Educational Innovations, Inc.

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Surprising Science for Kids:

Living Things

KIT-545

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Welcome to Surprising Science for Kids: Living Things

Grades 5-8

Your **Surprising Science for Kids: Living Things** kit includes almost everything you need to perform hands-on experiments and dynamic demonstrations related to life science.

Biology is the natural science that studies life. The name comes from the Greek words *bios* (life) and *logos* (study). The world around you is teaming with life, and though it may not seem to be, everything is connected in one way or another. When the balance of an ecosystem is disrupted, it can have major effects on everything in it. This is one reason we study biology. We have gathered some exciting experiments in this kit. We hope you enjoy them!

Included in this kit:

- 1 Liter plastic bottle
- Packet of active yeast
- 12 packets of sugar
- Balloon
- 6 lima beans
- Plastic bag
- Bag of soil
- Cup
- 1 piece of cardboard
- Shrinkles® plastic
- Plant and animal cell templates
- 2 plastic loops for cells
- 2 toothpicks
- 4 craft sticks
- 1 pipe cleaner
- Rubber bands
- 2 plastic spoons
- 3 marbles
- Small tan seeds
- Paper clips
- Cotton balls
- 8 anatomically accurate sea turtle models
- Grey construction paper
- Black construction paper
- 30 grey seeds
- 30 black seeds

You will also need:

- Water
- Scissors
- Cookie sheet
- Hole punch
- Stop watch or timer
- Paper towels
- Colored pencils or markers
- Tape
- Aluminum foil
- Oven or toaster oven

Vocabulary

Abiotic Factors

Nonliving things in an ecosystem that includes physical factors (examples include water, soil, light, energy)

Biotic Factors

Living things in an ecosystem (examples include birds, mushrooms, leaves, bacteria)

Ecosystem

A community or group of living organisms that live in and interact with each other in a specific environment

Microorganism

A microscopic organism too small to be seen with the naked eye

Photosynthesis

The process by which plants use the energy from sunlight to make their own food

Activity 1:
Is It Alive?

Background Information:

All living things (also known as **biotic factors**) are made of cells which are capable of changing food into energy. Energy is a non-living or **abiotic factor**.

Microorganisms are biotic and made up of very few cells. Some are even made of a single cell, yet they are still able of carrying out all of life's processes. An example of this is yeast, which is a member of the fungus family that includes mushrooms. Fungus is different from plants because it does not have **chlorophyll** (the green substance in leaves that helps make food for plants). Therefore, it cannot **photosynthesize**, or use the energy from sunlight to make its own food. Yeast needs sugar and starch to create energy. It does this by changing them into carbon dioxide and alcohol.

Materials:

- 1 Liter plastic bottle
- 12 packets of sugar
- A packet of active dry yeast
- 1 cup of very warm water (not included)
- Balloon

Procedure:

1. Add a cup of very warm water (100° C) into your plastic bottle. Warm water is important in order to make the yeast active.

2. Add the packet of yeast and *gently* swirl it in the bottle for a few seconds.

3. Now add the sugar and swirl the mixture around for a few more seconds, until it dissolves. Yeast needs food for energy so it will begin to eat the sugar. What do you notice after you set the bottle down? Draw your observations here:

Activity 3:
Grow a Maze

Now that your lima beans have germinated, why not keep them going… and growing? All plants need sunlight to make food. This process is called **photosynthesis**. But what happens if a plant doesn't have access to direct sunlight? What lengths will it go to? Here's your chance to find out.

Background Information:

A **stimulus** is a change in the environment that living things respond to. **Tropism** is a plant's growth in response to a stimulus. The word **tropism** is taken from the Greek word *tropos* (a turning).

Materials:

- Germinated lima beans
- 1 piece of cardboard
- Tape (not included)
- Cup
- Scissors (not included)
- Water (not included)
- Soil
- Box from your kit

Procedure:

1. Add soil to the cup until it is approximately ¾ full.
2. Plant a couple of your germinated lima beans in the soil, about one inch below the surface of the soil.
3. Water the soil and place in a sunny window.
4. Using the box that your kit came in (or a shoe box**), with the help of an adult**, cut a large, rectangular window at one end. A serrated knife may work best.

