The Carbon Cycle and the Nitrogen Cycle

Overview:

Students will learn that the element carbon (C) is taken from the atmosphere by plants through a process called photosynthesis. Animals, including humans, get carbon by eating plants or eating animals that have eaten plants. Carbon is an element found in all living things and those that have died.

Nitrogen (N) is an element found in all living things (plants and animals). It is also an important part of non-living things like the air above (atmosphere) and the soil below. Nitrogen atoms move slowly between living things, dead things, the air, soil, and water.

Materials:

- Sentence frames
- Paper
- Pencils
- Visual aids of the photosynthesis formula, nitrogen cycle, and carbon cycle
- Large poster board for each group

On the Board:

- Vocabulary
- Student Reflection Questions

Suggested Snack:

- Seasonal produce from the garden

Objectives:

At the end of the lesson students will be able to:

- **Describe** photosynthesis in simple language.
- **Identify** what items on earth produce carbon.
- **Explain** why nitrogen is important for living things.
- **Draw** a graphic of the carbon or nitrogen cycle in the garden.
- **Predict** what will happen when there is too much carbon dioxide in the air.

Preparation:

- Make large, poster-sized copies of the photosynthesis formula, nitrogen cycle, and carbon cycle.

Vocabulary:

- respiration
- precipitation
- cycle
- atoms
- photosynthesis
- decay
- decompose
- fossil fuels
- greenhouse gas

Learning Activities:

1. Warm-Up (5 min.)
   A. Tell students what today's lesson will cover. Show them the photosynthesis formula and have them explain it in simple language.
   B. Ask them if they remember that when making a compost pile, we include both plants with nitrogen (kitchen scraps) and plants with carbon (straw, wood, chips, paper) so that the soil will be healthy and ready to grow new plants (and worms).

2. Presentation (10 min.)
   A. Ask students to define a "cycle." Then, show them the poster of the Nitrogen Cycle and ask one-two students to explain it to the class.
   B. Show them a poster of the Carbon Cycle and ask one-two students to explain it to the class.
   C. Tell students that carbon is in decaying/decomposing plants. When it is combined with oxygen, it creates carbon dioxide. Carbon dioxide is a "greenhouse gas." When we have a lot of greenhouse gases in the atmosphere, a layer that protects the earth, called the ozone layer, becomes depleted. This is why we have global warming.

3. Garden Activity (20 min.)
   A. Divide students into groups of four and take them into the garden.
   B. Hand out one large poster board to each group.
   C. Assign half of the groups to draw the Nitrogen Cycle and the other half to draw the Carbon Cycle.
   D. Bring students back into the classroom to share their graphics with their classmates.

4. Snack (5 min.)
   A. Serve seasonal produce from the garden.

5. Reflection (5 min.)
   A. Have students answer the Reflection Questions in their garden journals.

Student Reflection Questions:

1. How is carbon taken from the atmosphere?
   - **photosynthesis**
2. Where in the garden is there evidence of the carbon cycle?
   - **dead vegetation, N-organic matter, wood chips, live plants, or those just picked**

Assessment Questions:

1. Describe the carbon cycle and nitrogen cycle in your own words. Why are they important for life on earth?

Standards:

