Name ____________________ Date __________ Class __________

Enrich

Energy Flow in Ecosystems

The open ocean, like all land ecosystems, has many food webs. The chart below provides a list of animals in a typical South Atlantic food web and their sources of food energy. Study the table and answer the questions that follow.

Food Webs in the Ocean

Organisms	Obtain food energy from...
Squid	shrimp, fish
Algae	make their own food by photosynthesis
Fishes	shrimp
Penguins	squid

1. Which organisms are the producers?

____

2. Which organism is a first-level consumer?

____

3. What makes the squid's role different from that of other consumers listed in the table?

____

____

4. In the space below, draw the ocean food web. Label each organism to identify its energy role in the ecosystem.

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Enrich

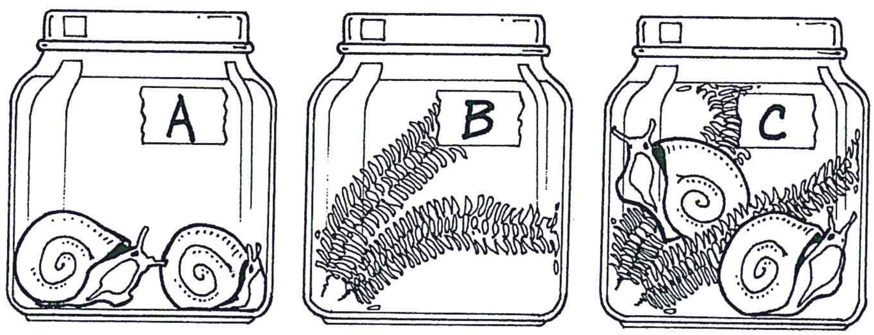
Cycles of Matter

Deepa wanted to study how oxygen and carbon dioxide move through ecosystems. To do this, she set up three jars to represent consumers, producers, and consumers and producers together. She tested the jars for the presence of oxygen and carbon dioxide. Deepa's procedure and results are shown below. Study this information and then use a separate sheet of paper to answer the questions.

Testing for Oxygen and Carbon Dioxide

Procedure

Bromthymol blue (BTB) is a chemical that turns yellow in the presences of carbon dioxide. In the presence of oxygen, BTB stays blue. Deepa put the same amount of BTB in the three jars, and varied the organisms she placed in each jar. In Jar A, she put two aquatic snails. In Jar B, she put two sprigs of Elodea, an aquatic plant. In Jar C, she put two snails and two sprigs of Elodea.



Results

Deepa examined the jars every day for three days. These are the observations she recorded.

Jar	Observations
A	The BTB solution turned yellow.
B	The BTB solution stayed blue.
C	The BTB solution stayed blue.

Analyze and Conclude

1. Why did the BTB solution in Jar A turn yellow?
2. Why did the BTB solution in Jar B stay blue?
3. Why did the BTB solution in Jar C stay blue?
4. Which jar showed what happens during the carbon and oxygen cycles in nature? Describe the process that occurred in that jar.

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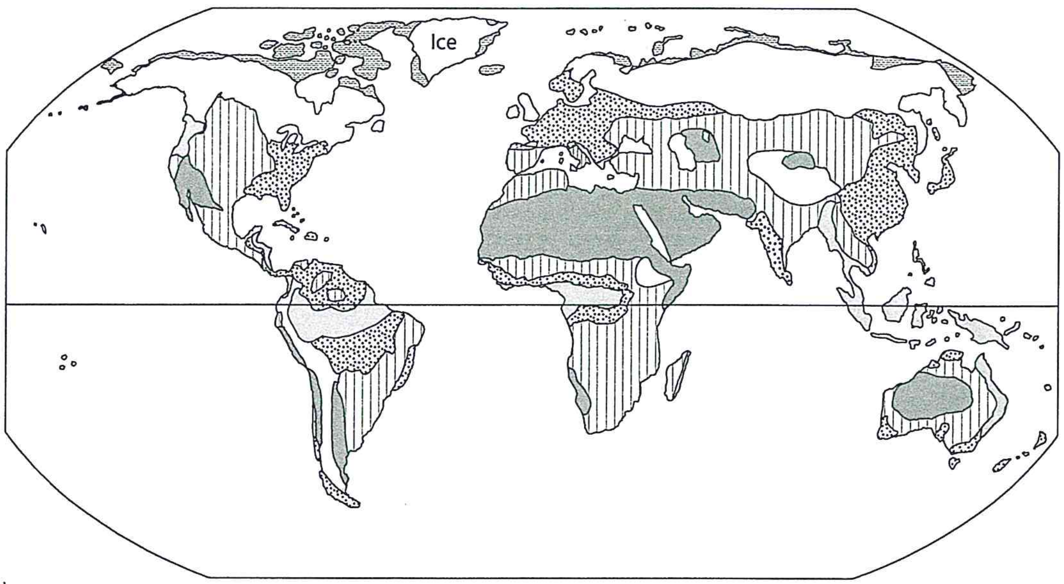
Enrich

Biomes

The map below shows the six major biomes on Earth. Examine the map carefully. Then follow the instructions below.



