

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. You have likely seen a video of robots at work in a factory.

You may have watched a robot cut someone's lawn or vacuum carpets. There are even robots that "hear" and obey certain commands, and robots that are able to "smell" a small indoor fire - and put it out! 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!

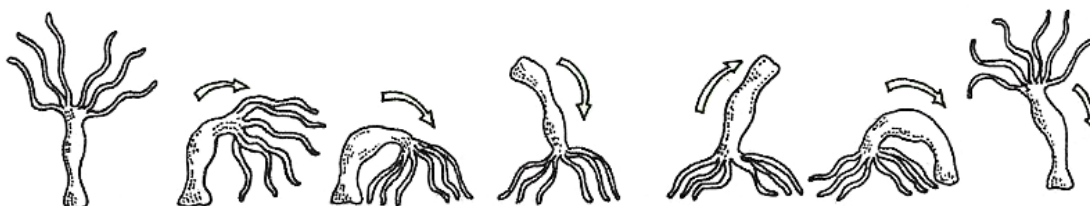
What Living Things Do

Look around you. What living things do you see? Anything that is alive is an **organism** (OR-guh-niz-um). Any animal, any plant, even any living thing too small for us to see, is an organism. Of course, you are an organism!

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

▸ **MOVE** Living things can **move**, even if they stay in one place. The hydra (HY-druh) shown below 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!

Most plants stay put. However, one called tumbleweed is easily blown from place to place.



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



Mimosa leaves are open during the day. They close at night, or when they are touched.

▸ **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.

▸ **RESPOND** Living things react, or **respond**, to changes in the environment. An organism's **environment** (en-VY-run-munt) is everything that is around it. Touch the leaves of a mimosa tree, and they respond by closing up.

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

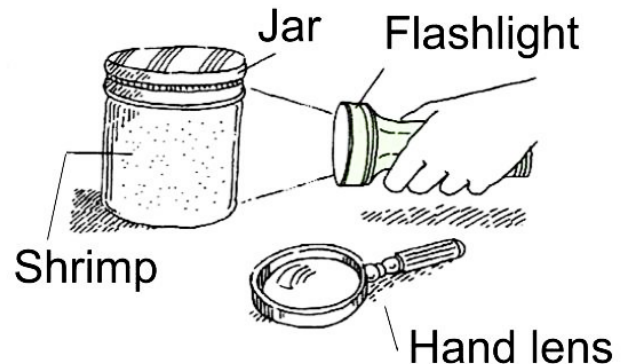
➤ To Do Yourself

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? _____

▸ **REPRODUCE** Living things can make more of their own kind, or **reproduce**. A pig can produce more pigs. The seeds of a corn plant become new corn plants. Yogurt gets its tangy taste from the work of tiny bacteria (bak-TEER-ee-uh) that reproduce by splitting in half.

▸ **USE FOOD, OXYGEN, WATER**

▸ **HAVE RIGHT TEMPERATURE**

Living things need energy to stay alive. **Food** supplies energy. Animals and other organisms take in food. Plants and plant-like living things make their own food.

Most living things also need and use oxygen (OK-si-jun) to help get energy from food. **Oxygen** is a part of the air that you breathe.

Other basic needs of living things are water and the right temperature. The environment supplies all of these needs: food, oxygen, water, and the right temperature.

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

As stated earlier, all of the things that organisms do to stay alive are called the **life functions**. Moving, growing, and responding are life functions. So are reproducing, using food and oxygen, and getting rid of wastes.

In some ways, nonliving things seem to carry out some life functions. A hang glider moves in the wind. Blow air into a beach ball and it grows larger. Stretch and let go of a rubber band, and it reacts. A robot can even make another robot. So, you cannot use any *single* life function to tell if something is alive. Living things carry on all of the life functions.

REVIEW

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

energy	environment	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 _____. Everything around a living

thing is its _____.

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?
