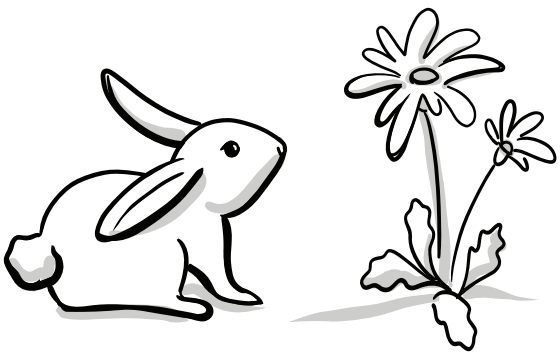
# Needs of Plants and Animals



Plants and animals have needs that help them survive. Put *A* next to the things animals need, put *P* next to the things plants need, and put *AP* if it is a need of both animals and plants.

____ A. oxygen from air

____ B. carbon dioxide from air

____ C. water

____ D. energy from sunlight

____ E. energy from food

____ F. material from food for growth and repair

____ G. shelter

____ H. space to live and grow

____ I. the right temperature

____ J. minerals

Explain your thinking.

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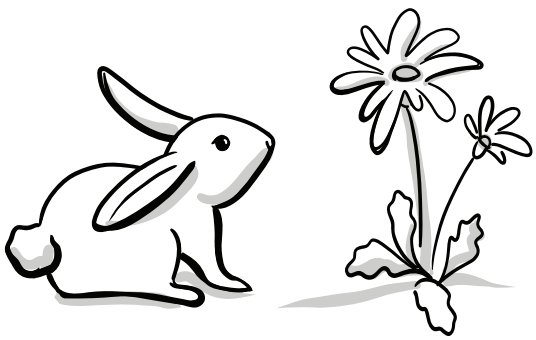
# Necesidades de Plantas y Animales



Las plantas y los animales tienen que cubrir ciertas necesidades para poder sobrevivir. Coloca una *A* al lado de las cosas que necesitan los animales, coloca una *P* al lado de las cosas que necesitan las plantas, y coloca *AP* si es una necesidad tanto de los animales como de las plantas.

____ A. oxígeno del aire

____ B. dióxido de carbono del aire

____ C. agua

____ D. energía de la luz solar

____ E. energía de los alimentos

____ F. materia de los alimentos para crecer y reparar.

____ G. refugio

____ H. espacio para vivir y crecer

____ I. minerales

____ J. temperatura adecuada

Explica tu razonamiento.

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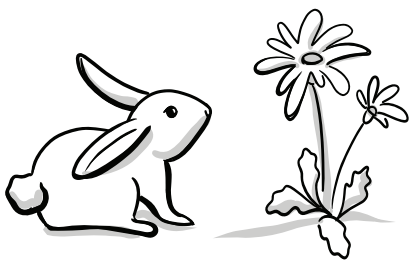
# Needs of Plants and Animals

## Teacher Notes



### Purpose

The purpose of this assessment probe is to elicit students' ideas about the needs of plants and animals. The probe is designed to reveal whether students recognize that there are similarities and differences between the needs of plants and animals.

### Type of Probe

Concept-based justified list

### Related Concepts

Needs of organisms

### Explanation

The best answers are: (A) *AP*—oxygen from air; (B) *P*—carbon dioxide from air; (C) *AP*—water; (D) *P*—energy from sunlight; (E) *AP*—energy from food; (F) *AP*—material from food for growth and repair; (G) *A*—shelter; (H) *AP*—space to live and grow; (I) *AP*—the right temperature; (J) *AP*—minerals. Both animals and plants use oxygen for respiration (A), but only plants use carbon dioxide for photosynthesis (B). Carbon dioxide is a waste product for animals. Plants use energy from sunlight to make their food (D). They also use energy from the food they make to carry out their life processes. Animals use energy from food, but energy from sunlight is not a direct need of animals; although some students may argue that some animals, such as reptiles, need sunlight for thermoregulation. Both plants and animals use material from food (molecules that food is broken down into) for growth and repair (F). Typically, animals require shelter such as a den, nest, hole in the ground, home, etc.; although some students may argue that plants grow best in areas that are sheltered from environmental effects (G). Both plants and animals need space to live and grow (H). Overcrowding limits availability of resources. Some animals, such as mammals, are able to regulate their body temperatures but still require a range of temperatures in order to survive (I). Temperature is critical to plant growth

and survival. Both plants and animals need minerals (J). Animals typically get minerals such as salt, calcium, iron, etc. from the foods they eat. Plants typically acquire minerals and other nutrients such as nitrogen, phosphorous, potassium, and magnesium from the soil.

## Administering the Probe

This probe can be used with elementary, middle, and high school students. Remove items elementary students may not be familiar with. You can adapt the probe by having students select the things only plants need or only animals need. A Venn diagram or other graphic organizer can be used with this probe.

## Related Disciplinary Core Ideas From *A Framework for K–12 Science Education* (NRC 2012)

### K–2 LS2.A Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow.

### 3–5 LS1.C Organization for Matter and Energy Flow in Organisms

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.

### 6–8 LS1.C Organization for Matter and Energy Flow in Organisms

- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use.
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.

### 9–12 LS1.C Organization for Matter and Energy Flow in Organisms

- Cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken down and new compounds are formed that can transport energy to muscles.

## Related Research

- A study by the Department of Education in England of age 5–11 children showed that they are likely to learn that living things depend on their environment to survive; that animals (including humans) need air, water, and nutrients from food to keep them alive; and that plants need air, water, and light (to make their own food), plus nutrients from soil (Department for Education 2013).
- Horizon Research, Inc. identified commonly held ideas middle school students had about matter and energy in living systems, including (1) energy needed by animals is different from that needed by plants; and (2) animals, not plants, break down food into simpler substances that are used for growth and repair of parts and tissues (Taylor et al. 2012).
- A large study of 15-year-old students revealed that only half recognized that plants use oxygen for respiration (Driver et al. 1994).
- Early studies showed there is little understanding of food providing energy for plants' life processes (Bell et al. 1985).

## Suggestions for Instruction and Assessment

- This probe can be used as a card sort. Print the answer choices on cards and have students sort them into three columns: Needs of Plants, Needs of Animals, Needs of Both or Plants and Animals. A fourth column can be added for Unsure, We Do Not All Agree, or Need More Information.
- For older students, ask them to link the needs of plants and animals to the needs of their cells.
- For younger students, link the needs of plants and animals to how they obtain their needs.
- A similar probe, "Needs of Seeds," reveals what students think seeds need to germinate and grow (Keeley 2021).

## References

Bell, B. and A. Brook. 1984. Aspects of secondary students' understanding of plant nutrition. *Children's Learning in Science Project*. University of Leeds, UK: Centre for Studies in Science and Mathematics Education.

Department for Education. 2013. Science programmes of study: Key stages 1 and 2: National curriculum in England.

Driver, R., A. Squires, P. Rushworth, and V. Wood-Robinson. 1994. *Making sense of secondary science: Research into children's ideas*. London: RoutledgeFalmer.

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National Research Council (NRC). 2012. *A framework for K–12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.

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