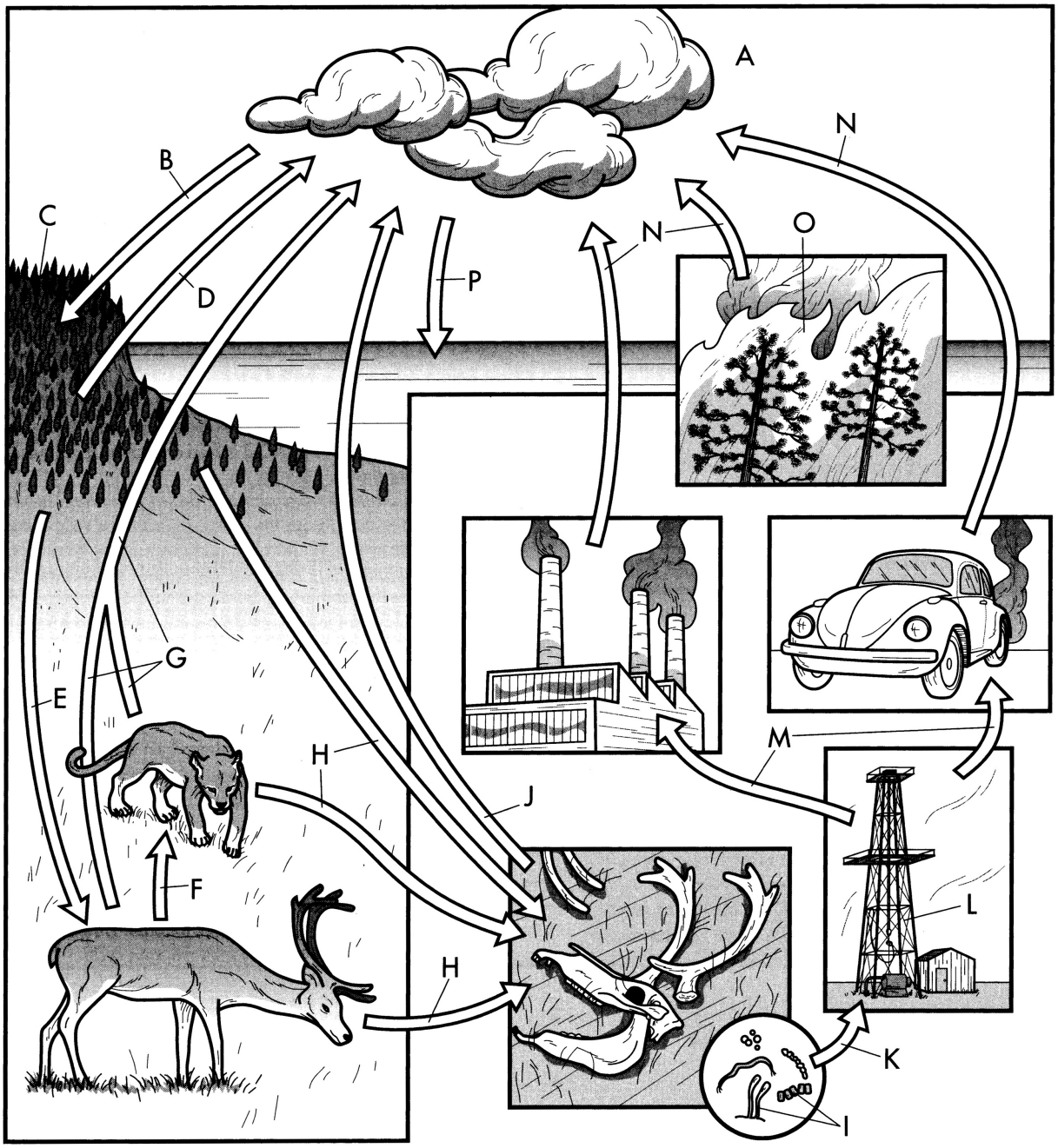
Carbon Cycle Diagram

Name:

Period:



The Carbon Cycle

- ○ Atmosphere .....A
- ○ Photosynthesis .....B
- ○ Forest C
- ○ Respiration in Plants..D
- ○ Plant Consumption.....E
- ○ Animal Consumption ....F
- ○ Respiration in Animals.....G
- ○ Decay.....H
- ○ Detritus Feeders I
- ○ Respiration in Detritus Feeders.....J
- ○ Conversion to Fossil Fuel .....K
- ○ Fossil Fuel Processing L
- ○ Uses for Fossil Fuel ..M
- ○ Products of Combustion .....N
- ○ Forest Fire.....O
- ○ Exchange with Oceans ..P

diagram from The Princeton Review Biology Coloring Book (1998) by I. Edward Alcamo

Practice: 9 points, Assessment: 4 points

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Follow the directions below to color-code the diagram and to answer the questions. Use colored pencils, and check off each box ☑ as you finish that part of the instructions.

For this exercise, you will be seeing how carbon appears in different forms throughout the carbon cycle.

You have learned that the element carbon (C) can show up in different ways and in different places in and around Earth. Carbon atoms can be part of both living things (like penguins) and nonliving things (like rocks). The pictures in this diagram represent a variety of forms that contain carbon atoms, and the arrows show how carbon can move from one form to another.

1. Let's start with Earth's atmosphere, the largest reservoir of carbon on or around our planet. This is where we find carbon as part of the molecule carbon dioxide (CO_2), a gas. Leave the clouds white, but color the sky light blue □ . In the key, color the little circle next to "Atmosphere" light blue as well □ .

