

Name: _____

8th Grade Science

SUMMER PACKET

Part 1: Physics: *Newton's Laws of Motion*

$F = m \times a$ (Force equals mass times acceleration)

$a = F/m$ (Acceleration equals force divided by mass)

$m = F/a$ (Mass equals Force divided by acceleration)

Example: What is the acceleration of a 25 kg mass if a force of 175 N is applied to it?

Step 1: $a = F/m$

Step 2: $? = 175/25$

Step 3: $a = 7\text{m/s/s}$

1. What force is necessary to accelerate a 25 kg block at a rate of 300 m/s/s?
2. What is the mass of an object if a force of 200 N produces an acceleration of 4 m/s/s?
3. What force is necessary to accelerate a 1,000 kg car at a rate of 50 m/s/s?
4. What is the mass of an object if a force of 210 N produces an acceleration of 7 m/s/s?
5. What is the acceleration of a 15 kg mass if a force of 135 N was applied to it?
6. What is the force necessary to accelerate a 1,000kg car at a rate of 10 m/s/s?
7. A 12 kg mass is pushed with a 60 N force. How fast does it speed up?
8. What is the mass of an object if a force of 1,162 N produces an acceleration of 8m/s/s?

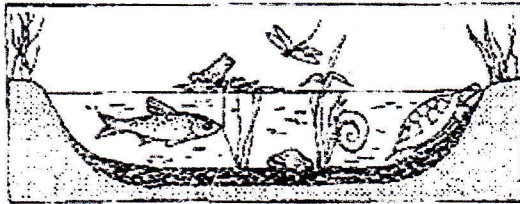
Part 2: Environmental Science: Ecological Succession

Succession, a series of environmental changes, occurs in all ecosystems. The stages that any ecosystem passes through are predictable. In this activity, you will place the stages of succession of two ecosystems into sequence. You will also describe changes in an ecosystem and make predictions about changes that will take place from one stage of succession to another.

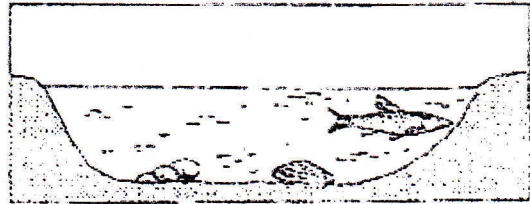
The evolution of a body of water from a lake to a marsh can last for thousands of years. The process cannot be observed directly. Instead, a method can be used to find the links of stages and then to put them together to develop a complete story.

The water level of Lake Michigan was once 18 meters higher than it is today. As the water level fell, land was exposed. Many small lakes or ponds were left behind where there were depressions in the land. Below are illustrations and descriptions of four ponds as they exist today. Use the illustrations and descriptions to answer the questions about the ponds.

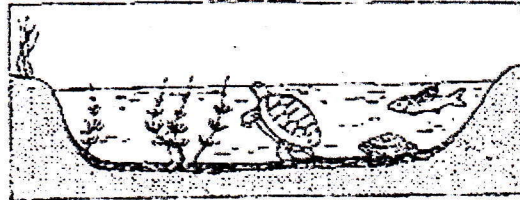
Pond A



Pond B



Pond C



Pond D



Pond A: Cattails, bulrushes, and water lilies grow in the pond. These plants have their roots in the bottom of the pond, but they can reach above the surface of the water. This pond is an ideal habitat for the animals that must climb to the surface for oxygen. Aquatic insect larvae are abundant. They serve as food for larger insects, which in turn are food for crayfish, frogs, salamanders, and turtles.

Pond B: Plankton growth is rich enough to support animals that entered when the pond was connected to the lake. Fish make nests on the sandy bottom. Mussels crawl over the bottom.

Pond C: Decayed bodies of plants and animals form a layer of humus over the bottom of the pond. Chara, branching green algae, covers the humus. Fish that build nests on the bare bottom have been replaced by those that lay their eggs on the Chara.

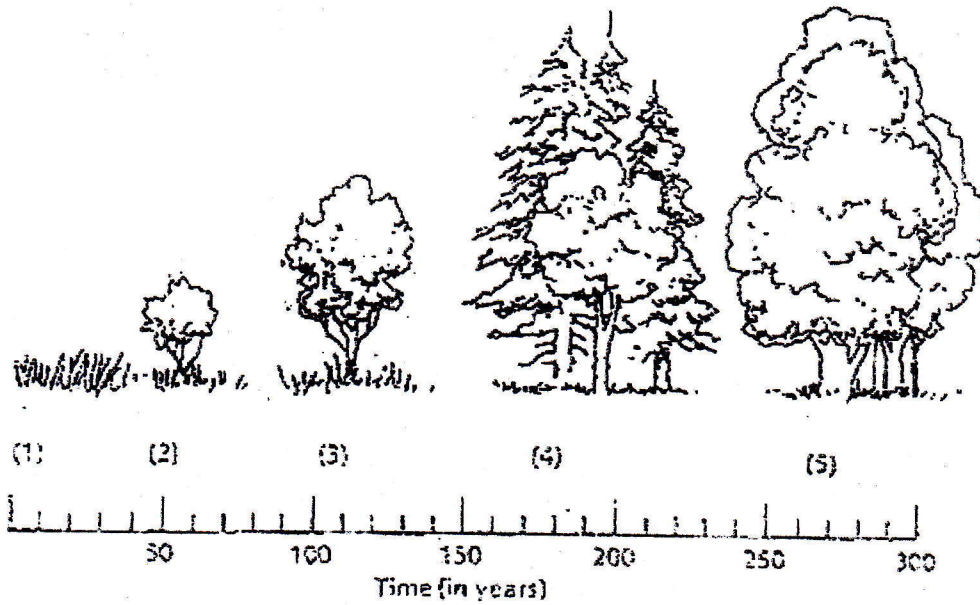
Pond D: The pond is so filled with vegetation that there are no longer any large areas of open water. Instead, the pond is filled with grasses. The water dries up during the summer months.

