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The Seven Characteristics of Life

Grade Level: 3rd grade

Abstract: The purpose of this lesson is for students to learn the characteristics of living organisms. Students will need to have a general knowledge of living and nonliving things. They will learn about the specific characteristics organisms need to be considered living by researching one of the seven characteristics. Once they learn about their characteristic they'll create a song and teach it to the other students.

Utah State Core:

Standard 2

Students will understand that organisms depend on living and nonliving things within their environment.

Objective 1

- Identify characteristics of living and nonliving things.
- Classify living and nonliving things in an environment.

Instructional time: 90 minutes (Can be broken into two lesson periods)

Background Information:

All living things must have these characteristics:

- **Feeding:** All living organisms need to take substances from their environment to obtain energy, to grow and to stay healthy.
- **Movement:** All living organisms show movement of one kind or another. All living organisms have internal movement, which means that they have the ability of moving substances from one part of their body to another. Some living organisms show external movement as well - they can move from place to place by walking, flying or swimming
- **Breathing or Respiration:** All living things exchange gases with their environment. Animals take in oxygen and breathe out carbon dioxide.
- **Growth and Development:** When living things feed they gain energy. Some of this energy is used in growth. Living things become larger and more complicated as they grow.
- **Sensitivity:** Living things react to changes around them. We react to touch, light, heat, cold and sound, as do other living things.
- **Reproduction:** All living things produce young. Humans make babies, cats produce kittens and pigeons lay eggs. Plants also reproduce. Many make seeds which can germinate and grow into new plants.
- **Excretion:** Excretion is the removal of waste from the body. If this waste was allowed to remain in the body it could be poisonous. Humans produce a liquid waste called urine. We also excrete waste when we breathe out. All living things need to remove waste from their bodies.

Information from: <http://www.saburchill.com/chapters/chap0001.html>

Examples of Living Organisms:

Brine Shrimp
Insects
Plants
Weeds
Birds

Examples of Nonliving:

Air
Rocks
Wood
Fire
Water

Living organisms depend on nonliving things in their environment for survival.

Vocabulary:

Organism: a form of life composed of mutually interdependent parts that maintain various vital processes.

Living: having life; being alive; not dead

Nonliving: not having life; not being alive; dead or never was alive

Characteristic: a distinguishing trait, quality, or property

Respiration: the act of respiring; inhalation and exhalation of air; breathing.

Excretion: the removal of waste from the body such as: urine, sweat, certain plant products, etc.

Sensitivity: the ability of an organism or part of an organism to react to stimuli; irritability

Reproduction: the natural process among organisms by which new individuals are generated and the species perpetuated.

Intended Learning Outcomes:

- Students will recognize the different characteristics that organisms need to be considered alive.
- Students will be able to classify living and nonliving things in an environment.
- Students will understand that organisms use nonliving things in the environment to survive.

Materials:

- A rock disguised as a student (a decorated rock).
- Pictures of living and non-living things
- 11 x 17 paper
- Tape
- Large sheets of lined paper
- Markers
- Nice singing voice
- Description of 7 characteristics (see attachment)

Initiation Activity: The point of this activity is to help students understand the importance of learning about living and nonliving organisms.

- Come into the class and introduce your pet rock as a new member of the class.

- Ask, in a very serious manner, for a volunteer to take the rock around the school and introduce it to the principal, secretaries, maintenance crew, and lunch servers. This should stir up quite a conversation
- Provide thought provoking questions such as: “Can I have the same expectations for our new students that I have for you all? Why not?”
- Hopefully students will point out that the rock is not alive which will lead into the discussion of what characteristics do living and nonliving things have.

Prior Knowledge Assessment:

Assess students’ knowledge of living and nonliving

- Pair students up.
- Pass out 10 pictures of living and non-living things (make sure all students have the same pictures).
- Provide 11 x 17 paper for each partnership
- Have students fold the paper in half (hamburger style).
- Have them label one side living and one side nonliving.
- Have pairs tape pictures in the correct column.
- Create columns for living and nonliving on the board.
- Have each pair bring up one picture and put it in the column where they think it belongs.
- Have students explain why they put them there. Ask, “What about this picture makes you think it’s alive or not alive?”
- As you have students explain their reasons, begin to generate a list of characteristics of living things.
- At the end of this activity have students write their own characteristics of living and nonliving things in their science journals. Collect to assess their prior knowledge.

Instructional Procedures:

Part I: The initiation activity will lead students into understanding the 7 characteristics of living things.

