Hands - On LIFE SCIENCE

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CHAPTER 1

Imagine you're in the park, surrounded by lots of different things. You can see swings, a tree, a few birds, a bench or two, and some pebbles on the ground. Which of these things are alive, and which are not? Obviously, the birds and trees are alive, while everything else is not. But what do birds and trees have that makes them alive, especially since they are so different?

WHAT IS LIFE?

For something to be considered a living thing, it needs to have certain features. These features are called **characteristics of life**. Although they show them differently, animals and plants are living things because they have these characteristics. What are these characteristics of life? Let's find out!

How many living things can you see in this picture?

MOVEMENT

All living things move.

All living things need to be able to move on their own, without anyone pushing or pulling them. Animals can definitely move. Horses walk or run, monkeys climb, and fish swim. They all move to look for food or to run away from danger. While plants can't exactly go for a walk, they still need to move to stay alive. They move their leaves toward the sunlight and their flowers can open and close.

RESPOND TO STIMULI

Living things react to **stimuli**[1], which are changes in the environment. For example, penguins respond to the cold by huddling together, and dogs breathe heavily to get rid of extra body heat. Deer react to the smell of food by running toward it, and some octopuses camouflage themselves to avoid danger. Many trees lose their leaves when it gets cold to help them survive the winter, and some plants open their flowers by day to collect sunlight and then close them at night.

Reacting to stimuli keeps living things safe and helps them survive. Animals detect changes in the environment with their eyes, ears, mouth, and nose. Plants can't see or hear, but are able to sense touch, light, and other stimuli.

Words to Know

1. **Stimuli** - chemical or physical change in the environment that triggers some sort of behavioral change in a living organism
2. **Reproduction** - the production of offspring

Many trees respond to the change of season by losing their leaves.

GROWTH AND REPRODUCTION

Living things start off small, and as time goes on, they grow bigger. Lambs grow into sheep, and caterpillars transform into butterflies. Seeds develop into plants, and trees grow more branches and leaves. Once animals reach adulthood, they usually stop growing. Plants, on the other hand, continue to grow their entire lives.

Living things can also make copies of themselves in a process called **reproduction**[2]. Some animals, like cats and giraffes, reproduce by having babies; while other animals, such as chickens and ducks, reproduce by laying eggs. Plants generally reproduce through their seeds. The seeds are scattered around, and under the right conditions, they will grow into new identical plants.

All living things, like these little ducklings, are able to grow. Credit: Mat Fascione, Wikimedia.

DEPENDENT ON ENVIRONMENT

Living things rely on their environment to give them what they need for survival, including light, water, and air. Without these basic things, life wouldn't exist. Plants use sunlight, water (from rain), and carbon dioxide (a gas in the air) to make their own food through a process called photosynthesis. The food they produce gives them the nutrients and energy they need to grow and live. Animals can't make their own food, but they receive their nutrients from eating other living things around them; either plants or other animals. Water is also essential for animals. Their bodies need water to be able to function properly.

Words to Know

3. **Respiration** - the process that all living things go through to create the energy they need to live
4. **Glucose** - sugar that plays a vital role in the metabolism of most living things

Flowers depend on sunlight, water, and carbon dioxide to survive.

RESPIRATION

All living things need to be able to respire. **Respiration**[3] is an essential process that supplies living things with the energy they need to function and stay alive. During respiration, living things take in oxygen (a gas in the air), which mixes with **glucose**[4] (a type of sugar). This causes a reaction that releases energy. This process also produces carbon dioxide (another gas in the air), which is let out into the air.

Where do living things get glucose from? Animals receive glucose from the foods they eat, while plants create their own glucose through photosynthesis. And how do they take in oxygen from the air? While animals breathe in oxygen and breathe out carbon dioxide, plants take in oxygen and release carbon dioxide through little openings in their leaves called stomata.

NON-LIVING

Can a stone move by itself or reproduce more stones? And what about a computer or a cardboard box? Obviously not! These things only move if someone picks them up. They can't respond to the environment, grow bigger, or respire. Since they don't have any characteristics of living things, they are non-living objects.

But what about things that have some, but not all, of the characteristics of life? A fire, for example, can grow bigger, move by itself, and reproduce other fires through its sparks. But it can't respire or respond to stimuli. It definitely has some properties of life, but because it lacks the rest of them, it's considered non-living. Clouds can also grow bigger and move on their own. But they don't have the other characteristics of life, so they are non-living, too. In other words, something has to have all the characteristics of life to be a living thing!

Fire is not alive.

ONCE ALIVE

Here's a tricky question. Is a dead plant living or non-living? You might at first think that it's non-living, but the answer isn't so simple. Anything that was once alive will always be considered a living thing, even though it no longer has the properties of life. A rock, for instance, has always been nonliving, so too a dead plant was once alive, so it is still a living thing. The same goes for parts of a living thing, like a branch that has snapped off a living tree. Since the tree is alive, all of its branches are living whether they are still part of the tree or not.

WORD MATCH

GLUCOSE	_____	1. Make copies of oneself
LIVING THING	_____	2. Changes in the environment that trigger a reaction
RESPIRATION	_____	3. A type of sugar that is used for energy
REPRODUCTION	_____	4. Something that does not have all the characteristics of life
NON-LIVING	_____	5. Something that has all the characteristics of life
STIMULI	_____	6. A process which uses oxygen to produce energy

REVIEW QUESTIONS

1. **What is the difference between living and non-living things?**

_____

_____

2. **Which characteristic of life is being used when animals migrate to warmer places in the winter? Explain your answer.**

_____

_____

3. **How is food turned into energy?**

_____

_____

4. **Can you think of some examples of things that were once alive?**

_____

_____

OBSERVATIONS

1. **Which bag grew the fastest?**

_____

2. **Which bag grew the most?**

_____

3. **Which bag grew the least?**

_____

4. **Is yeast alive?**

_____

5. **What does yeast do to show it is alive?**

_____

_____