell organisms? **Of course. They are larger and have more cells, so they are naturally more complex and organized relative to unicellular organisms.**

2.6 PROPERTIES OF LIFE: RESPONSIVE

- All living things are responsive to their surroundings or environment.
- The ability to respond is controlled by different types of receptors.

Topic question:

What are the structures called that allow an organism to sense and respond to their environment? **Receptors.**

2.7 PROPERTIES OF LIFE: ENERGY EXTRACTION AND USAGE

- All organisms extract energy they need to survive from their environment.
- Producers extract the energy they need from the sun through photosynthesis.
- Consumers and decomposers extract the energy they need by eating other organisms and using it during cellular respiration.

Topic questions:

True or False? Plants convert the sun's energy through the process of cellular respiration. **False. Plants convert the sun's energy through photosynthesis.**

True or False? Plants extract the energy they need from their environment, but animals do not. **False. All living things extract the energy they need to live from their environment.**

2.8 PROPERTIES OF LIFE: HOMEOSTASIS

- All organisms maintain a stable internal environment, a process called **homeostasis**.

Topic question:

When a fish that is cold swims into warmer water to warm up, then later swims to cooler water to cool down, what property of life is the fish displaying? **Homeostasis.**

2.9 PROPERTIES OF LIFE: GROWTH

- All living things grow.

Topic questions: none

2.10 PROPERTIES OF LIFE: CLASSIFICATION

- All living things are systematically classified based on similarities and differences to other organisms.
- The scientific pursuit of classifying organisms is called taxonomy.
- The current taxonomical system is a seven-level system founded on that of Carl Linnaeus.

Topic question:

What is a binomial name? **It is a specific name for an organism that no other organism shares. The binomial name is a unique identifier. The first part of a binomial name is the genus the organism is classified into; the second name is the species.**

2.11 PROPERTIES OF LIFE: COMMON THINGS ALMOST ALL ORGANISMS NEED

- All living organisms need food for energy and a habitat in which to live. In addition, most organisms require oxygen, but not all. There are some organisms that die in the presence of oxygen

Topic questions:

What is an aerobic organism? **One that needs oxygen to survive.**

True or False? Air is made up mainly of nitrogen, oxygen, carbon dioxide, and argon. **True.**

2.12 KEY CHAPTER POINTS

- All living things have the following properties in common:
 - Composed of one (unicellular) or more cells (multicellular).
 - Contain the blueprint of life, DNA.
 - Sexually or asexually reproduce to make more cells and more organisms.
 - Complex and organized on many levels.
 - Have ways to sense and respond to changes in their environment.
 - Extract energy from their surroundings.
 - Maintain homeostasis.
 - Grow in size.
 - Can be classified based on similarities and differences in structure and function.
 - Almost all organisms need water, air, food, and a habitat to live.