5. Tape the cardboard piece about two-thirds of the way from the bottom of the box so it resembles a shelf that spans about ¾ of the way across the box, leaving an opening on the opposite side of the top hole.
6. Once your lima bean sprouts through the soil, place the cup into the box. The cup should be in one corner and the shelf's opening should be on the opposite side of the cup.

Activity 4:
Let's Cell-ebrate Cells!

continued

Materials:

- Shrinkles® plastic sheet
- Plant and animal cell templates (p. 13)
- 2 plastic loops
- Cookie sheet (not included)
- Hole punch (not included)
- Colored pencils or fine permanent markers (not included)*
- Tape (optional, not included)
- Aluminum foil (not included)
- Scissors (not included)
- Oven or toaster oven (not included)

*** NOTE: Do not use wax crayons or oil-based colored pencils.**

Procedure:

1. Position a blank Shrinkles® sheet **rough side up** over the top of the cell diagram you wish to replicate (page 13). Once the sheet is in position, you may tape down the corners to prevent the sheets from sliding apart.

2. Using a black colored pencil or a fine lined permanent marker (for sharper lines), trace over the lines in the cell diagram, and all its organelles.

3. Use your colored pencils or markers to color in the plant and animal cell designs. NOTE: Colors will intensify and become more vibrant after baking.

4. OPTIONAL: You may want to color code the "Cell Organelles" sheet on page 12 to help identify the cell structures.

5. Use scissors to carefully cut around the outside black border of the cell wall. Be sure to round out any sharp edges.

6. Punch a hole in the finished piece if you wish to attach a plastic loop after baking.

7. **With the help of an adult**, preheat a toaster oven or conventional oven to 325 degrees.

8. Place some aluminum foil on a baking tray. Turn up one corner of the foil sheet to make it easier to remove it from the oven later.

Activity 4:
Let's Cell-ebrate Cells!

continued

9. Place your cell designs on the foil, **colored side up**. If you are shrinking more than one cell at a time, be sure to keep them away from one another.

10. Carefully place your baking tray into the preheated oven.

11. Watch closely as your colored creation quickly begins to twist, curl, and shrink down to approximately one-third of its original size!

12. Once the shrunken cell has reached the point where it lies flat, leave it in the oven for an additional 15 seconds.

13. Carefully remove the tray (with foil and cell) from the oven and immediately press down on it with an oven mitt or a book to flatten the piece.

14. Allow another 30 seconds for your cell to completely cool before handling.

15. Find a place where you would like to hang your new cell model (i.e., zipper pull, backpack, etc.) and secure it there with a plastic loop or similar.

Tips and Tricks:

- To minimize curling while baking, place a sheet of heavyweight vellum or parchment paper on top of the pieces in the oven.
- If your design is curled after baking, flatten it with a spatula or a small piece of cardboard.
- Don't touch the pieces when they're hot! Chopsticks are a good way to move them around without burning your hands.
- Baking pieces at a lower temperature for a longer time will minimize distortion, especially in larger designs.

Question to Consider:

Now that you have created a model of both a plant and an animal cell, what are the differences you have noticed? What are the similarities?

Activity 5:
Bird Beak Buffet

Background Information:

Living things have basic features and adaptations that help them to survive and reproduce. **Adaptations** are physical traits or behaviors that allow an organism to successfully survive in its environment. For example, a giraffe has a long neck to help it eat leaves in tall trees. A puffer fish can inflate several times its normal size to protect it from predators.

Have you ever noticed that different species of birds have differently-shaped beaks? Over time, birds living in the same habitat have had to adapt to be able to eat and gather different types of food in order to avoid competition with one another to survive.

Materials for making beaks:

- Toothpicks
- Rubber bands
- Aluminum foil (not included)
- 4 craft sticks
- 2 plastic spoons
- Tape (not included)
- 1 pipe cleaner
- Cardboard

Materials for food:

- 3 marbles
- 2 lima beans
- Small tan seeds
- Cotton balls
- Paper clips

Activity 6:
Sorting Sea Turtles

Background Information:

Scientists group living things together based on similar physical traits or characteristics. They examine the way the organism looks—for example, whether it has a backbone or not. This is an important way to see how organisms are related to each other. A **dichotomous key** is a tool used by scientists to identify living things in a group by means of answering yes or no questions about the organism. The word **dichotomous** means 'divided into two parts,' as each question about an organism in the key has two choices. Once a question is answered, then two more choices are presented until the last choice is made and you have identified each individual organism.