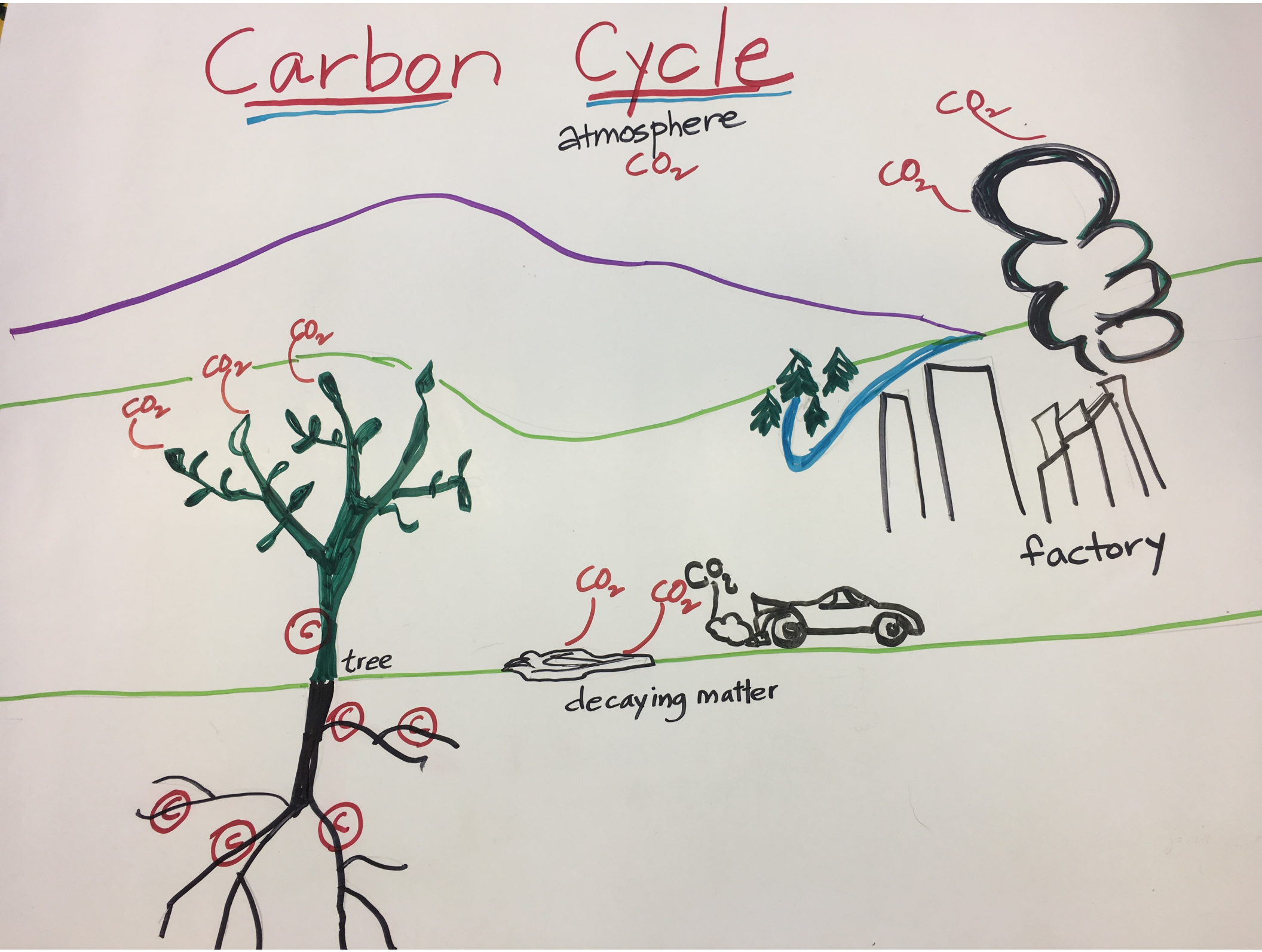
Next Generation Science Standards

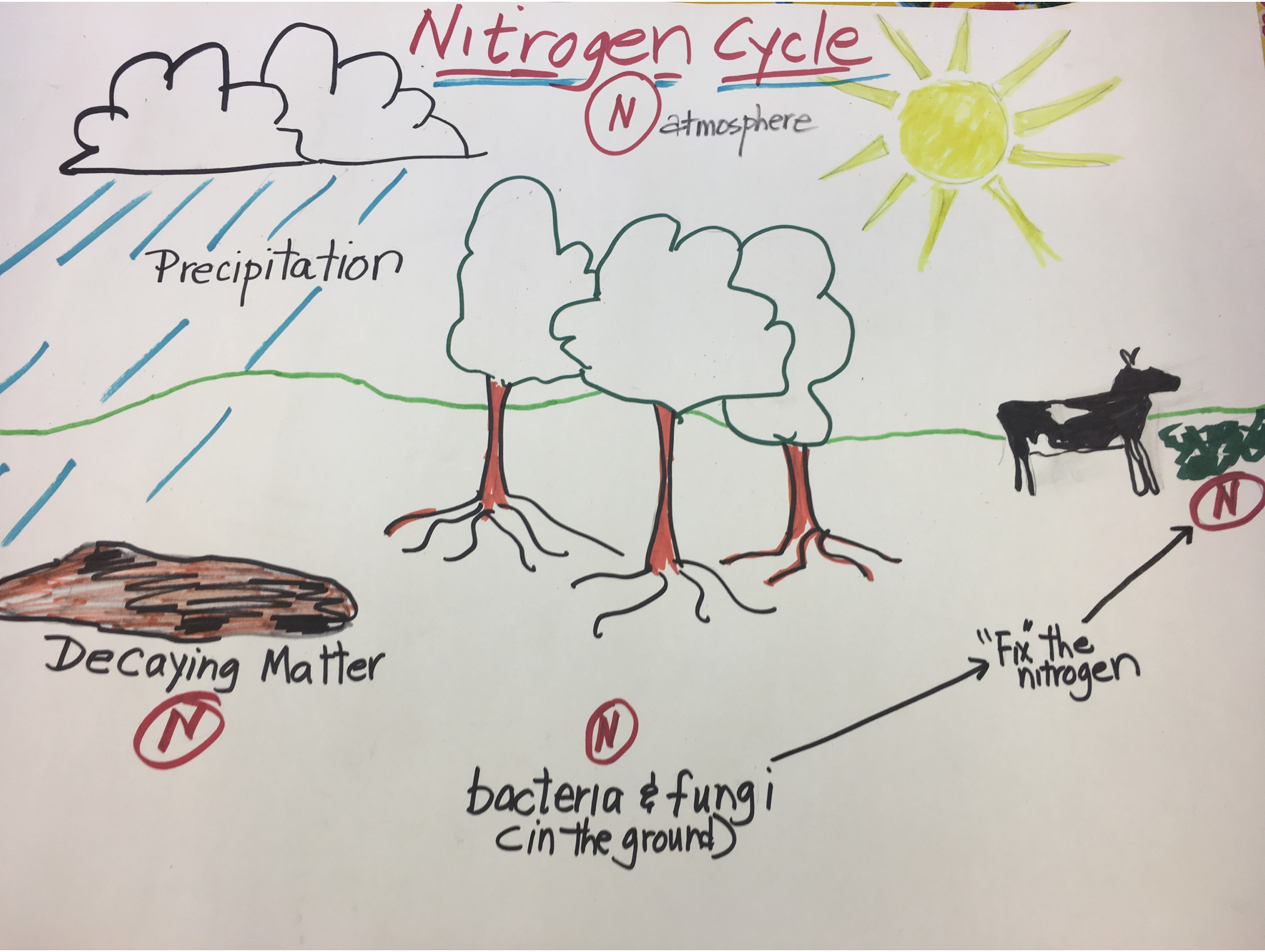
NGSS-DCI Disciplinary Core Idea

- MS-LS1-7

Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Carbon Cycle




Nitrogen Cycle
N
atmosphere
Precipitation
Decaying Matter
N
N
bacteria & fungi
(in the ground)
"Fix" the
nitrogen
N

The Photosynthesis Formula