Instructions

Read the information in each section carefully. The goal is to understand two important, but very different, processes in nature. Answer the questions that follow each section to test your knowledge. You can check your work with the answer key at the very end.

Part 1: How Trees Clean the Air

Have you ever thought about how a tiny seed grows into a giant tree? It doesn't eat food like we do, so where does it get its building blocks? The answer is that trees perform an amazing chemical reaction called **photosynthesis**. Think of a tree's leaf as a tiny, solar-powered factory.

This factory takes in three main ingredients:

- **Sunlight:** The energy source, like electricity for the factory.
- **Water (H_2O):** Sucked up from the ground through the tree's roots.
- **Carbon Dioxide (CO_2):** A gas that the tree breathes in from the air through tiny pores in its leaves.

Inside the leaf, a green substance called **chlorophyll** (which is what makes leaves green!) uses the sun's energy to convert the water and carbon dioxide into two new things. The first is a sugar called **glucose**, which is the tree's food. It uses this food to grow bigger and stronger. The second is **oxygen (O_2)**, which the tree releases back into the air as a waste product. It's the very same oxygen we need to breathe!

But what happens to the carbon from the carbon dioxide? It doesn't just disappear. The tree uses it as a primary building block. It locks the carbon away in its wood, bark, leaves, and roots. This process of storing carbon is called **carbon sequestration**. By taking CO_2 out of the atmosphere and locking it into its own body, a tree helps to reduce the amount of carbon in the air, which is a big help in fighting climate change.

Activity 1A: Fill in the Blanks

Use the words from the word bank below to complete the sentences. Each word is used only once.

Word Bank: photosynthesis, carbon dioxide, oxygen, chlorophyll, glucose, sunlight

1. The process trees use to make their own food is called _____.
2. The green pigment in leaves that captures energy from the sun is _____.
3. Trees take in a gas from the air called _____ to use as a building block.
4. The energy source that powers this entire process is _____.
5. After the process is complete, trees release a gas called _____ that animals need to breathe.
6. The sugar that a tree creates to feed itself is called _____.

Activity 1B: Quick Questions

1. Besides making oxygen for us to breathe, what is the other major way that photosynthesis helps the environment?

   _____

   _____

2. If a tree's leaves were not green, it would probably have a hard time surviving. Why?

_____

_____

Part 2: Forest Fires - Nature's Housekeepers

We usually think of forest fires as terrible disasters, and when they are too big and threaten homes, they certainly are. However, for thousands of years, smaller, naturally occurring fires (often started by lightning) have been a healthy and necessary part of a forest's life cycle. Many ecosystems actually depend on fire to stay healthy.

Here’s why some fires are helpful:

- **Clearing the Floor:** Fires burn up dead leaves, fallen branches, and thick, shrubby **underbrush** on the forest floor. This gets rid of old debris and makes room for new seeds and grasses to grow.
- **Returning Nutrients:** The ash left behind after a fire is rich in **nutrients** like potassium and calcium. This ash acts like a natural fertilizer, enriching the soil for the plants that grow back.
- **Helping Seeds Sprout:** Some trees, like the Jack Pine and Giant Sequoia, have cones that are sealed shut with a strong resin. The intense heat of a fire is the only thing that can melt the resin and allow the cones to open, releasing their seeds onto the newly cleared and fertilized ground. This is called heat-induced **germination**.
- **Preventing Bigger Fires:** When small fires regularly clear out the underbrush, they prevent a massive buildup of fuel. Without these small "housekeeping" fires, dead wood can pile up for decades, leading to the possibility of a much larger, hotter, and more destructive megafire later on.

Activity 2A: Matching

Match the term on the left with its correct definition on the right. Write the letter of the definition in the blank.

1. _____ Underbrush A. The process of a seed beginning to sprout and grow.

2. _____ Nutrients B. The layer of dead leaves, twigs, and small shrubs on the forest floor.

3. _____ Germination C. Substances in the soil that act like food for plants.

Activity 2B: Critical Thinking

For many years, the policy in most forests was to put out every single fire as quickly as possible. Based on what you just read, what is one negative consequence this policy might have had on the forest ecosystem?

_____

_____

_____

Answer Key

Part 1: How Trees Clean the Air

Activity 1A: Fill in the Blanks

1. photosynthesis
2. chlorophyll
3. carbon dioxide
4. sunlight
5. oxygen
6. glucose

Activity 1B: Quick Questions

1. It helps the environment by taking carbon dioxide out of the atmosphere and storing (sequestering) the carbon in the tree's wood, roots, and leaves. This helps reduce gases that contribute to climate change.
2. The green color comes from chlorophyll. Without chlorophyll, the tree could not capture energy from the sun to perform photosynthesis and make its own food.

Part 2: Forest Fires - Nature's Housekeepers

Activity 2A: Matching

1. **B**
2. **C**
3. **A**

Activity 2B: Critical Thinking

(Acceptable answers will mention one or more of the following points):

- It could lead to a massive buildup of fuel (dead leaves, branches, etc.) on the forest floor, which could cause a much larger and more destructive fire in the future.
- Trees like the Jack Pine would not be able to reproduce because their cones need the heat from a fire to open and release their seeds. Over time, these types of trees could disappear from the forest.
- The soil would not be replenished with nutrients from ash, making it harder for new plants to grow.
- The forest floor would become too crowded with underbrush, choking out sunlight and space for new seedlings.