Materials:

- Eight anatomically accurate sea turtle models
- Sea turtle vocabulary sheet (p. 19)
- Sea turtle dichotomous key (p. 18)
- Answer key (p. 22)

Procedure:

1. Review the vocabulary included with the key (on page 19) so you are familiar with sea turtle anatomy.

2. Observe the physical traits of each of the eight sea turtle models very closely. Pay special attention to the scutes (the bony plates on the top of the sea turtle's shell). This is the most general trait that sea turtle biologists use to identify individual species.

3. Two choices are written for each number. Read the choices and while answering yes or no, follow the key until you have identified all eight sea turtles.

Questions to Consider:

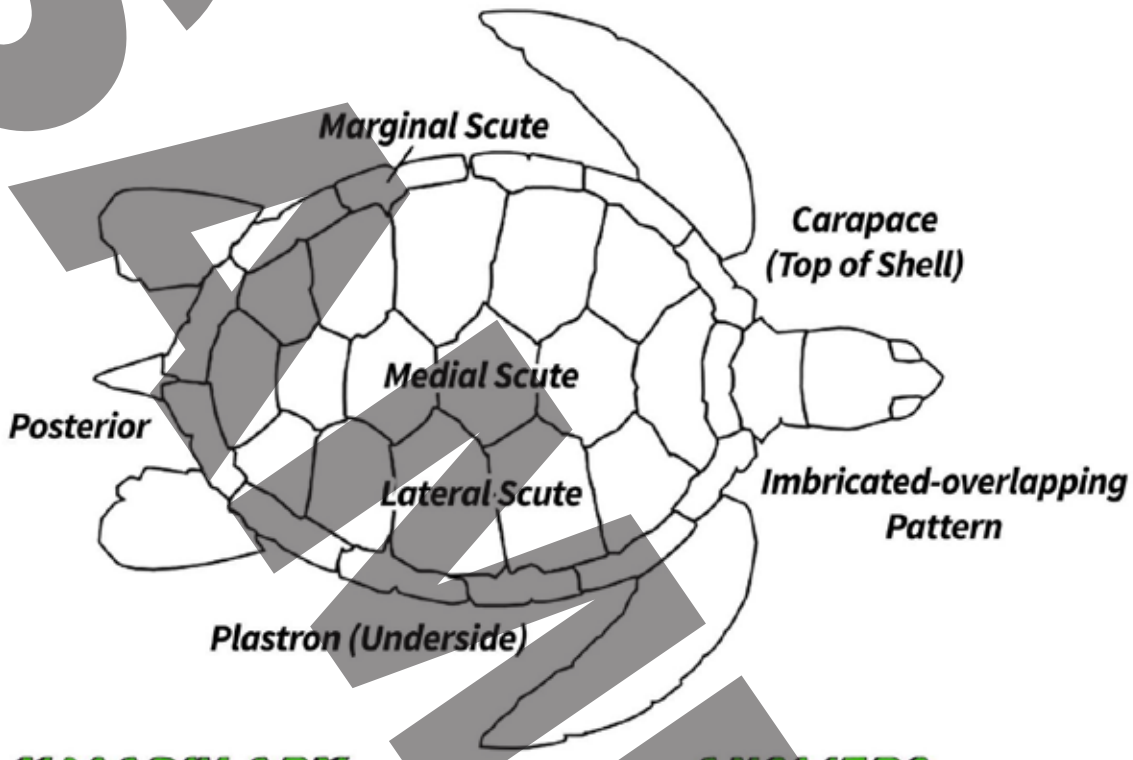
1. In your own words, describe why a scientist might use a dichotomous key.

2. If you were snorkeling over a reef, explain how you would know if you were swimming next to a Kemp's Ridley or Loggerhead sea turtle?

Activity 6:
Sorting Sea Turtles

continued

Write your answers below.



VOCABULARY

carapace - top of shell

scute - bony external plate

marginal - on the edge

medial - pertaining to the middle

terminal – end

lateral - pertaining to the sides

posterior - back or rear

plastron - underside of shell

imbricated - to overlap in a regular pattern

beak – mouth of the turtle

ANSWERS

Place your answers next to the corresponding number.

The gender of a turtle can be determined by the length of the tail. The tail of a male extends beyond the carapace; a female's tail does not. Circle M or F.

1. M F	2. M F
3. M F	4. M F
5. M F	6. M F
7. M F	8. M F