Key:

☐ ______________________	☐ ______________________
☐ ______________________	☐ ______________________
☐ ______________________	☐ ______________________

1. Label North America, South America, Europe, Asia, Africa, and Australia on the map.
2. Color each block in the key a different color.
3. Color the biomes on the map, using the same colors you used in the key.
4. Write the names of the biomes in the key.
5. Mark a red dot where you live. In which biome do you live?

____

6. Locate the equator on the map. Which biome is most common along the equator?

____

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Enrich

Aquatic Ecosystems

A hydrothermal vent is a place very hot water from Earth's crust rises to the ocean floor and is released into the surrounding seawater through cracks in the ocean floor. Read the passage and then answer the questions on a separate sheet of paper.

Hydrothermal Vent Communities

There are many ecosystems within the marine environment including estuaries, the intertidal zone, and the open ocean. Within each of these ecosystems, life is rich and diverse. The open ocean can be divided into two main zones, the surface zone, where light penetrates water to a depth of a few hundred meters, and the deep zone, where there is little to no light. In the surface zone, algae are the producers, using light energy from the sun to undergo photosynthesis and produce glucose, an energy-rich compound. In the deepest areas of the ocean, where there is no light, photosynthesis cannot take place. Although vast areas of the deep-ocean floor are empty of life, one unique community of organisms exists in some of the deepest areas of the ocean, around hydrothermal vents.

At hydrothermal vents, the hot water is rich in minerals, including sulfur compounds. Certain types of bacteria can produce glucose from the sulfur compounds through a process called *chemosynthesis*. These bacteria are producers. Like algae in the surface zone that use light energy to produce glucose, the bacteria use the energy in the sulfur compounds to do the same.

These communities have been found as deep as 2.2 km below the ocean surface. The bacteria in a hydrothermal vent community can live on rocks that are heated to temperatures of 110°C from the water gushing out of cracks in the ocean floor. They coat the hot rocks and are grazed on by shrimp. The shrimp and other grazers are eaten by crabs and fishes.

1. What process do producers in the surface zone undergo to produce glucose?
2. What are hydrothermal vent communities?
3. Which organisms are the producers in a hydrothermal vent community? What process do these organisms undergo to produce glucose?
4. How can these bacteria produce glucose without light energy from the sun?
5. Predict what would happen if the hot, sulfur-containing water stopped entering the surrounding ocean water.

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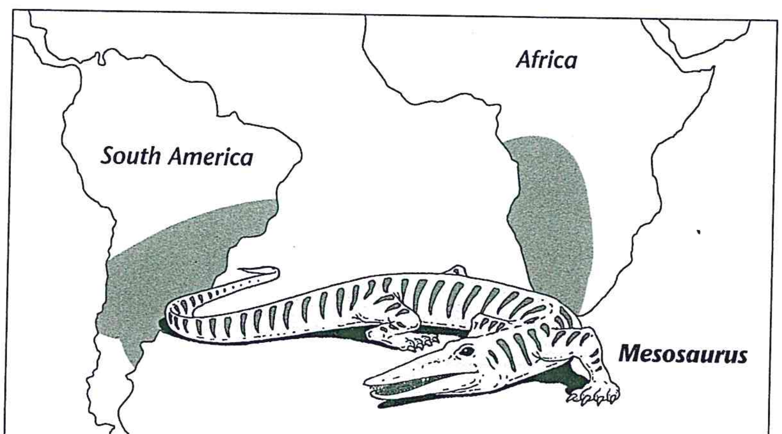
Enrich

Biogeography

Continental drift takes place over thousands of centuries and can affect where in the world organisms are located. Read the following descriptions. Then answer the questions on a separate sheet of paper.

Organisms and Continental Drift

1. Madagascar is a large island located about 400 kilometers off the southeast coast of Africa. Madagascar is home to about 15 species of monkeylike animals called lemurs that are found nowhere else in the world. Lemurs are related to the ancient ancestors of monkeys and apes that live in Africa today. What does this tell you about Madagascar's location millions of years ago? Why are there no lemurs in Africa today?
2. *Mesosaurus* was an aquatic reptile that lived in lakes and estuaries. Fossils of *Mesosaurus* have been found in eastern South America and southwestern Africa, as shown on the map below. No *Mesosaurus* fossils have been found anywhere else in the world. What could explain the existence of *Mesosaurus* fossils only in eastern South America and southwestern Africa?



Areas where Mesosaurus fossils have been found

3. Continental drift is still occurring today. For example, the western part of California moves north along the San Andreas fault at a rate of about 3.4 centimeters per year. Examine a map and find where the western part of California will be in 100 million years. How might that location affect the types of organism that now live in the western part of California? (Assume that the climate of the new location will be the same in 100 million years as it is today.)