Questions

1. Write the letters of the ponds in order from the youngest, to the oldest.

2. Black bass and bluegill make their nests on sandy bottoms. In which pond would you find them? _____
3. What will happen to the black bass and blue gill as the floor of the ponds fills with organic debris? _____
4. Golden shiner and mud minnows lay their eggs on Chara. In which pond would you find them? _____
5. Some amphibians and crayfish can withstand periods of dryness by burying themselves in mud. In which pond(s) would they survive? _____
6. Dragonfly nymphs spend their early stages clinging to submerged plants. Then, they climb to the surface, shed their skins and fly away as dragonflies. Which pond is best suited for dragonflies? _____
7. In which pond will gill breathing snails be replaced by lung breathing snails that climb to the surface to breathe? _____
8. Some mussels require a sandy bottom in order to maintain an upright position. In which pond will they die out? _____

The climax community in the area of Michigan is a beech-maple forest. After the ponds are filled in, the area will undergo another series of stages of succession. This is illustrated below. Briefly explain what is happening in the diagram.



1.

2.

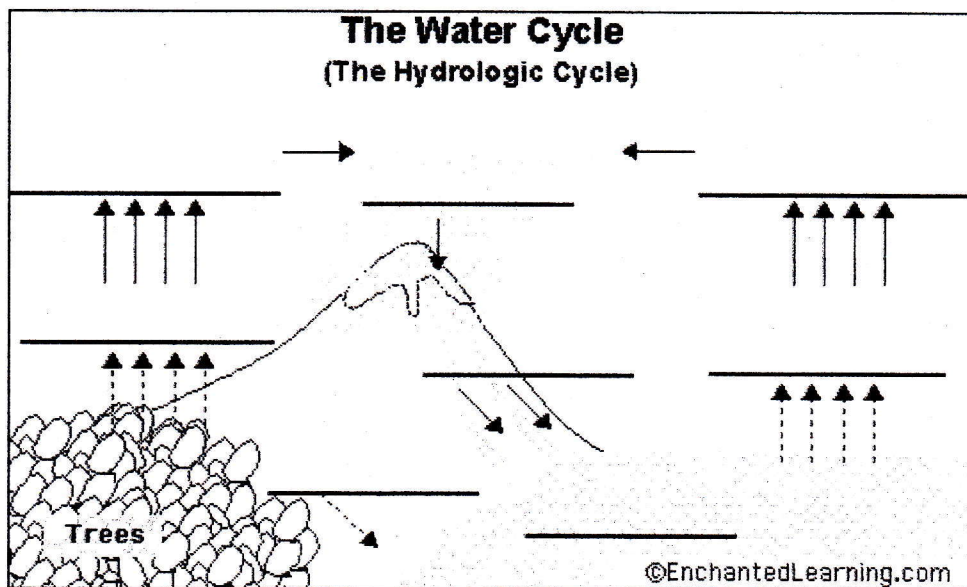
3.

4.

5.

Part 3: Environmental Science: *Cycles in Nature*

Read the definitions below, and then label the water cycle diagram.



Accumulation - the process in which water pools in large bodies (like oceans, seas and lakes).

Condensation - the process in which water vapor (a gas) in the air turns into liquid water. Condensing water forms clouds in the sky. Water drops that form on the outside of a glass of icy water are condensed water. (This term appears twice in the diagram.)

Evaporation - the process in which liquid water becomes water vapor (a gas). Water vaporizes from the surfaces of oceans and lakes, from the surface of the land, and from melts in snow fields.

Precipitation - the process in which water (in the form of rain, snow, sleet, or hail) falls from clouds in the sky.

Subsurface Runoff - rain, snow melt, or other water that flows in underground streams, drains, or sewers.

Surface Runoff - rain, snow melt, or other water that flows in surface streams, rivers, or canals.

Transpiration - the process in which some water within plants evaporates into the atmosphere. Water is first absorbed by the plant's roots, then later exits by evaporating through pores in the plant.

Part 5: Life Science: *Characteristics of Living Things*

Read each of the passages. Then, answer the questions that follow each passage.

Exploring caves can be dangerous but can also lead to interesting discoveries. For example, deep in the darkness of Cueva de Villa Luz, a cave in Mexico, are slippery formations called *snottites*. They were named snottites because they look just like a two-year-old's runny nose. If you use an electron microscope to look at them, you see that snottites are composed of single-celled organisms called prokaryotes, thick, sticky fluids, and small amounts of minerals produced by the prokaryotes. As tiny as they are, these prokaryotes can build up snottite structures that may eventually turn into rock. Formations in other caves look like hardened snottites. The prokaryotes in snottites are acidophiles. Acidophiles live in environments that are highly acidic. Snottite prokaryotes produce sulfuric acid and live in an environment that is similar to the inside of a car battery.

1. Which statement best describes snottites?

- A Snottites are prokaryotes that live in car batteries.
- B Snottites are rock formations found in caves.
- C Snottites were named for a cave in Mexico.
- D Snottites are made of prokaryotes, sticky fluids, and minerals.

2. Based on this passage, which conclusion about snottites is most likely to be correct?

- A Snottites are found in caves everywhere.
- B Snottite prokaryotes do not need sunlight.
- C You could grow snottites in a greenhouse.
- D Snottites create other prokaryotes in caves.

3. What is the main idea of this passage?

- A Acidophiles are unusual organisms.
- B Snottites are strange formations.
- C Exploring caves is dangerous.
- D Snottites are large, slippery prokaryotes.