- Label the 7 characteristics on the board.
- Tell students that they are going to get into 6 groups and make up a song about one of the characteristics to teach to the class.
- Provide an example of your own, probably using the reproduction characteristic to avoid any awkward situations.
 - Example: “All living things reproduce, reproduce, reproduce, Dogs make puppies, nice and new. Reproduction!!!” (Sing to the tune of *London Bridge is Falling Down*.)
- Form students into 6 groups.
- Provide each group with a piece of paper describing one of the characteristics (See attachment).
- Allow students about 15 minutes to make up a song and have each group write it NICELY on a big piece of lined paper for the class to read. (You may want to laminate the songs to use over and over again!)
- Walk around and observe students to make sure that they understand the instructions and are on task.

- Have each group teach and present their songs to the class.

Assessment:

Question and Answer-

After students have presented ask specific questions about what they should have learned.

1. How many characteristics are there?
2. What are they?
3. Let's sing the song about "growth and development" or whatever characteristic you choose.
4. Hold up a picture and ask if it is living or nonliving.
5. Why is it living or nonliving?

Observe students' answers.

The Seven Characteristics of Living Things

Feeding

All living organisms need to take substances from their environment to obtain energy, to grow and to stay healthy.

Movement



All living organisms show movement of one kind or another. All living organisms have internal movement, which means that they have the ability of moving substances from one part of their body to another. Some living organisms show external movement as well - they can move from place to place by walking, flying or swimming.

Breathing or Respiration

All living things exchange gases with their environment. Animals take in oxygen and breathe out carbon dioxide.

Excretion

Excretion is the removal of waste from the body. If this waste was allowed to remain in the body it could be poisonous. Humans produce a liquid waste called urine. We also excrete waste when we breathe out. All living things need to remove waste from their bodies.

Growth



When living things feed they gain energy. Some of this energy is used in growth. Living things become larger and more complicated as they grow.

Sensitivity

Living things react to changes around them. We react to touch, light, heat, cold and sound, as do other living things.

Reproduction

All living things produce young. Humans make babies, cats produce kittens and pigeons lay eggs. Plants also reproduce. Many make seeds which can germinate and grow into new plants.

<http://www.saburchill.com/chapters/chap0001.html>

Does Aeration Affect the Hatching of Brine Shrimp Cysts?

Grade Level: 3rd grade

Abstract: Students will understand how the seven characteristics of living organisms relate to brine shrimp. They will need to know the seven characteristics of life. This lesson focuses on the fact that all living things need oxygen. Students will be able to observe the affect of oxygen on brine shrimp cysts through an experiment in which they will test if aeration affects the hatching of brine shrimp cysts.

Utah State Core:

Standard 2: Students will understand that organisms depend on living and nonliving things within their environment.

Objective 1

- Identify characteristics of living and nonliving things.
- Classify living and nonliving things in an environment.
- Determine whether or not brine shrimp are living or nonliving

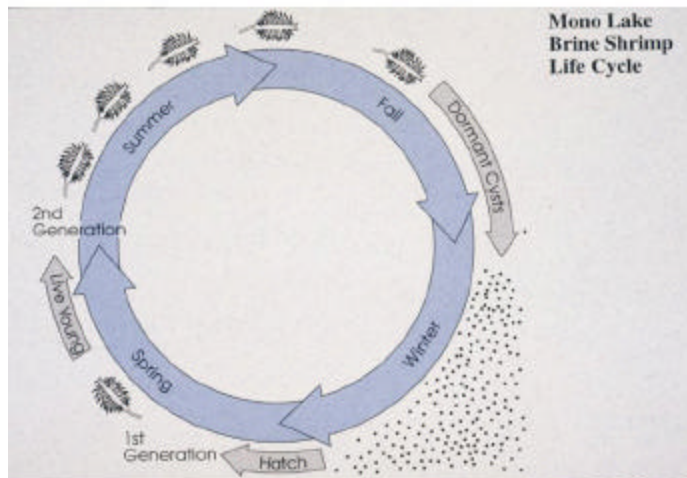
Instructional Time: 2-4 days with experiment

Background Information:

This lesson uses brine shrimp as a model of living organisms and has students critically think about the 7 characteristics of life, and whether or not the cysts fall into that category. Brine shrimp are living organisms because they move, reproduce, excrete, breathe, grow and develop, need food, and are sensitive to their environment. In other words they have the 7 characteristics of living organisms.

1. **Reproduction:** The brine shrimp have a simple life cycle that is very well suited for the environment that they live in. They are one of the few multi-cellular organisms that have flourished in the Great Salt Lake. The baby brine shrimp hatch in the spring from the dormant cysts. However, towards the end of fall, males are required to produce overwintering cysts. The production of cysts requires sexual reproduction, which means that males need to contribute sperm to the egg. This special adaptation allows the brine shrimp to flourish in the Great Salt Lake and maintains genetic variability.