In each molecule of gas of carbon dioxide (CO_2), how many atoms of carbon are there?

2. Atoms of carbon are changed from being part of gas molecules to being part of solid molecules through the process of photosynthesis. When plants (producers) convert carbon dioxide (CO_2) into glucose ($C_6H_{12}O_6$), the carbon dioxide molecules get pulled apart, and glucose molecules are made from the loose atoms.

How many molecules of carbon dioxide (CO_2) would be needed to have enough carbon atoms to make a molecule of glucose ($C_6H_{12}O_6$)?

3. Color the arrow labeled B dark green □ . In the key, color the little circle next to "Photosynthesis" dark green as well □ . Next, color the trees (C) and grass using light green □ . In the key, color the little circle next to "Forest" dark green as well □ .

How does carbon get from the atmosphere (which is abiotic) into plants (which are biotic)?

4. When any living thing goes through cellular respiration, its cells are turning fuel into energy. A gas is made as "exhaust" during this process. The gas is then released back into the atmosphere. Use light brown to color the arrow labeled D □ . In the key, color the little circle next to "Respiration in Plants" light brown as well □ .

What gas is released back into the atmosphere by plant cells doing cellular respiration?

5. When an animal eat plants (as primary consumers), whatever carbon was in the plant gets moved into the animal. Color the deer using colors to make it look realistic □ . Color the arrow labeled E yellow □ . In the key, color the little circle next to "Plant Consumption" yellow as well □ . The body of the animal will then break down the plant material and move the carbon to its cells to use in cellular respiration.

turn over for more questions

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6. Does an animal prefer its carbon to come from meat instead of plants? Secondary consumers (carnivores) like the mountain lion get carbon atoms into their bodies by eating the cells of their prey. Color the mountain lion using colors to make it look realistic □ . Color the arrow labeled F yellow □ . In the key, color the little circle next to "Animal Consumption" yellow as well □ . Just like in the deer, carbon atoms are moved from the cells of the food to the cells of the consumer. There, carbon atoms are again available for cellular respiration. As before, during the process of cellular respiration, some of the carbon atoms are converted to an "exhaust" gas. The gas is then released back into the atmosphere. Use light brown to color the arrow labeled G □ . In the key, color the little circle next to "Respiration in Animals" light brown as well □ .

What gas is released back into the atmosphere by animal cells doing cellular respiration?

7. Eventually, animals (and plants) die. If their bodies have not been eaten, they rot (decay). Their cells break apart and become part of the soil. The carbon atoms have now moved from biotic organisms to abiotic soil. Use yellow to color the arrows labeled H □ . In the key, color the little circle next to "Decay" yellow as well □ . Use grey to color the bones □ , and brown to color the soil around the bones.

How does carbon get from animals and plants (which are biotic) into soil (which is abiotic)?

8. Tiny animals in the soil break apart the decaying animal and plant cells. These decomposers turn the fuel they eat into energy, using cellular respiration. This means that they are also releasing carbon into the atmosphere, just as the plants and other animals did. Use light brown to color the arrow labeled J □ . In the key, color the little circle next to "Respiration in Detritus Feeders" light brown as well □ .

What gas is released back into the atmosphere by the cells of detritus feeders doing cellular respiration?

9. Over a very long time, the carbon in soil is turned into fossil fuels like oil, coal, and natural gas. Use yellow to color the arrow labeled K □ . In the key, color the little circle next to "Conversion to Fossil Fuel" yellow as well □ . People then remove fossil fuels from the ground, and turn them into a form that we can use in the engines of cars and factories. Use yellow to color the arrows labeled M □ . In the key, color the little circle next to "Uses for Fossil Fuel" yellow as well □ . Just like cells doing cellular respiration, the engines that use fossil fuels create an exhaust. Use light brown to color the arrows labeled N □ . In the key, color the little circle next to "Products of Combustion" light brown as well □ . Color the exhaust from the factory and from the car light brown □ . Color the factory and car with colors that make them look realistic □ .

Some of the exhaust of engines is made of exactly the same gas created during the process of cellular respiration. What is this gas which is released back into the atmosphere?

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10. Cellular respiration is not the only way that carbon can be released back into the atmosphere. When trees and plants burn up during forest fires, the carbon that was in their cells turns into smoke and gases. The carbon atoms in this material then rejoins the atmosphere. Use light brown to color the arrow labeled N □ . In the key, color the little circle next to "Products of Combustion" light brown as well □ . Color the picture of the forest fire using colors that make it appear realistic □ .

How is a forest fire like cellular respiration?

11. Carbon atoms also move around in the oceans. Animals with shells (like snails, clams, and coral) are able to take carbon atoms from carbon dioxide in the water and combine the carbon with atoms of calcium to make their shells. Over time, the shells decay, releasing the carbon back into the water, where it eventually may enter the atmosphere again. Use dark blue to color the arrow labeled P □ . In the key, color the little circle next to "Exchange with Oceans" dark blue as well □ . Color the ocean blue □ .

Scientists are discovering that the world's oceans are becoming more acidic. As this happens, shells of marine organisms are beginning to break down much more quickly. How could shells dissolving possibly affect the amount of carbon in the atmosphere ?

As the world's oceans become more acidic, would you expect Earth's atmosphere to become warmer or cooler? Explain your answer.

Practice: 9 points, Assessment: 4 points