

What Are Living Things?

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Exploring Science

Are Robots Alive? The meaning of the word robot has changed over time. For years a robot was expected to look like a human. Today, looks don't matter. The word *robot* now means a machine that does work for us - with the help of a computer. Some experts argue that true robots are also able to make decisions.

What about a drone? Is it a robot? One type of drone is able to sense objects and avoid them. This drone is certainly a robot.

In fact, in many ways this drone seems to be alive! Compare it to us. We have a brain; its computer functions as a brain. We take in food for energy; it takes in electrical energy. We can see nearby objects; it can "see" - and even share what it sees with people. We can move; it can move. In fact, it can fly!

Drones have been designed to deliver packages, to check on farm crops, and to locate

forest fires or lost hikers. Other robots help us build cars and many other items. So, should we consider robots to be living things?

➤ In some schools, students learn to build robots? Can you guess what name is often given to the room where robots are built?



A drone on the lookout!

What Living Things Do

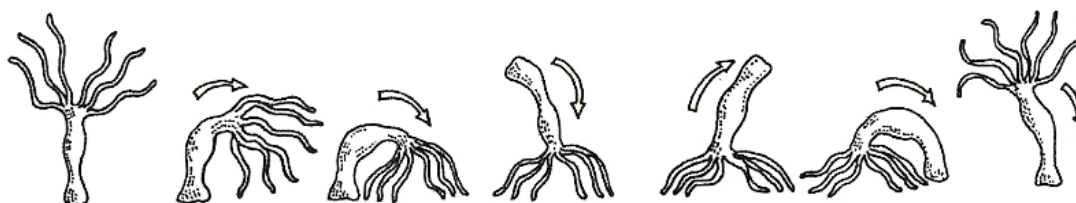
Anything that is alive is an **organism**. (OR-guh-niz-um). Organisms include animals, plants, and **microorganisms** (living things too small for us to see).

Let's look at the things that organisms are able to do. Scientists call these **life functions**.

▸ **OBTAIN ENERGY** To live, organisms must have energy. **Food** supplies the energy for most animals (and animal-like organisms). Plants make their own food, as do plant-like organisms. To release the energy from food, most living things need **oxygen** (OK-si-jun) from the air. **Water** and the **right temperature** are also vital as organisms use energy.

▸ **REPRODUCE** Organisms don't live forever, so they must **reproduce** (make more of their own kind). A pig can produce more pigs. The seeds of a corn plant become new corn plants. Yogurt is formed by tiny bacteria that reproduce by splitting in half.

▸ **GROW** Living things become larger in size, or **grow**. At birth, a red kangaroo is less than two centimeters long and weighs one gram. When fully grown, it may be 210 centimeters long and weigh 90 kilograms. A marble-sized acorn grows into a huge oak tree. How much have *you* grown since first grade?



A hydra usually stays in one place, in the position shown at the left. If it needs to move, it somersaults.



The open mimosa leaves (at left) respond to touch. How might this help them survive?

► **GET RID OF WASTES** Living things get rid of wastes. For example, your body makes carbon dioxide when energy is released from food. When you breathe, your body releases this carbon dioxide as a waste product.

► **MOVE** Living things can **move**, even if they stay in one place. The hydra (HY-druh) shown on page 1 is a barely-visible pond animal. It usually stays in place by attaching its base to a twig or stone. It waves its arms to catch food. At times it moves its whole body - by flipping!

Tumbleweed is a plant that is easily blown from place to place. However, most plants stay put - but they slowly bend toward light.

► **RESPOND** Organisms react, or **respond**, to changes in their **environment** (everything around them). This includes taking steps to keep their bodies at a safe temperature, or simply to keep themselves safe from harm!

Living things also respond to changes from *within* themselves. What do you do when you feel hungry?

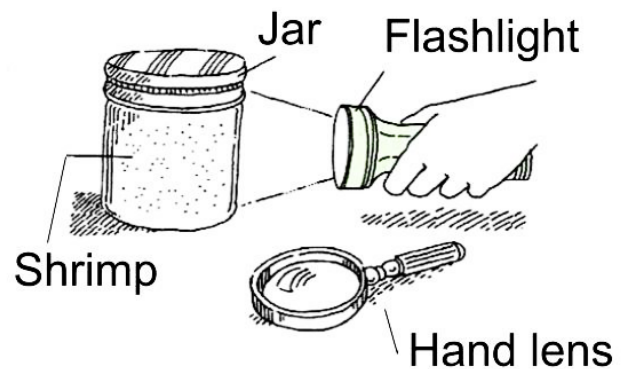
► To Do Yourself

How do brine shrimp react to changes in their environment?

You will need:

Brine shrimp eggs; large wide-mouth jar; aged tap water; 6 teaspoons of table salt; hand lens; flashlight; timer (stopwatch)

1. In the jar, mix 6 teaspoons of salt in a liter of dechlorinated water.
2. Add a teaspoon of brine shrimp eggs.
3. Let the jar with eggs sit for a day.
4. After 24 hours, observe the jar with a hand lens. Record your observations.
5. Shine a flashlight on the water for five minutes. Examine the shrimp with your hand lens. Describe what happens to the shrimp. Do they move toward or away from the light?

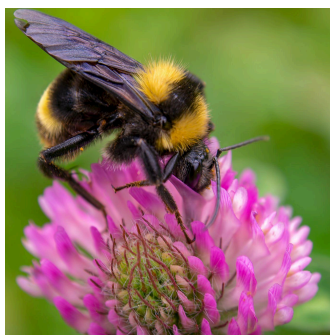


Questions:

1. How long did it take for the shrimp eggs to hatch? _____
2. Which way did the brine shrimp move when you shined the light on them? _____

As stated earlier, all of the things that organisms do to stay alive are called the **life functions**. Obtaining energy, reproducing, growing, and getting rid of wastes are life functions. So are moving and responding to changes.

In some ways, nonliving things (like robots) seem to carry out life functions. However, to determine if something is alive, we cannot use any *single* life function. Living things carry on all of the life functions.



STAYING IN BALANCE = HOMEOSTASIS

Can you think of problems that might occur if a flower makes too much or too little nectar? How about a frog that responds too quickly or too slowly to an approaching snake? How about a human who doesn't drink enough or sweat enough on a very hot day - or who doesn't seek shelter when it's freezing outside?

Organisms try to perform just the right amount of each of the life functions. Scientists use the term **homeostasis** (HO-me-o-STAY-sis) to describe this balance. ["Homeo" means similar; "stasis" means stable.]

It takes energy to carry out life functions. An organism that puts too much or too little energy into completing a life function is not likely to survive. As you learn about organisms during this course, ask yourself, "How is this organism staying in balance?" In other words, how is it maintaining homeostasis?

----- REVIEW -----

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I. In each blank write the word that fits best. Choose from the words below.

energy	homeostasis	wastes	respond	functions	grow
organism	oxygen	move	reproduce	temperature	robot

Any living thing is an _____. Four things that all organisms do are _____, _____, _____, and _____. Living things get _____ from the air. They get rid of _____. The things that an organism does to stay alive are its life _____. Organisms put energy into carrying out life functions, and to maintain _____.

II. Write the word that matches each statement.

- | | | |
|-------------|----------------|------------------|
| grow | respond | reproduce |
|-------------|----------------|------------------|
- A. _____ An earthworm moves away from light.
- B. _____ A dog gives birth to puppies.
- C. _____ A tree becomes taller.

III. You are an astronaut on another planet. You find an object that moves. How might you decide if it is an organism?