2. **Growth and Development:**



3. Breathe: Brine shrimp require oxygen to survive, which they get from algae and other organisms living in the lake. Very red colored brine shrimp are a sign of low oxygen levels, whilst pale, blue to green brine shrimp (depending on the food they are consuming) indicate medium to high oxygen levels. When oxygen becomes limited, brine shrimp react by producing hemoglobin molecules, which enables them to "absorb" the dissolved oxygen still present in the medium.
4. Food: Adult shrimp feed primarily on phytoplankton (algae) suspended in the water but can also "graze" on benthic algae such as blue-greens or diatoms growing on the bottom of Great Salt Lake in shallow areas.
5. Movement: Brine shrimp are always in motion because they are filter feeders.
6. Excretion: Brine shrimp eat therefore they excrete waste which creates oolitic sand.
7. Sensitivity: Brine shrimp are affected by temperature, salinity, and other factors in their environment.

Vocabulary

Brine Shrimp: a small crustacean, *Artemia salina*, of the order Anostraca, common to saline lakes, including Great Salt Lake in Utah.

Brine Shrimp Cysts: dormant brine shrimp babies.

Aeration: exposure to air (oxygen)

Intended Learning Outcomes:

- Students will understand how the seven characteristics of living organisms relate to brine shrimp.
- Students will experiment with the fact that brine shrimp need oxygen. Is more really better when trying to hatch the cysts?

Materials:

- graphic organizer web
- brine shrimp cysts (can be purchased at: <http://www.brineshrimpdirect.com>, <http://www.pondsolutions.com/brineshrimp.htm>)
- adult brine shrimp or picture of one (<http://www.msj.edu/davisr/bio115/brinesch.htm>)
- 6 cups per group with lids with holes
- 10% salt water in each cup (14 tsp. of salt for every 1000 ml of water)
- straws
- Petri dishes
- Droppers to collect 1 ml of water
- Magnifying glass
- Journals for observations

Initiation and Prior Assessment

Pass around some brine shrimp cysts for students to observe. Ask students if they have any idea as to what they are looking at. Based on the previous lesson ask students if what they are looking at is living or not and why. Pass around examples of live brine shrimp. Assess students' prior knowledge by asking them what they already know about the Great Salt Lake and brine shrimp. Introduce the terms brine shrimp cysts and brine shrimp. Give background information on the habitat and lifecycles of brine shrimp.

Instructional Procedures:

- Provide web graphic organizer (see attachment).

- Brainstorm as a class why brine shrimp are living organism through the 7 characteristics discussed in the previous lesson.
- Fill out web together with the class (use background information).

Experimental Procedures:

Remind students that all living things need oxygen, therefore brine shrimp need oxygen. Ask the question, “Do brine shrimp cysts need oxygen?” Tell them they are going to get to explore this question by providing brine shrimp cysts with aeration. Introduce aeration.

Question: Does aeration have any effect (positive or negative) on the hatching of brine shrimp cysts?

- Have students get into groups of three or four and create a hypothesis according to the question. What do they think the outcome will be?
- Each group will have 6 cups of 10% salinity to place their brine shrimp cysts in.
- Each group will blow (with straws) into three of their cups three times a day for extra aeration. Three of the cups will not receive aeration.
- Each day, students will look at their cysts and write down what they observe.
- On the fourth day students will use a dropper and Petri dishes to obtain a more accurate measure of how many cysts have hatched.
- Have students use the droppers to take three separate samples for each cup.
- Each time students fill up the dropper count the hatched brine shrimp.
- Find the average of each cup and compare the results.
- Through these observations students should be able to come to some sort of a conclusion on whether or not extra aeration has any effect on the hatching of brine shrimp cysts.
- Tie to ideas of living/nonliving things.

Assessment: Students will keep a journal of their hypothesis, observations, and conclusion. Have students write about how this experiment relates to the characteristic of organisms’ need for air to be considered a living thing. Have students graph their results as a class and compare the similarities and differences. Students should copy the graph in their journals. Collect journal.

Rubric for journal:

5 points	Question
10 points	Hypothesis
15 points	Write up of Experiment
10 points	Observations
10 points	Conclusion/Results
5 points	Graph
15 points	Reflection on experiment and how it relates to the 7 characteristics of life

Total possible 70 points

Resources:

<http://www.ali-artemia.com/noframes/env.htm>
<http://www.isslr.org/userhtm/Melack/Slide27.JPG>
<http://www.msg.edu/davisr/bio115/brinesch.htm>
<http://people.westminstercollege.edu/faculty/tharrison/gslfood/studentpages/brine.html>
<http://fins.actwin.com/killietalk/month.200111/msg00239.html>

