# **<u>Characteristics of Life</u>**

Name: \_\_\_\_\_\_ Period: \_\_\_\_\_\_

Objective: To become familiar with the characteristics of life

# Part 1: What are characteristics that all living things share?

## 1. Living organisms are composed of cells.

a. Plants, animals, fungus, and bacteria are all composed of cells. Cells are highly organized units that can function independently, or as an organized unit. Microscopic, single-celled organisms are the most common life-form on Earth. Larger multi-cellular organisms have cells with specialized functions all working together to sustain the organism.

## 2. Living organisms metabolize.

a. Metabolism is a set of chemical reactions that an organism carries out to access energy sources. There are many different kinds of metabolism; some organisms use the sun in photosynthesis, others undergo cellular respiration, anaerobic respiration, or fermentation. The products of these reactions are used to fuel cellular processes that sustain life.

## 3. Living organisms respond to stimuli.

a. Organisms must react to their environment to survive. Stimuli are factors from an environment that are sensed by an organism. Temperature, touch, light, chemical signals (smell, taste), sound, and humidity are all stimuli to which organisms respond. These stimuli trigger a response in the form of a behavioral change (pulling hand away from hot stove), or a physiological change (dilating pupils, sweating, etc.)

## 4. Living organisms must maintain homeostasis.

a. Organisms must be able to keep internal functions regular. Homeostasis is defined as the maintenance of constant internal conditions (as opposed to reaction to stimuli which is response to external conditions). Examples of vital internal conditions that are regulated include temperature and blood sugar. The body is able to regulate through positive and negative feedback systems, though negative feedback systems are much more common. Negative feedback is when a stimulus causes a reaction to reverse the effect of the stimulus. For example, when a human overheats they react by sweating, this reaction causes the body reversing the stimulus. Similarly, when a human becomes too cold it causes a reaction of shivering and blood vessel constriction, reversing the stimulus by warming the body up.

#### 5. Living organisms reproduce.

a. Members of each species must have the ability to make new individuals, or reproduce themselves. This involves passing on genetic material, in the form of deoxyribonucleic acid (DNA) or ribonucleic acid (RNA). There is both asexual and sexual reproduction, involving one parent organism or two parent organisms.

# 6. Living organisms change over time.

a. Living things change over time as they grow and develop. These changes allow an organism to mature into a reproductive stage, or are a consequence of the effects of aging.

# 7. Living organisms have genetic material.

a. All livings things have genetic material because it provides instructions for every life process, including all of the other 6 characteristics of life. On Earth there are two kinds of genetic material that are both classified as nucleic acids; deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). Genetic material is passed from parents to offspring through reproduction (both sexual and asexual).

# 8. Living organisms are members of species that evolve.

a. Individual organisms DO NOT EVOLVE, however a group of the same kind of organism can change over many generations. The ability of a group of organisms to change over time is invaluable to survival of the species in an ever changing world.

# Part 2: Comprehension

1. What are two classifications for organisms from a cellular perspective?

**2.** What is metabolism?

3. What are three kinds of stimuli an organism may experience in an environment?

4. What does negative feedback mean? Give an example of negative feedback.

5. What are two kinds of reproduction?

6. What are two kinds of nucleic acid?

7. List the characteristics that distinguish a living organism from a non-living organism.

#### Part 3: Application

**1.** A salt crystal placed in super-saturated salt water will grow in size. Does this mean that the salt crystal is alive? Explain.

**2.** Give an example of metabolism.

3. Is a block of wood alive? Explain.

4. Bean seeds can sit on a shelf for decades and not change. Are they alive? Explain.

5. Is a supermarket tomato alive or no longer living? Explain.